Works Approval Application Supporting Document

Mulga Downs Iron Ore Mine – Western Australia

Environmental Protection Act 1986 – Division 3, Part V

Mulga Downs Iron Ore Pty Ltd
ACN 080 659 150

3 February 2026

[redacted]

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1 Introduction

This document provides information to support Mulga Downs Iron Ore's (MDIO or the Applicant) application for a works approval under Division 3, Part V of the *Environmental Protection Act 1986* (EP Act) for the construction and time limited operation of the Mulga Downs Iron Ore Mine (MDIOM).

1.1 Background

MDIO is proposing to develop the MDIOM located approximately 210 km south of Port Hedland and 180 km north-west of Newman in the Pilbara Region of Western Australia (Map 1 in Attachment 2). The MDIOM will produce up to 12 million tonnes per annum (Mtpa) of iron ore and have an operational life of approximately 18 years. The MDIOM is a new asset that will contribute to maintaining the supply of iron ore product for Hancock Prospecting Pty Ltd (HPPL) customers through port facilities located at Port Hedland.

1.2 Purpose and Scope

This document, together with the completed Department of Water and Environmental Regulation (DWER) Application Form, constitutes the Works Approval Application pursuant to Division 3, Part V of the EP Act. Table 1-1 provides an overview of the Application Form supporting attachments and the relevant sections of this document that address each item.

Table 1-1 Information relevant to the application

Section in Application	Where information is presented
Attachment 1A: Proof of occupier status	Pending
Attachment 1B: ASIC company extract	Yes
Attachment 1C: Authorisation to act as a representative of the occupier	Not applicable
Attachment 2: Premises map/s	Yes
Attachment 3A: Environmental commissioning plan	Not applicable
Attachment 3B: Proposed activities	Section 2
Attachment 3C: Map of area proposed to be cleared (only applicable if clearing is proposed)	Not applicable
Attachment 3D: Additional information for clearing assessment	Not applicable
Attachment 4: Marine surveys (only applicable if marine surveys included in application)	Not applicable
Attachment 5: Other approvals and consultation documentation	Yes
Attachment 6A: Emissions and discharges	Section 3
Attachment 7: Siting and location	Section 4
Attachment 8: Additional information submitted	Yes
Attachment 8A: HanRoy's Environmental Policy	-
Attachment 8B: Process Flow Diagram	-
Attachment 8C: Crusher Pads Drawings	-
Attachment 8D: Landfill Drawings	-
Attachment 8E: Bulk fuel storage drawings	-
Attachment 8F: Conceptual Erosion and Sediment Control Plan	-

Section in Application	Where information is presented
Attachment 8G: Sedimentation Basin Drawings	-
Attachment 8H: Environmental Compliance Standards	-
Attachment 8I: Water Management Plan	-
Attachment 8J: Turkey Nest Design	
Attachment 8K: Groundwater Operating Strategy	-
Attachment 8L: Community Noise Monitoring	-
Attachment 8M: Air Quality Assessment	-
Attachment 9: Category-specific checklist(s)	Not applicable
Attachment 10: Proposed calculation fee	Yes
Attachment 11: Request for exemption from publication	Not applicable

1.3 Prescribed Premises Categories

The MDIOM comprises the following prescribed premises categories and throughput production/design capacities (Table 1-2), as listed in Schedule 1 of the Environmental Protection Regulations 1987 (EP Regulations).

Table 1-2 Prescribed premises categories applicable to the MDIOM

Category	Description	Production/design capacity threshold	MDIOM production/ design capacity
12	Screening etc. of material: premises (other than premises within category 5 or 8) on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated.	50,000 tonnes or more per year	3,504,000 tonnes per year (at rate of 400 tonnes per hour)
5	Processing or beneficiation of metallic or non-metallic ore: premises on which - a) metallic or non-metallic ore is crushed, ground, milled or otherwise processed; or b) tailings from metallic or non-metallic ore are reprocessed; or c) tailings or residue from metallic or non-metallic ore are discharged into a containment cell or dam.	50,000 tonnes or more per year	12,000,000 tonnes per year
6	Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore.	50,000 tonnes or more per year	12,000,000 tonnes per year
54	Sewage facility: premises — a) on which sewage is treated (excluding septic tanks); or b) from which treated sewage is discharged onto land or into waters.	100 m^3 or more per day	137 m^3 per day
57	Used tyre storage (general): premises (other than premises within category 56) on which used tyres are stored.	100 tyres or more	6,000 tyres
64	Class II or III 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.	20 tonnes or more per year	5,000 tonnes per year

Category	Description	Production/design capacity threshold	MDIOM production/ design capacity
73	Bulk storage of chemicals etc.: premises on which acids, alkalis or chemicals that — a) contain at least one carbon to carbon bond; and b) are liquid at STP (standard temperature and pressure), are stored.	1,000 m^3 in aggregate	2,106 m^3
85B	Water desalination plant: premises at which salt is extracted from water if wastewater is discharged onto land or into waters (other than marine waters)	0.50 GL or more per year	0.05 GL per year

Note: the proposed water desalination plants are below the production/design capacity threshold for category 85B set in the EP Regulations. However, the filter media backwash and reject water that will be produced as part of the RO process will be mixed with the treated wastewater to decrease the salinity level prior to discharging over the irrigation spray field as part of the category 54 activities.

1.4 Applicant Details

The applicant for this works approval application is Mulga Downs Iron Ore Pty Ltd (ACN 080 659 150) (MDIO). MDIO's details are shown in Table 1-3 and the Australian Securities & Investments Commission (ASIC) company extract is contained in Attachment 1B.

HPPL, the parent company of MDIO, is an independent, privately owned Australian company that has a long history within the iron ore sector and Pilbara region of Western Australia. HPPL holds retention, exploration and miscellaneous tenements located across the Mulga Downs Pastoral Station and adjacent land in the Central Pilbara region. HPPL has been exploring the tenements held across the Mulga Downs Pastoral Station, and adjacent Mt Florance and Hooley Station Pastoral Stations, since the late 2000s and is currently in the process of applying to convert relevant Mulga Downs project tenure into a mining lease.

HanRoy Iron Ore Projects Pty Limited (HanRoy) is the HPPL subsidiary that undertakes project development activities on behalf of HPPL group companies, including development of the Mulga Downs mine. HanRoy undertakes all project development activities in accordance with its Environmental Policy provided in Attachment 8A. In accordance with this policy, HanRoy will develop an Environmental Management System (EMS) for the Mulga Downs mine that aligns with that of HPPL's operating divisions and the requirements of ISO 14001. The EMS will provide a structured, strategic approach to environmental management, and ensure environmental risks and issues are identified and managed, and regulatory obligations are met in accordance with the HanRoy Environment Policy.

Both HanRoy and MDIO (HPPL) are committed to minimising potential harm to the natural environment, local visual amenity and biodiversity, as well as preventing pollution whilst implementing its activities.

Table 1-3 Applicant details

Detail	Response
Applicant	Mulga Downs Iron Ore Pty Ltd
ACN	ACN 080 659 150
Registered business address	28-42 Ventnor Ave, West Perth WA 6005

[redacted]

1.5 Premises Details

The premises details are provided in Table 1-4 and the prescribed premises boundary is shown on Map 2 in Attachment 2.

Table 1-4 Premises details

Detail	Response
Premises name	Mulga Downs Iron Ore Mine
Site description	As defined by the prescribed premises boundary shown on Map 2 in Attachment 2.
Site address	Not applicable
Occupier status	Tenement holder
Local Government Authority	Shire of Ashburton

1.5.1 Murray's Hill Project

Murray's Hill was referred to the Environmental Protection Authority (EPA) in 2013 (reference 13-0000243207). Murray's Hill is a stand-alone, 5 Mtpa direct shipping ore (DSO) mine with a life of up to five years (including decommissioning and rehabilitation) proposed by HPPL, which involves only the above water table mining portion of the Murray's Hill pit, crushing and screening, associated mining infrastructure, accommodation camp and roads.

The EPA's decision was that the proposal did not require environmental assessment under Part IV of the EP Act as it was unlikely to result in a significant effect on the environment.

HPPL has applied for a works approval from DWER for the construction of the mine (category 12: Screening etc. of material) and establishment of a wastewater treatment plant (WWTP) at the proposed accommodation camp (category 54: Sewage facility). The works approval has been assessed by DWER and is pending confirmation of tenure before it can be granted.

The works approval prescribed premises boundary for Murray's Hill is within the premises boundary for the MDIOM. However, MDIO will be the holder of both approvals, and it is expected that both activities will operate under one common licence post construction, commissioning and time-limited operations under the separate works approvals.

1.6 Occupier Status

The MDIOM is located within the following tenements and leases which are held by HPPL or one of a series of wholly owned subsidiary companies (Table 1-5). The tenements have been granted or are pending under the *Mining Act 1978*.

Table 1-5 Tenement holder details

Tenement	Tenement Holder	HPPL Stake	Area (ha)
Live			
R 47-12-I	Mulga Downs Iron Ore Pty Ltd	100%	22,186.41
L 45/380	Mulga Downs Investments Pty Ltd Mulga Downs Iron Pty Ltd	100%	1,785.65
L 45/383	Mulga Downs Iron Ore Pty Ltd	100%	1,091.83
L 45/384	Mulga Downs Iron Ore Pty Ltd Mulga Downs Investments Pty Ltd	100%	397.23
L 45/769	Mulga Downs Iron Ore Pty Ltd	100%	505.33
Pending			
M47/1621 (pending)	Mulga Downs Iron Ore Pty Ltd	100%	22,186.41
G 45/358 (pending)	Mulga Downs Iron Ore Pty Ltd	100%	654.57
L 45/652 (pending)	Mulga Downs Iron Ore Pty Ltd	100%	2,331.24
L 45/654 (pending)	Mulga Downs Iron Ore Pty Ltd	100%	904.81
L 45/655 (pending)	Mulga Downs Iron Ore Pty Ltd	100%	815.42
L 45/687 (pending)	Mulga Downs Iron Ore Pty Ltd	100%	511.49
L 45/823 (pending)	Mulga Downs Iron Ore Pty Ltd	100%	50.08

Evidence of the above tenure will be provided to DWER when available.

1.7 Other Approvals

The following sections provide information regarding the other approvals relevant to the MDIOM.

1.7.1 Environmental Assessments and Approvals – Commonwealth Legislation

The MDIOM has been separately referred as a Proposed Action for assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (reference EPBC 2022/09255). The Proposed Action referred under the EPBC Act and being assessed by the Commonwealth Department of Climate Change, Energy, Environment and Water (DCCEEW) is different to the MDIOM in that it includes the Murray's Hill Project (refer to Section 1.5.1).

The design of the Proposed Action has been altered throughout the assessment process, based on the outcomes of consultation and assessment of potential environmental impacts. In addition to changes to construction elements to reduce potential impacts, amendments to operational activities also occurred because of ongoing studies and investigations.

After the referral to DCCEEW, HPPL applied under Section 156A (s156A) of the EPBC Act in March 2023 to 'vary a Proposed Action during assessment' to modify (reduce) the Proposed Action Area and Disturbance Footprint, and to refine and amend various aspects of the Proposed Action. A second s156A application was submitted to DCCEEW in December 2023 for the removal of the Mulga West Borefield and associated pipeline access road. A third s156A application was submitted to DCCEEW in September 2024 to reduce the scale of the mine to 12 Mtpa dry Direct Shipping Ore (DSO), which is consistent with this works approval application.

The above variations have been approved by DCCEEW and have resulted in an overall reduction in the Proposed Action Area and Disturbance Footprint required for the Proposed Action, with reduced impacts to Matters of National Environmental Significance (MNES).

1.7.2 Environmental Impact Assessment – Referral and Assessment of Proposals

The MDIOM was referred to the EPA in December 2021. On 24 February 2022, the EPA determined the proposal should be assessed at a Public Environmental Review (PER) level of assessment with a 6-week public review period. A proponent prepared Environmental Scoping Document (ESD) was submitted and approved by the EPA on 24 August 2022.

Since referral of the MDIOM in 2021, HPPL has continued to refine and develop the design of the MDIOM and has undertaken additional environmental studies to support the impact assessment. This refinement has resulted in applications made under Section 43A (s43A) of the EP Act to amend aspects of the proposal and reduce the overall environmental impact. These applications include:

- Application submitted on 15 March 2023 to reduce the overall extent of the Development Envelope and Indicative Footprint. This application was approved on 29 May 2023.
- Application submitted in December 2023 to remove the Mulga West Borefield. This application was approved on 23 February 2024.
- Application submitted on 12 September 2024 to reduce the scale of the Proposal from a 20 Mtpa mine to a 12 Mtpa Direct Shipping Ore (DSO) mine. This application was approved on 4 October 2024.

The EPA has identified the following preliminary key environmental factors for the proposal:

- Inland waters;
- Subterranean fauna;
- Flora and vegetation;
- Terrestrial fauna;
- Terrestrial environmental quality;
- Greenhouse gas emissions;
- Air quality; and
- Social surroundings (including Aboriginal heritage).

HPPL has prepared an Environmental Review Document (ERD) for the proposal, which was published for public review from 17 April 2025 to 2 June 2025[1]. The proposal is currently under assessment by the EPA, including consideration of submission received during the public review period and HPPL's response to them. The EPA's assessment report for the proposal is expected to be published on its website in late January 2026.

1.7.2.1 Risk Pathways Regulated under Part IV of the *Environmental Protection Act 1986*

If approved under Part IV of the EP Act, the Ministerial Statement (MS) that will be issued for the MDIOM will set out the conditions and procedures that HPPL must adhere to during project implementation to ensure that

[1] Mulga Downs Iron Ore Mine | EPA Western Australia

the residual risk associated with the proposed activities will be adequately mitigated so that the EPA's objectives can be met.

Table 1-6 outlines the risk pathways that HPPL expects will be regulated under Part IV of the EP Act and where the conditions and procedures outlined in the MS will provide the primary controls. These aspects, therefore, have not been considered further in this works approval application.

Table 1-6 Risk pathways regulated under Part IV of the EP Act

Environmental factors	Risk pathway	Aspects regulated under Part IV EP Act
Terrestrial environmental quality	Contamination of soils resulting from generation of acid and/or metalliferous drainage, oxidation from acid sulphate soils, chemicals and hydrocarbons, seepage of landfill leachate, sedimentation resulting from erosion and redistribution of asbestos containing material (ACM) that is present from historical anthropogenic activities.	EPA Objective: To maintain the quality of land and soils so that environmental values are protected. HPPL assessment: Environmental Review Document (ERD) Section 11. Aspects: Construction, operation, care and maintenance and closure.
Inland waters	Modification of the existing hydrological regime, by increasing or reducing water availability within the downstream environment. Modification of the physical water quality (i.e., suspended sediments) in the downstream environment resulting in increased sediment loads to the Fortescue Valley (including claypans and pools). Modification of the chemical water quality (for example hydrocarbon pollution) resulting in contamination of local waterways and the Fortescue Valley. Modification of groundwater level/quality through dewatering and Managed Aquifer Recharge (MAR).	EPA objective: To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected. HPPL assessment: ERD Section 7. Aspects: Construction, operation, care and maintenance and closure.
Subterranean fauna	Excavation of the mine pits (including some proposed borrow pit areas) and MAR leading to mounding resulting in loss of troglofaunal habitat and species. The excavation of pits, groundwater drawdown and changes to groundwater salinity (quality) as a result of the dewatering and MAR resulting in loss of stygofauna habitat, reduction in qualify of habitat and loss of species.	EPA Objective: To protect subterranean fauna so that biological diversity and ecological integrity are maintained. HPPL assessment: ERD Section 8. Aspects: Construction, operation, care and maintenance and closure.
Flora and vegetation	Clearing of vegetation resulting in loss of native vegetation, loss of conservation significant vegetation communities and loss of conservation significant flora.	EPA Objective: To protect flora and vegetation so that biological diversity and ecological integrity are maintained. HPPL assessment: ERD Section 9. Aspects: Construction, operation, care and maintenance and closure.

Environmental factors	Risk pathway	Aspects regulated under Part IV EP Act
Terrestrial fauna	Loss of fauna individuals (collision and entrapment) resulting from ground disturbance, vehicle strike (including heavy haulage vehicles), machinery, infrastructure and mining operations. Loss of fauna habitat resulting from clearing for ore extraction, construction and operation (mining infrastructure) – this includes clearing of vegetation and removal of landforms (caves, ridges).	EPA Objective: To protect terrestrial fauna so that biological diversity and ecological integrity are maintained. HPPL assessment: ERD Section 10. Aspects: Construction, operation, care and maintenance and closure.

1.7.3 *Mining Act 1978* – Mining Development and Closure Proposal

The *Mining Act 1978* (Mining Act) requires that, prior to undertaking any activity for the purposes of, or in preparation for, mining operations or carrying out mining operations on a tenement granted under the Mining Act, the activity must be included in a Mining Development and Closure Proposal (MDCP) for approval by the Department of Mines, Petroleum and Exploration (DMPE) and recorded on an Approvals Statement. Activities must be undertaken in accordance with the Approvals Statement. Accordingly, HPPL is preparing a MDCP in accordance with DMPE guidance.

The MDCP includes detailed information regarding:

- The proposed mining operations to be carried out;
- The decommissioning of any proposed mine to which the mining development and closure proposal relates;
- The rehabilitation of the land subject of the mining tenement to which the mining development and closure proposal relates;
- The closure outcomes; and
- Any prescribed information.

It is expected that HPPL will submit the MDCP to DMPE in the first quarter of 2026.

1.7.4 Water Abstraction and Use

HPPL holds existing approvals under the *Rights in Water and Irrigation Act 1914* (RiWI Act) and will be required to obtain further approvals for water supply and dewatering activities at the MDIOM. These include approvals to:

- Commence, construct, enlarge, deepen or alter groundwater wells (26D licence);
- Take water from a watercourse, well, and or, underground source (5C licence);
- Interfere or obstruct the bed and banks of a watercourse or wetland.

The status of groundwater licences held by HPPL or under assessment by DWER are shown in Table 1-7.

Table 1-7 Groundwater licences

Licence no.	Status	Application date	Granted date	Expiry date	Purpose	Tenements	Allocation (kL/year)
GWL 167239	Active	-	25/10/2020	25/10/2030	General camp, mineral exploration activities	R47/12	99,000
GWL 176596	Active	-	25/10/2020	25/10/2030	Dust suppression for earthworks and construction purposes, exploration drilling operations, mineral exploration activities	R47/12. E47/12	95,000
72165	Under assessment	12/06/2025	-	-	Dewatering, mining, dust suppression, mine camp	R47/12, M47/1621	12,000,000
72165	Under assessment	12/06/2025	-	-	Dewatering, mining, dust suppression, mine camp	R47/12, M47/1621	

1.7.5 Dangerous Goods

HPPL will require various approvals under the *Dangerous Goods Safety Act 2004* and associated regulations administered by the Department of Local Government, Industry Regulation and Safety (DLGIRS), including:

- Dangerous goods site licence for the storage and handling of fuel and chemicals associated with the MDIOM, if the storage quantities exceed the manifest quantities; and
- Dangerous goods site licence – explosives (storage) licences for the storage of explosives (e.g., ammonium nitrate and emulsions).

Dangerous good approvals will be sought prior to commencement of construction and/or operations at the MDIOM.

1.8 Stakeholder Consultation

The following sections provide information regarding the consultation carried out with parties considered to have a direct interest in the MDIOM (i.e., interested parties or persons who are directly affected by the project).

1.8.1 Overview of Stakeholder Engagement Strategy

HPPL has actively engaged in stakeholder consultation throughout the planning of the MDIOM, which will continue through the detailed design, construction and time limited and full operational phases. The methods of consultation vary depending on the forum, subject matter and purpose. The main forms of communication associated with the MDIOM are:

- Broad briefings and presentations;

- HPPL and stakeholder meetings and discussions, including those undertaken on HPPL's behalf by consultants;
- Environmental risk workshops;
- Written communications, distribution of updates and brochures;
- Specific native title discussions and briefings to Traditional Owners;
- Telephone discussions; and
- Distribution of environmental documentation.

The generalised strategies for engagement with key stakeholder groups are summarised below:

- Government agencies: ensure environmental acceptability (as determined through EP Act and EPBC Act) and meet the requirements of various regulatory approvals and legislation managed by various government agencies;
- Native Title groups: consultation to protect heritage, understand potential impacts on social surroundings, participation in planning of the MDIOM to avoid or minimise potential impacts, compensation for impairment of rights and interests to land, participation in environmental surveys, employment opportunities and involvement;
- Pastoralists: management of access, planning to minimize disturbance to pastoral operations, compensation for identified and proposed activity losses, future land use requirements and water availability and use; and
- Community groups and individuals: opportunities or community infrastructure upgrades, employment, enhanced environmental management, environmental research and community support/sponsorship, concerns with fly-in/fly-out workforce.

As well as regular stakeholder engagement, triggers for further specific engagement include, but are not limited to:

- Where new approvals are required;
- Where relevant conditions are received on approvals;
- Changes to the MDIOM that may have significant impact on stakeholders; and
- Developing the closure strategy.

1.8.2 Key Stakeholders

The key stakeholders identified for the MDIOM are detailed in the following sections. Consultation with these stakeholder groups has commenced and will continue to be undertaken as required during the assessment, construction and operational phases of the mine.

1.8.2.1 Government Agencies

Consultation has commenced and is ongoing with the following key regulatory stakeholder groups:

- DWER (EPA Services; Part V; Water);
- DMPE (Environment and Mining Divisions);
- DLGIRS (WorkSafe);

- Department of Biodiversity, Conservation and Attractions (DBCA);
- Department of Planning, Lands and Heritage (DPLH);
- DCCEEW;
- Department of Energy and Economic Diversification (DEED);
- Main Roads Western Australia;
- Pilbara Development Commission; and
- Shire of Ashburton.

1.8.2.2 Traditional Owners

The key Traditional Owners and communities identified for the MDIOM are:

- Banjima Native Title Aboriginal Corporation RNTBC (BNTAC) is the registered native title body corporate which holds native title rights and interests in trust for the Banjima People;
- Youngaleena Community; and
- Wirrilimarra Community.

The MDIOM is located within the Banjima Native Title determination area.

1.8.2.3 Industry

The following industry stakeholder groups have been identified, and consultation will continue as required:

- Chamber of Minerals and Energy of Western Australia;
- Chamber of Commerce and Industry WA;
- Regional Chambers of Commerce WA - Karratha & Districts, Port Hedland and Newman Chambers of Commerce and Industry;
- Association of Mining and Exploration Companies; and
- Fortescue Metals Group.

1.8.2.4 Community

The following key community stakeholders have been identified, and consultation is ongoing:

- Mulga Downs Station; and
- Auski Munjina Roadhouse.

1.8.3 Stakeholder Consultation Outcomes

Details of stakeholder consultation undertaken to date for the MDIOM are provided in Attachment 5. Consultation has commenced and will continue with the key regulatory bodies, Traditional Owners, Industry and community groups.

2 Proposed Activities

The following sections describe the proposed activities relevant to each category of prescribed premises included in this works approval application.

2.1 Infrastructure and Equipment

A list of infrastructure and equipment within the premises and relevant to this works approval application is provided in Table 2-1.

Table 2-1 Infrastructure and equipment

Infrastructure and equipment	Relevant categories	Site plan reference	Critical containment infrastructure	Environmental commissioning
Crushing and screening plant, estimated three locations, each plant including: 2 x Jaw Crusher (e.g., Metso C125) (1 x duty; 1 x spare) Screener (e.g., McCloskey S190) 3 x Cone crusher (e.g., Powerscreen 1300) Screener (e.g., McCloskey S190) Stacker (80 ft)	12	Borrow Pits (Map 3 in Attachment 2)	No	No
3 x three-stage crushing plants, each including: ROM pad (~48 m x 74 m x 9m high) Feed hopper to suit front end loader operation Vibrating grizzly feeder Primary jaw crusher Primary screening unit (Double-deck screen) Surge bins above secondary and tertiary crushers 1 x secondary cone crusher 1 x tertiary cone crusher 2 x secondary screening units (Double-deck screens) Radial stacker Conveyors, sampling station and rock breaker	5	Crusher locations on Premises Layout Plan (Map 3 in Attachment 2)	No	No
Borefields and MAR network	6	Water infrastructure as shown on Premises Layout Plan (Map 3 in Attachment 2)	No	No
Hydrocarbon storage facilities: Maintenance and Service Area (MSA) Haulage Yard Crusher Locations ANFO and Magazine Remote Hubs Refer to section 2.5.7 for storage configurations at each location. Maximum storage quantity in one tank is 200 kL).	73	Locations as shown on Premises Layout Plan (Map 3 in Attachment 2)	No	No

Infrastructure and equipment	Relevant categories	Site plan reference	Critical containment infrastructure	Environmental commissioning
Use tyre storage and disposal area	57	Crusher locations, MSA and Haulage Yard on Premises Layout Plan (Map 3 in Attachment 2)	No	No
Landfill facility	64	Landfill on Premises Layout Plan (Map 3 in Attachment 2)	No	No
Mobile plant, including but not limited to: Front End Loaders; Dozers (e.g., CAT D10) Excavators (e.g., 50-tonne, Hitachi ZX490-5) Water Carts Service Trucks	12, 5	Within prescribed premises boundary (Map 3 in Attachment 2)	No	No
Camp WWTP: 2 x Sequence Batch Reactor (SBR) trains to treat approximately 120 kL per day of domestic sewage from 400 equivalent persons (EP); each unit comprising: Duty 2.5 mm inlet bar screen 1 x 50 kL polyethylene balance tank SBR tank with heavy-duty submersible aerators and floating decant weir. SBR irrigation tank 1 x 50 kL polyethylene sludge tank Balance, decant, sludge and recirculation pumps Sodium hypochlorite dosing system. Poly-aluminium chloride (PAC) dosing system Sludge dewatering system, including screw press, sludge press and supernatant return Irrigation pump and discharge flow meter Control panel; audible and visual alarm. **Camp Spray field:** Minimum 40,000 m^2 Design discharge 165 kL per day (120 kL treated effluent and 45 kL WTP reject stream) Above ground hammer cast iron type sprinklers with 30 m spray radius each 1,200 mm high, 2-strand boundary fence with vehicle access gate and safety signage Earthen perimeter bund and 5 m buffer between Spray Field and fenced boundary. **MSA WWTP:** SBR train to treat up to 17 kL per day of domestic sewage from 340 EP. **MSA Spray Field**: Minimum 5,000 m^3 Design discharge 25 kL per day.	54	Camp and MSA on Premises Layout Plan (Map 3 in Attachment 2)	No	Yes

Infrastructure and equipment	Relevant categories	Site plan reference	Critical containment infrastructure	Environmental commissioning
Above ground hammer cast iron type sprinklers with 30 m spray radius each 1,200 mm high, 2-strand boundary fence with vehicle access gate and safety signage Earthen perimeter bund and 5 m buffer between Spray Field and fenced boundary.				
Water treatment plant (WTP): Reverse osmosis (RO) plants	85B	Camp and MSA on Premises Layout Plan (Map 3 in Attachment 2)	No	No
Construction				
Temporary Diesel Generators (e.g. 3 x 1.2 MVA units)	5, 12, 73	Within prescribed premises boundary (Map 3 in Attachment 2)	No	No

2.2 Timing

The anticipated timeframes for the construction, operation, decommissioning and rehabilitation of the MDIOM are presented in Table 2-2. Note that timeframes are subject to obtaining all necessary approvals.

Table 2-2 Proposed timing

Proposed activity	Timing
Construction of associated mine infrastructure	FY 2027
Construction of mine pits	Commencing in FY 2028
Operation	FY 2027 – FY 2045
Decommissioning	Progressively over the life of mine
Rehabilitation	Progressively over the life of mine

2.3 Mine Construction Activities

Construction of the MDIOM is anticipated to commence in financial year (FY) 2027 and is forecast to take approximately 24 months. Construction activities for the MDIOM will involve the clearing of vegetation and development of associated infrastructure required to establish the mine. Associated infrastructure required as part of the MDIOM includes:

- Facilities for dry crushing and screening of ore;
- Infrastructure to manage surface water (diversion of creeks and surface water flows);
- Linear infrastructure (haul roads, powerlines, pipelines and conveyor corridors); and
- Mine associated infrastructure and support facilities (including, but not limited to accommodation camp, energy supply infrastructure, airstrip, wastewater treatment plant, landfill, offices, workshops, laydown areas, etc.).

Pre-strip of the mine pits will commence in both the west at Murrays Hill and east at Fridge Hill, with pits developed over the life of the mine to allow for appropriate water management and grade control. Surplus

water not required for operations will be disposed of through MAR by reinjection and/or in-pit infiltration within the prescribed premises boundary.

A construction water supply of approximately 1 GL per annum (GL/a) will be required over the duration of construction prior to mining. Construction water supply will be sourced from licensed groundwater abstraction, which will continue into the early stages of operations before dewatering and MAR activities commence (refer to Figure 2-1).

HPPL intends to continue monitoring water use prior to construction and during initial mine development to further enhance existing datasets and support validation and verification of current numeric modelling. As such, it is expected that the WMP will be revised and updated to reflect increased knowledge prior to construction phase of the Proposal, and again following initiation of dewatering and MAR activities.

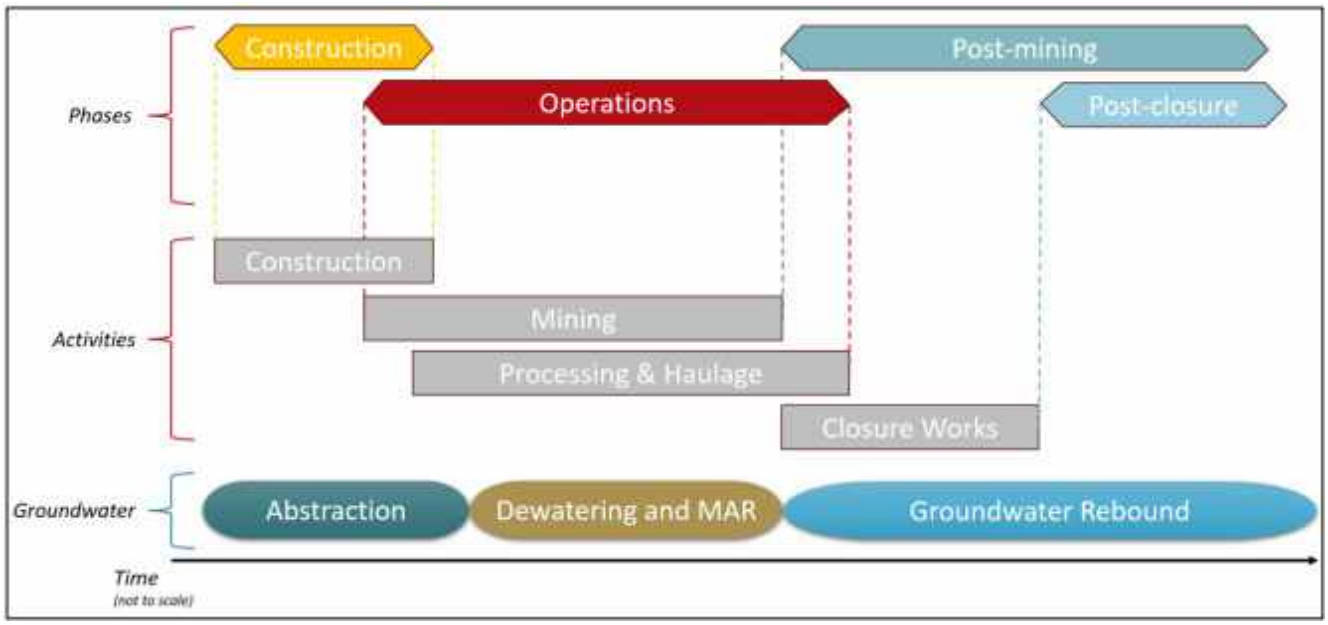

Figure 2-1 Proposed phases and water management activities

Construction and mine operations require access to water within reasonable distances. Minimising piping runs and water cart travel distances offer significant savings and efficiencies. To that end, turkeys nest dams will be spaced along the haul road to assist the construction effort whilst keeping in mind the water demand locations required during operations.

The locations of the turkey's nests will be constant throughout the life of the mine and are shown on Map 3 in Attachment 2. Suitable existing bores have been identified to feed the turkey's nests, with only two additional bores required to supply all water consumption requirements. The effective storage capacity of the turkey nests is proposed to be in the order of 1-2ML (sufficient capacity to fill 25 water carts without any supply inflow). The turkey nests will be constructed following a standard design and will be uniform across the mine (refer to design drawing in Attachment 8J).

Where possible, topsoil and vegetation will be removed and stockpiled in adjacent well-drained areas. Topsoil stockpiles will be managed so the material will be available for future rehabilitation operations. Topsoil stockpiles will be constructed no higher than 3 m and subsoil stockpiles no higher than 10 m with a slope of

≤ 15°. This will help to minimise erosion from the stockpiles by limiting the length and steepness of the outer stockpile slopes. Stockpiles will be retained for a period of greater than three months, and those which have not naturally established a suitable density of groundcover to minimise erosion will be bunded around the perimeter to minimise sediment mobilisation.

2.3.1 Category 12 Mobile Crushing and Screening

Mobile crushing and screening will be required to produce road base and subbase for the MDIOM. The following activities will be required prior to commencing the crushing and screening campaign:

- Mobilisation of plant and equipment;
- Site establishment – set up the lay down, unload parts, and set up containers; and
- Install plant and commission – unfold plant and prepare the feed pile for crushing operations by clearing and leveling an area for the crusher set up.

It is anticipated that up to three crushing plants will be required located in or near borrow pits established for the MDIOM. The construction crushing and screening activity will comprise:

- Pushing of feed material with a dozer;
- Crushing and screening of feed material;
- Stockpiling of crushed material;
- Sampling and testing
- Water cart for dust suppression and filling dust suppression tank; and
- Clean up and demobilisation.

An indicative plant layout and orientation are shown in Figure 2-2.

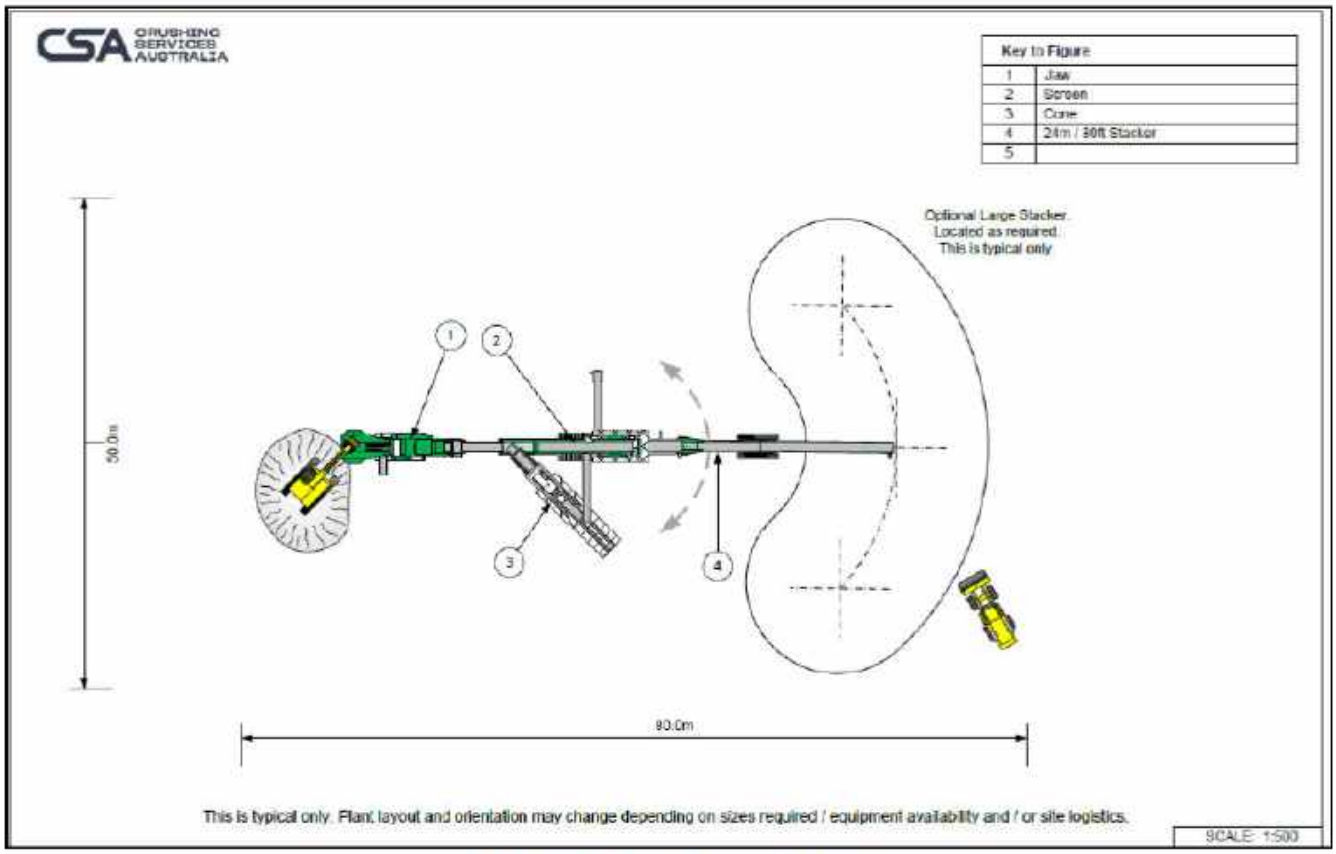

Figure 2-2 Indicative mobile crushing layout

The crushing plant will be loaded from a feed pile using a 50-tonne excavator or similar into a primary crusher with a closed side setting (CSS) of 90 mm. The material will be processed through an incline screen with a deck size of approximately 24 mm. The +24 mm material will be recirculated through a cone crusher with a CSS of approximately 19 mm and rescreened. The plant setup will be a closed circuit where all feed material will be crushed and screened.

The crushing plant will move back into the feed material as it is being processed. A dozer (e.g., CAT D10) will be used to push and blend feed material, enabling a consistent feed available whilst reducing the number of plant moves and allowing the feed material to be blended as required. The dozer will also assist with reducing the height of the feed pile.

A front-end loader (FEL) will be used to load out the conforming material from the stockpiling stacker and place it in the designated stockpiling area. Material will be stored in sized stockpiles allowing for the separation of tested material. Compliant material will be combined, increasing the stockpile area allowing for storage on top. The dozer will be used create a ramp to stockpile on top of the tested material for additional stockpile space.

Estimated production rates, subject to feed material and site conditions, are provided in Table 2-3.

Table 2-3 Estimated construction crushing production rates

Material	Tonnes per hour	Total hours per day	Utilisation	Average run hours per day	Daily production	Tonnes per month
Subbase	400	11	93%	10.23	4,092	122,760
Base Course	400	11	93%	10.23	4,092	122,760

2.4 Environmental Commissioning Activities

Due to nature of the proposed activities, and the infrastructure and equipment involved (e.g., prefabricated units, mobile plant), environmental commissioning activities will be limited and typically involve:

- Category 5 ore processing:
  - Construction verification;
  - Pre-commissioning; and
  - No-load commissioning.
- Category 6 dewatering:
  - Post-drilling development of wells and pipeline integrity testing;
- Category 73 bulk fuel storage:
  - Dry commissioning of all systems to test functionality of the facility;
  - Wet commissioning using diesel fuel to complete the testing;
- Category 54 Sewage facility:
  - Establish and sustain biological processes in WWTP.

Emissions and discharges generated by the commissioning activities will be the same as those generated during time limited operations, and no specific controls are deemed necessary. No environmental commissioning is envisaged for the landfill and used tyre storage and disposal areas.

2.5 Time Limited Operation Activities

The MDIOM is expected to operate for up to 15 years and will involve mining, establishing Waste Rock Dumps (WRDs), processing (dry) ore and operation of associated supporting infrastructure. Supporting infrastructure to the primary operation is detailed in Section 2.5.11.

The key operational activities for the MDIOM are detailed in the sections below.

2.5.1 Mining

Mining activities are being assessed under Part IV of the EP Act and will be regulated through a MS and associated EMPs. The activities will also be regulated under the Mining Act through an approved MDCP.

The open mine pits are described by seven domains – Murray's Hill, Anticline Hill, Fridge West, Fridge Central, Fridge Hill, Horseshoe West, and Horseshoe Hill – as shown on the Premises Layout Plan (Map 2 in Attachment 2). Mining will be undertaken using conventional drill and blast, load and haul methods. It is expected the iron ore will be mined with an average strip ratio of 1:1.4 (waste to ore).

Mining will be undertaken on a 24-hour basis, seven days a week.

Mined ore will be transported (loaded and hauled) from the open pits to the run of mine (ROM) pads. Three ROM pads are anticipated to be constructed (two operational at a time) over the life of the mine to service the various open pits. The East Crusher Pad will be in use for the life of the mine; the West Crusher Pad will move to the central location as the mining sequence shifts east.

2.5.1.1 Water Supply

Groundwater abstraction for water supply and dewatering is projected to increase over the life of the mine to a maximum of 12 GL/a. Dewatering rates are expected to decrease rapidly in the last year of mining. The operation of the mine is driven by mine dewatering and will occur in a west to east direction to allow for MAR (refer to Figure 2-1).

2.5.1.2 Waste Rock Dumps

Approximately 150 Mt of waste rock will be mined throughout the life of the mine. Waste rock will initially be used to construct infrastructure (e.g. access roads and ramps, ROM and stockpile bases, drainage structures and safety bunds with the remainder stored in above ground WRDs or used to backfill pits. The indicative locations of the WRDs are shown on the Premises Layout Plan (Map 3 in Attachment 2).

WRDs will be designed to minimise the area of disturbance, maintain the overall surface water flows feeding into the Fortescue Valley, and integrate into the surrounding landforms, with a height that enables a stable landform and minimises visual impacts. Surface roughening techniques may be employed to minimise erosion potential for slope faces. Although a reduced batter grade is more desirable from a potential erosion perspective, this increases the footprint of the WRD.

Potentially acid forming (PAF) fresh rock with elevated sulfur has been eliminated from the mine plan and pit design. Weathered rock with elevated sulfur (>0.25%) has been conservatively designated PAF, and other low sulfur material with low amounts of neutralising material has been designated as uncertain (UC). This material has a low likelihood of generating acid (SRK Consulting 2025), but to manage this residual risk to 'As Low As Reasonably Practical (ALARP)' it will be situated in the centre of the WRDs with non-acid forming (NAF) material as cover.

Pits will be backfilled to a minimum of 2 m above the maximum groundwater elevation. Only NAF material sourced from waste rock will be used for backfilling the mined-out pits. The maximum backfill elevations for the pits are summarised in Table 2-4 (SRK Consulting 2025).

The maximum depth of backfill placement will range from approximately 10-18 m. Since the backfill will consist of NAF only, oxygen ingress and ongoing oxidation is of limited concern. Therefore, it is anticipated there will be no need for backfill to be placed in compacted multiple lifts of thin layers to minimise permeability.

Table 2-4 Mine pit backfill elevations

Pit Area	Base of mining (m RL)	Backfill elevation (m RL)	Backfill (volume of pit %)
Murray's Hill	388	403	80%
Anticline Hill	388	403	10%
Fridge central	420	-	-
Fridge Hill	396	406	7%
Fridge West	388	404	73%
Horseshoe Hill	456	-	-
Horseshoe West	388	406	38%

2.5.2 Category 5 Processing or Beneficiation of Metallic or Non-Metallic Ore

An overview of the ore processing operation is shown in the plant flow sheet in Figure 2-3 and Process Flow Diagram in Attachment 8B.

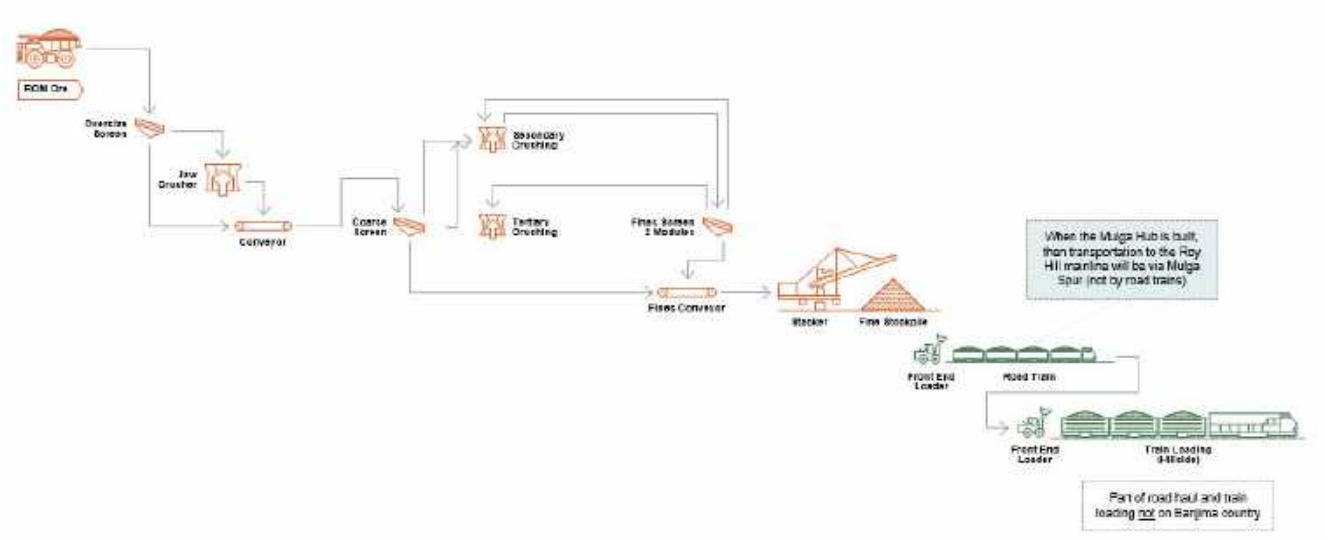

Figure 2-3 Plant flow sheet

Ore from the mine pits will be stored in stockpiles on ROM pads at each crusher location. Each ROM pad will have five 60 kt stockpiles, approximately 48 m long x 74 m wide x 9m high.

Ore from the ROM stockpiles will be transported to the ore crushing plants. One crushing plant will be located at the West Crusher location and the other plant will be located at the East Crusher location. The West Crusher will operate in its location for the first 10 years before being moved to the Central Crusher location for the remainder life of the mine. The East Crusher will remain in its position for the entire life of mine. The crusher locations are shown on the Premises Layout Plant (Map 3 in Attachment 2).

Each crusher pad will comprise an approximate 500 m x 900 m area made from mine waste and fill material. In some areas of the pad, a cap material (low grade ore) will be applied (i.e., at the crusher location and heavy-wear areas). The pads will be graded (0.5%) to allow sediment-laden surface water to be captured and diverted to sedimentation ponds. Plans and sections of the crusher pads are provided in Attachment 8C.

The crushing plants will be delivered to the premises in prefabricated parts and assembled in accordance with manufacturer's specifications. Once assembled, the plants will undergo initial testing, which will entail configuring the plant to ensure there are no manufacturing faults and that it produces a material that meets the required specifications. Minor adjustments and testing will be made, as required, once production has commenced. Due to the prefabricated nature of the plants, no environmental commissioning will be undertaken.

Each of the plants are three-stage crushing and screening plants, including:

- Feed hopper to suit front end loader operation;
- Vibrating grizzly feeder;
- Primary jaw crusher;

- Primary screening unit (Double-deck screen);
- Surge bins above secondary and tertiary crushers;
- 1 x secondary cone crusher;
- 1 x tertiary cone crusher;
- 2 x secondary screening units (Double-deck screens);
- Radial stacker; and
- Conveyors, sampling station and rock breaker.

A photograph of a typical processing plant is shown in Figure 2-4.

Each plant is anticipated to process up to 6 Mtpa of iron ore over the life of the mine. This is based on the plant being operational on a 24hr/day, 7 days per week basis.

Each crushing plant will be fed ore by front end loaders into the ROM bin/feed hopper. The ore will be crushed and screened, and the product will be placed into stockpiles by a radial stacker. Each crusher pad will have three 15 kt stockpiles (radial 180 deg in total, 40 m wide and 12 m peak height) and four 15 kt overflow/dead stockpiles. The processed ore will be loaded by front end loaders into road trains and transported off-site.

Figure 2-4 Photograph of processing plant

Dust suppression will occur using a raw water tank and spray bars on various equipment throughout the plants, and water carts will make periodic rounds to spray down the crushing pad area. The raw water tank will have a 100 kL capacity and will feed spray bars at various equipment points as follows (refer to Process flow Diagram in Attachment 8B):

- ROM bin;
- Primary crusher;
- Primary screening unit feed;
- Primary screening unit oversize transfer point;
- Secondary crusher feed;
- Secondary crusher discharge transfer point;
- Secondary screening unit feed (each of the two screens);
- Secondary screening unit undersize transfer point (each of the two screens);
- Tertiary crusher feed; and
- Tertiary crusher discharge point.

2.5.3 Category 6 Dewatering

Approximately 20 of the pits located throughout the seven mining areas are proposed to extend to varying depths below groundwater level and will, therefore, require dewatering. The lowest estimated pit elevation is 388 m RL (i.e., approximately 12-16 m below the groundwater level) (AQ2 2024).

The notional locations of proposed dewatering bores are shown on Map 3 in Attachment 2 (labelled as 'Water Infrastructure') and are shown on Figure 2-5.

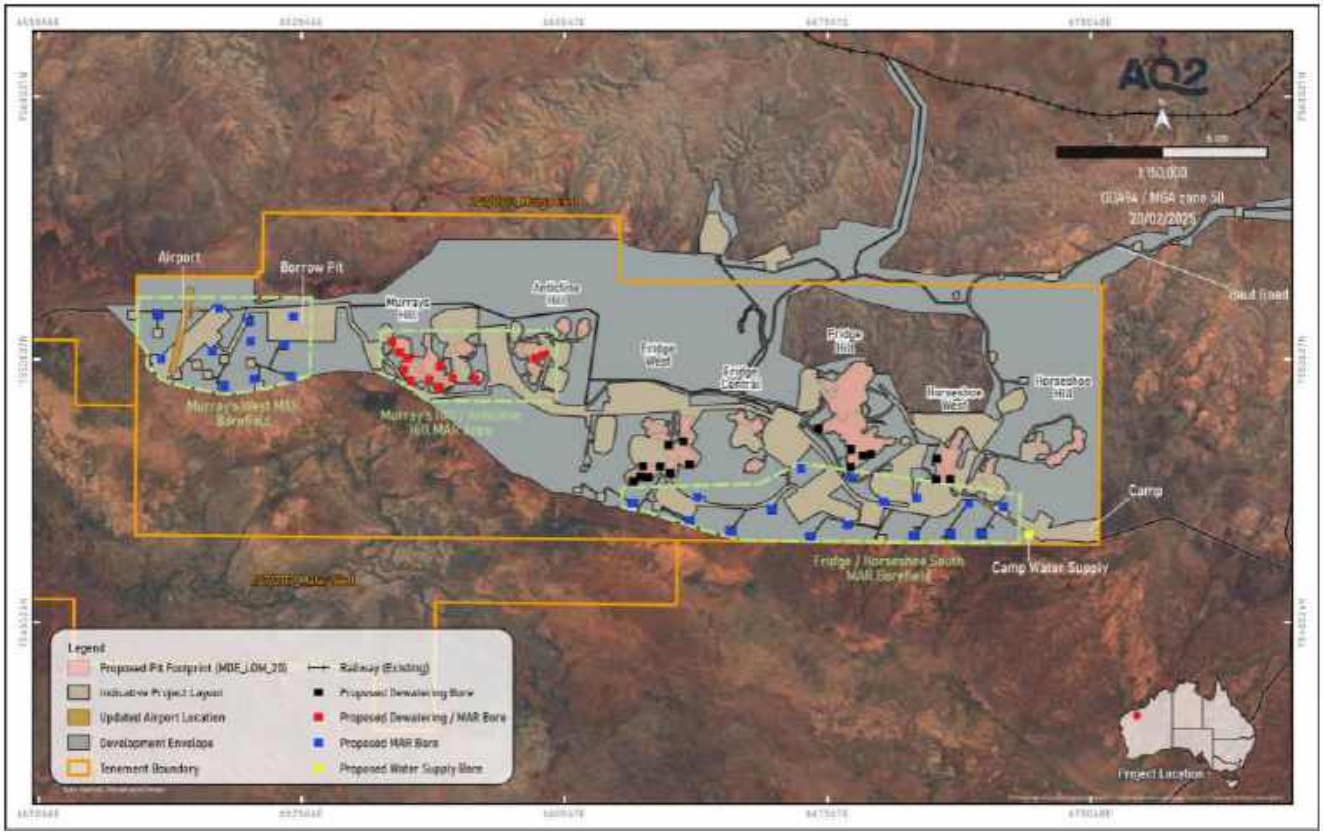

Figure 2-5 Notional locations of dewatering, water supply and MAR bores during operations (AQ2 2024)

Temporary water storage may be required to assist in managing water quality and supply prior to discharge. The mine plan will continue to be refined to account for the constraints imposed by groundwater management.

The adopted mining scenario has mining commencing in January 2027 with a 15.5-year life of mine. Below water table mining commences in 2028 in the west, in the Murray's Hill area, progressing east to Anticline Hill, followed by mining of Horseshoe West, and finally the Fridge West, Fridge Central and Fridge Hill areas.

Dewatering of up to 12 GL per year will be carried out under a licence to take groundwater issued by DWER under the RiWI Act (refer to Section 1.7.4).

Predicted dewatering commences in April 2028 at approximately 8,600 kL/d (3.2 GL/yr). Numerical groundwater modelling predicts peak dewatering rates of between 30,000-31,300 kL/d (11-11.4 GL/yr) during the concurrent dewatering of Murray's Hill, Anticline Hill and Horseshoe West during 2032 and 2033, with similar peaks (30,200 kL/d) between 2037 and 2041 during the mining of Fridge Hill and Fridge West.

Dewatering rates decline rapidly upon the completion of mining Fridge Hill, with rates of approximately 4,300 kL/d (1.6 GL/yr) predicted for the final of year of mining Fridge West. The proposed Fridge Central pits (FC02 and FC03) only extend approximately 2 mbgl and, as such, these pits will be dewatered passively by interference effects from the dewatering of neighbouring pits.

Dewatering bores will be operated continuously at abstraction rates that achieve the pit dewatering schedules. Once the proposed dewatering bores have been installed, pumping capacities and annual abstraction rates will be provided for each bore. Individual bore pumping rates are anticipated to range between 30 to 50 L/s, with yields at some bores declining as the aquifer units are dewatered, particularly the northernmost bores (AQ2 2024).

Water supply requirements during the life of the mine will preferentially be sourced from the dewatering discharge, with water treated, if required, to meet operational water quality criteria. As dewatering exceeds the required water demand, excess water will be disposed of by MAR within the premises boundary.

MAR is proposed on the slopes of the valley (i.e., in and along the strike of the proposed mining areas), and will be implemented via purpose-built injection bores, with the potential for repurposing dewatering bores and in-pit infiltration, once mining of a pit is complete. The notional locations of (modelled) MAR bores are shown on Map 3 in Attachment 2 (labelled as 'Water Infrastructure') and are shown on Figure 2-5.

Once the proposed MAR bores have been installed, injection capacities/annual rates will be provided for each bore. Predicted re-injection rates range from approximately 2,000-10,000 ML/yr (AQ2 2024). MAR borefields will be operated for the sole purpose of disposing of surplus mine water. From an operational perspective, re-injection will be prioritised into areas furthest from active dewatering areas to reduce re-circulation. However, the distribution of MAR bores and individual bore injection rates will be managed to mitigate detrimental impact to vegetation, resulting from mounding.

The MAR injection rates will be automated according to real-time water levels at monitoring bores on each bore pad and in areas identified as having an increased risk of potential water logging, such that injection can be shut off remotely and automatically if trigger/threshold criteria are reached.

At the end of mining (but before closure), MAR via in-pit infiltration and groundwater recharge will result in temporary standing water within some of the pits. At closure, HPPL will backfill pits to above the water table after settlement to avoid formation of permanent pit lakes. This activity will be further informed by future infield study work as part of the closure planning process.

Both the dewatering and MAR activities will be managed in accordance with the Groundwater Operating Strategy for the MDIOM (Attachment 8K).

2.5.4 Category 64 Class II or III putrescible landfill site

An unlined Class II landfill will be constructed on-site for the disposal of general waste. The landfill location is shown on the Premises Layout Plan (Map 3 in Attachment 2).

The landfill will comprise a trench-based facility that will expand over the life of mine. Initially, four trenches will be opened with planning for a total of 36 trenches covering an area of approximately 16 ha. A layout plan and typical trench cross-section are provided in Attachment 8D.

The landfill has been sited with consideration of the following aspects:

- Located more than 100 m from any permanent or perennial watercourse;
- Located so that the vertical distance between the waste and highest seasonal and expected post mining groundwater level is no less than 3 m; and
- A boundary firebreak of at least 3 m will be maintained around the landfill.

The landfill will be surrounded by a 1.8 m high cyclone-rated fence with a lockable gate that will be maintained to provide an effective barrier to cattle, horses, and other animals. Signage will be installed near the access gate showing the waste types accepted. A 500 mm high berm will be constructed along the fence line to divert clean stormwater away from the landfill.

Each trench will be approximately 40 m long and 3 m wide at the base, with 1H:2V sidewalls. The maximum depth of a trench will be 3 m. A 400 mm high berm will be constructed around each trench to prevent ingress of stormwater. The trench will be accessed via a ramp with 200 mm high roll over bund.

Waste accepted at the landfill is specified in Table 2-5 and is consistent with the Landfill Waste Classification and Waste Definitions 1996 (as amended 2019) and in accordance with MDIO's Waste Management Procedure. Where waste does not meet the acceptance specification, it will be removed from the premises by a controlled waste contractor. If that is not possible, it will be stored in a segregated storage area or container and removed to an appropriately authorised facility as soon as practicable.

Table 2-5 Landfill waste acceptance

Waste type	Maximum rate at which waste is accepted	Acceptance specification
Clean Fill Inert Waste Type 1 Uncontaminated fill Neutralised acid sulfate soil Putrescible Wastes	5,000 tonnes per year (combined total Category 64 capacity)	Acid sulphate soils (treated to neutralise acid-forming potential prior to disposal); Animal manures and carcasses; Asphalt; Blasting sand or garnet (excluding that used for stripping TBT containing paints); Bricks/masonry; Cardboard;

Waste type	Maximum rate at which waste is accepted	Acceptance specification
Contaminated solid waste meeting waste acceptance criteria specified for Class II landfills Inert Waste Type 2		Chemical containers that have been cleaned (as well as or better than the triple rinse method referred to in the Landfill Waste Classifications and Waste Definitions); Clean fill; Drained and mechanically crushed oil filters and rags; Dry cement / concrete; Dry paint containers; Dry, inert construction waste; Electrical equipment / whitegoods Glass; Light globes; Mattresses; Packaging waste; Paper; Personal sanitary materials; Plasterboard; Plastic sheeting, pipes, conduit, bottles etc.; Polystyrene; Putrescible waste (e.g. food scraps in garbage bags, green waste, sewage plant grits/screenings); Textiles and cloth; Timber (untreated); Tyres.

The landfill will be operated in accordance with MDIO's Landfill Management Procedure. Key management measures of this procedure are as follows:

- Inert Waste Type 1 and Inert Waste Type 2 will be segregated into separate trenches, with each trench clearly signposted;
- Only one active Type 1 Waste trench and one active Type 2 Waste trench will be open in the landfill at any one time;
- Sufficient stockpiles of cover material (clean fill) will be readily available and maintained to cover the general waste trench, ensuring no waste is exposed;
- Waste will be covered with a minimum 200 mm of soil or other approved inert material at least weekly so that no waste is left exposed;
- Waste will be placed and compacted to ensure that all faces are stable and capable of retaining material;
- The landfill facility will be always locked when not in use;
- The restoration of a trench will take place within six months after disposal in that trench has been completed;
- Waste will be prevented from being washed or blown outside the site, as far as practicable;
- A check will be done at least once per week to collect any windblown waste within the landfill facility;
- Vegetation will be removed from within the landfill facility at least monthly; and

- All volumes and types of waste taken to the landfill for disposal will be recorded.

2.5.5 Category 64 Tyre and Inert Waste Disposal

Tyre disposal areas (TDAs) will be located at the WRDs (Map 3 in Attachment 2) to facilitate the disposal of tyres, primarily consisting of a mixture of light vehicle, road train and haul truck tyres, and other inert materials.

Items accepted at the TDAs are specified in Table 2-6, which is consistent with the Landfill Waste Classification and Waste Definitions 1996 (as amended 2019) and MDIO's Waste Management Procedure and Used Tyre Storage and Disposal Management Procedure.

Table 2-6 Tyre disposal facility waste acceptance

Waste type	Maximum rate at which waste is accepted	Acceptance specification
Inert Waste Type 1 Inert Waste Type 2	5,000 tonnes per year (combined total Category 64 capacity)	Authorised waste: Bitumen; Concrete; Conveyor rubber; Polyethylene pipe; Tyres.

The TDAs will be operated in accordance with MDIO's Tyre Storage and Disposal Management Procedure, as follows:

- Tyres disposed of in batches of not more than 40 m^3 of tyres reduced to pieces, separated from each other by at least 100 mm of soil; or
- In batches of no more than 1,000 whole tyres, separated from each other by at least 100 mm of soil;
- Tyres covered under a final soil cover of not less than 1 m as soon as practical following the achievement of final waste levels;
- The base of TDAs must be greater than 3 m above original (pre-mining) groundwater level;
- Drainage, soil erosion and soil stability at the TDA are to be controlled so that any potential contaminants are retained within the TDA;
- Surface water or stormwater will be diverted around and away from the disposal area using diversion structures to reduce risk of erosion;
- A firebreak will be maintained around the disposal area;
- Any water that collects within the disposal allowed to evaporate and will not be discharged outside the disposal area;
- Restoration of a disposal area will take place within six months after disposal in that area has been completed; and
- All volumes and types of waste taken to the area for disposal will be recorded.

2.5.6 Category 57 Used Tyre Storage

Tyre Storage Areas (TSAs) will be located at the Crusher Pad locations, MSA and Haulage Yard (Map 3 in Attachment 2) for the temporary storage of tyres consisting of a mixture of light vehicle, road train and haul truck tyres.

The TSAs will be operated in accordance with MDIO's Tyre Storage and Disposal Management Procedure with consideration of Department of Fire and Emergency Service (DFES) Guidance Note: GN02 Bulk Storage of Rubber Tyres Including Shredded and Crumbed Tyres (DFES 2020), as follows:

- No more than 6,000 used tyres to be stored at the Used Tyre Storage Area;
- Tyres stored in batches of not more than 100 tyres, with a minimum 6 m separation distance between batches;
- Used tyres will be either stacked on their side walls (laid flat), or if stored on treads (upright), secured with a device made of non-combustible material;
- Surface water or stormwater will be diverted around and away from the Used Tyre Storage Area using diversion structures; and
- A firebreak will be maintained around the Used Tyre Storage Area.

2.5.7 Category 73 Bulk Storage of Chemicals

The premises will include several locations where bulk liquid chemicals will be stored, including fuel farms to supply diesel to mine and light vehicle fleet and ANFO and magazine facilities where diesel and ammonium nitrate will be mixed to make explosives used in mine blasting.

2.5.7.1 Fuel Farms

The premises will include several fuel storage locations comprising self-bunded fuel tanks, transfer pipes and pump units as described in Table 2-7. All tanks will be fitted with appropriate emergency devices, including an emergency shut off valve.

Table 2-7 Design and construction/installation requirements

Facility	Operational storage capacity	Tanks	Comment
MSA	750 kL	6 x 110 kL fuel tanks	Indicative layout shown in Attachment 8E. Fuel for heavy and light mobile plant and vehicles. Tank farm equipped with remotely visible fuel management system. Capacity sufficient for two weeks consumption.
		1 x 60 kL fuel tank 1 x 30 kL fuel tank	Indicative layout shown in Attachment 8E. Used to supply various lubricants for fleet and store waste oil before removal off-site.
Haulage Yard	545 kL	2 x 200 kL fuel tank 1 x 110 kL fuel tank 1 x 35 kL AdBlue tank	Indicative layout shown in Attachment 8E. Fuel for haulage and light vehicle fleet. Tank farm equipped with remotely visible fuel management system. 330 kL is sufficient for two weeks consumption.
Crusher Locations (x2)	100 kL	1 x 50 kL fuel tank at each operational crusher location	Tanks shown on the Crusher Pad plans in Attachment 8C. For re-fuelling the ROM front-end loaders and small mobile plant for operations and maintenance of crushing plants. The crushing plants will be powered by the power station.

Facility	Operational storage capacity	Tanks	Comment
			With the relocation of the Western Crusher location to the Central Crusher location at Year 10, the tank will also move to the new location.
ANFO Facility	11 kL	1 x 10 kL fuel tank (ANFO) 1 x 1 kL fuel tank (generator)	Location shown on Premises Layout Plan (Map 3 in Attachment 2). For use in ANFO blending and power generation.
Remote Hubs (East and West/Central)	700 kL	Two locations, each with: 2 x 100 kL fuel tanks 1 x 60 kL fuel tank 1 x 60 kL lubricatnt tank 1 x 30 kL lubricant tank	The West Remote Hub will be built as the temp facility for the first 16 months of mine life while the MSA is built. The West Remote Hub will then move to the Central Remote Hub. The East Remote Hub will stay permanent for the life of mine. Location shown on Premises Layout Plan (Map 3 in Attachment 2). Layout of remote hubs shown in Attachment 8E.

Liquid fuel will be transported to site in a road train by an appropriately qualified subcontractor licenced to transport dangerous goods. The fuel will be pumped from the road train into the tanks present at each fuel farm. Emergency equipment, including spill kits and firefighting equipment, will be made available at all locations.

2.5.7.2 ANFO and Magazine Facilities

The ANFO and magazine facilities are located 600 m apart, accessible via the ANFO Road and Magazine Road, respectively.

The magazine will be comprised of two modified, 10-foot shipping containers, which will be delivered to site prefabricated and located to meet the required separation distances from roads, offices and infrastructure. Containers will be 40 metres apart and the facility will be securely fenced as per relevant Australian Standards.

The ANFO Facility, including emulsion tank, will consist of several sea containers with an "igloo" style cover installed on a suitably compacted earth foundation. A fence will also be constructed around the area as per relevant Australian Standards.

The ammonium nitrate will be delivered by road trains and unloaded within the facility.

2.5.7.3 Other Chemical Storage

All other chemicals and lubricants that will be used on site will be kept in storage units in appropriate containers within workshops and close to areas of use. The storage units will be constructed in accordance with the requirements outlined in in the Dangerous Goods Safety (Storage and handling of Non-explosives) Regulations 2007, which includes the use of appropriate signage based on amount and type of chemicals present, inventory manifests as well as displaying a copy of the Dangerous Goods Licence, where relevant.

When needed, the required amount of chemical will be removed from the storage unit and transported within an appropriate container. When the materials are not being added or removed, the storage units will be kept secure. Emergency alarms, spill kits and fire extinguishers will be installed at various points within each storage unit and workshop.

2.5.8 Water Supply and Treatment

2.5.8.1 Category 85B Water Treatment Plant

Potable water for the mine will be supplied through two brackish water Reverse Osmosis (RO) plants, one at the MSA and a second at the camp. Both plants will be supplied raw water from dedicated bores.

The RO plant at the MSA has been sized to produce 17 kL per day, based on 50 L per person per day, with 340 persons to service, including personnel at the aerodrome, crushing plants, road haulage and gatehouse in addition to the MSA. The RO plant at the camp has been sized to produce 120 kL per day, based on 300 L per person per day for the 400 person camp.

The RO reject water from both plants will be plumbed to the respective wastewater treatment plant irrigation system for disposal in the spray fields. Reject water from the camp is estimated to be 45 kL per day and 8 kL per day from the MSA.

2.5.8.2 Category 54 Sewage Facilities

Sewage will be treated by two WWTPs, located at the MSA and camp. Both plants will be Sequential Batch Reactor (SBR) WWTPs, capable of handling a wide range of organic loads. The benefits of SBRs include low energy consumption, low sludge production, minimal maintenance requirements, and the plant's automated control system ensures reliable operation. The proposed systems will be containerised and assembled off-site and fully factory tested where possible, thus requiring minimal installation work on site (refer to example WWTP shown in Figure 2.6).

Figure 2.6 Example SBR WWTP (4 x process trains)

The WWTP at the MSA has been sized to treat 50 L per person per day and will receive sewage from a vacuum truck servicing ablutions at the aerodrome, power station, crushing plants, road haulage laydown and gatehouse in addition to the MSA (capacity estimated on 340 people). Treated wastewater will be discharged to a small, fenced spray field (approximately 0.5 ha).

The WWTP at the camp is sized on 300 L per person per day for a 400 person accommodation facility. It will be connected to an irrigation pump and fenced spray field (4 ha) to dispose of treated liquid waste.

Dewatered sludge from both WWTPs will be sent to landfill.

The SBR process can handle a wide range of organic loads and is well-suited to accommodate campsites as it can effectively treat wastewater generated by large numbers of people. The benefits of the SBR process include low energy consumption, low sludge production and minimal maintenance requirements. The plant's automated control system ensures reliable operation and high treatment performance.

Construction of each WWTP will involve:

- Minor excavation and bulk earthworks:
  - Installation of below ground infrastructure (e.g. irrigation pipework) and earthen perimeter bund, etc.;
  - Bunding around above-ground pipework;
- Installation of fencing around the Spray Field to prevent unauthorised personnel and fauna access;
- Installation of WWTP and associated infrastructure and pipework:
  - The WWTPs comprise process trains, each in containerised steel 'plug and play' units with external polyethylene tanks. Once installed, the units only require an inlet connection to the bar screen, electrical power connection to the control panel and connection to the spray field.
  - The camp WWTP will use two process trains and the MSA plant will use one.

Potential impacts associated with construction will be short-duration and limited to the WWTP areas.

Commissioning of the WWTPs will be carried out by the supplier's engineers who will ensure the plant is correctly installed and functioning as per the design requirements. A stringent commissioning regime will be carried out, including daily and weekly monitoring, which will be documented in a Commissioning Plan that will be provided by the WWTP supplier after final design and contract award is completed.

The WWTPs must establish and sustain biological processes to achieve the expected effluent quality. Typically, it can take up to 12 weeks before the biological aspect of the process is sustained.

The wastewater will be treated to the specification for Low Exposure Risk (level of human contact) effluent as defined in the *Guidelines for the non-potable uses of recycled water in Western Australia* (DoH 2011). A summary of target water quality parameters for treated wastewater from the WWTPs is provided in Table 2-8 along with the validation and verification monitoring that will be carried out during the commissioning period.

Table 2-8 Influent/effluent characteristics and validation and verification monitoring

Parameter	Units	Influent specification	Effluent specification (incl. WTP reject water)	Influent validation and verification monitoring	Effluent validation and verification monitoring
Hydraulic capacity	kL/d	Camp: 120 MSA: 17	Camp: 165 MSA: 25	N/A	N/A
BOD	mg/L	350	<20	N/A	Weekly
SS	mg/L	350	<30	N/A	Weekly

TN	mg/L	60	<30	Weekly	Weekly
TP	mg/L	14	<8	Weekly	Weekly
pH	pH units	6.5-8.5	6.5-8.5	Weekly	Daily
E.coli	cfu/100 mL	-	<1000	Weekly	Weekly
Chlorine (disinfection)	mg/L	-	0.2-2.0	N/A	Daily

During the commissioning period, the treated wastewater irrigated to land may not meet the target concentrations, i.e., the concentrations will be higher. Incidences of target exceedances are expected to be short-term (approximately six weeks), and monitoring will occur during this period. The potential environmental impacts during the commissioning period are expected to be insignificant in the context of the ongoing operation of the WWTP and are not expected to result in excessive nutrient loads being applied to the land given the size of Spray Field and limited amount of treated water discharged during this period.

If monitoring shows that wastewater quality targets are not being met during commissioning, the biological processes can be managed by seeding the plant or adding biological products to speed up and enhance the activity.

Once sustained performance of the WWTPs is achieved and the target water quality parameters are being met, the plants will commence time limited operations under the works approval.

The camp WWTP will accept approximately 120 m^3 (kL) per day of domestic sewage from the camp at full capacity (400 people) based on an allowance of 300 L per person per day. The MSA WWTP will accept approximately 17 kL per day from 340 people assuming 50 L per person per day.

The treatment process is arranged in an SBR configuration consisting of a primary tank, screen and balance tank. The SBR process features a combined anoxic/aerobic biological suspended growth treatment process, which relies on bacterial action to:

- Coagulate and remove non-settled colloidal solids and carbonaceous organic matter.
- Convert the colloidal and dissolved carbonaceous organic matter into various gases and cell mass.
- Reduce the nutrients such as nitrogen and phosphorus and other trace organic compounds.

The WWTPs will operate in five-step cycles over four, 6.5 hour cycles per day, as follows:

1. Filling (30 minutes).

In the fill stage, wastewater is introduced into the reactor and mixed with the existing biomass without aeration, promoting blending and denitrification. This stage creates anoxic conditions (absence of oxygen), promoting denitrification where nitrate is converted to nitrogen gas.

2. Reaction (mixing and aeration) phase (270 minutes).

During the reaction stage, the reactor is mixed, and aeration occurs supplying oxygen for microorganisms to degrade organic matter and oxidise ammonia to nitrate. The microorganisms consume the organic matter in the wastewater, converting it into carbon dioxide, water and new biomass.

3. Settling phase (45 minutes).

The aeration and mixing are stopped, allowing the solid biomass to settle at the bottom of the reactor, forming a clear supernatant on top.

4. Decant phase (45 minutes).

The decant stage involves carefully removing the clear supernatant from the top of the reactor without disturbing the settled sludge, resulting in the discharge of treated effluent.

5. Idle phase.

The idle stage is used for preparation, maintenance and sludge wasting before the next cycle begins.

The process sequence times are adjustable based on the influent/effluent concentrations. Following the idle phase, the SBR train will cycle again (i.e., fill, react, settle, decant, re-fill).

After the treated effluent is decanted from the SBR reactor, it is subjected to disinfection processes using chlorine to eliminate pathogenic microorganisms and ensure the water meets safety and regulatory standards.

The WWTPs will be fitted with audible and visual alarms that will alert the plant operators to issues with the operation and performance of the treatment process.

During time-limited operations, treated wastewater quality monitoring will be carried out in accordance with the DoH (2011) guidelines as shown in Table 2-9.

Table 2-9 Operational monitoring

Discharge point	Parameter	Frequency	Averaging period	Unit	Method
Discharge pipe to spray field	Flow	Continuous	-	m^3/day	Calibrated flow meter
	pH	Continuous	-	-	Calibrated online meter
	Chorine			mg/L	
	SS	Monthly	Spot sample		AS5667.1 and AS5667.10
	Total BOD				
	Inorganic nitrogen				
	Reactive phosphorous				
	E-coli			cfu/100 mL	
	Trace contaminants	Annually		mg/L	

The WWTPs will produce sludge that will have to be disposed from the system on regular intervals. A simple dewatering unit will be used to provide on-site treatment of sludge into a cake that can then be removed off-site for beneficial reuse (e.g., use as a land conditioner, in composting or anaerobic digestion) or disposal to landfill.

The WWTPs will discharge sludge from the sludge tanks on timed intervals. The sludge will be dosed with a polymer to assist in the coagulation before it is transferred to an in-line screw press, which is able to entrap the sludge and drain the excess water (supernatant).

The compressed dry sludge cake will be discharged through an incline auger chute direct to a bulk-bag for storage and removal off-site. A return pump will collect the supernatant and direct it to the start of the WWTP for re-processing.

Filter media backwash and brine reject water from the proposed WTP will be plumbed into the WWTP for mixing with the treated wastewater prior to discharge. The filer media backwash will connect to the balance tank and the brine reject water to the irrigation tank. Mixing ratios will be controlled to ensure that total dissolved solids (TDS) levels are maintained at an acceptable level.

2.5.9 Spray Fields

Treated effluent from the WWTPs and reject water from the WTPs will be pumped to a 40,000 m^2 (minimum) and a 5,000 m^2 (minimum) spray field for the Camp and MSA WWTPs, respectively, where the water will be discharged by above-ground hammer cast iron type sprinklers. Irrigation will be automatically controlled by the WWTP irrigation pump.

The location of the spray fields and irrigation sprayers will be determined with respect to local conditions. The outcome of the proposed layout is the minimisation of spray drift during windy conditions and to reduce the risk of treated wastewater leaving the boundary of the spray field.

The construction of the spray fields will be on land that is generally flat and level. An earthen bund will be constructed around the discharge area perimeter to prevent the inflow of surface water from outside the area, and to prevent the loss of discharged treated wastewater from within the area.

A 5 m wide buffer will be established around the edge of each spray field to prevent spray drift escaping beyond the boundary of the area.

To determine the minimum size of the Spray Field, nutrient loading rates were evaluated in accordance with *Water Quality Protection Note (WQPN) 22 Irrigation with nutrient-rich wastewater* (DoW 2008) using Risk Category D soil type and location (fine grained soils with low eutrophication risk of surface waters within 500 m of Spray Field) (Table 2-10).

Table 2-10 Spray Field area calculations

Parameter	Units	Camp Spray Field		MSA Spray Field	
		Nitrogen	Phosphorous	Nitrogen	Phosphorous
Effluent criteria (DoH 2011)	mg/L	30	8	30	8
Daily discharge	kg/day	5.0	1.3	0.6	0.16
Annual discharge	kg/year	1,800	475	219	58
Maximum nutrient loading rate (DoW 2008)	kg/ha/year	480	120	480	120
Area required	ha	3.8	4.0	0.46	0.49
Area available	**ha**	**4.0**		**0.5**	

The evaluations show that the spray fields are adequately sized for the disposal of treated wastewater from the WWTPs.

2.5.10 Erosion and Sediment Control

Erosion and sedimentation control will be managed in accordance with the Erosion and Sediment Control Plan (ESCP) for the premises (Attachment 8F) as summarised in the following sections.

2.5.10.1 Potential Sources of Erosion and Sedimentation

Due to the ground disturbance and vegetation removal associated with construction of the new infrastructure and activities, there is likely to be an increase of sediment runoff and erosion.

Surface water quality in the Pilbara tends to be dominated by high sediment loads caused by the large runoff events generated by significant rainfall events and cyclones. Notwithstanding this, diversion of flows into defined channels (diversion channels) has the potential to concentrate flows and increase velocities, increasing potential for scour. Activities associated with the mine, such as open cut mining and stockpiling of topsoil and waste materials, are all likely locations where sedimentation and erosion may occur.

Mining operations that have the potential to cause erosion or generate sediment and impact the surrounding catchment areas include:

- Construction and operational activities;
- Clearing or disturbance of land for mining or other activities;
- Placement of overburden and topsoil; and
- Vehicle and equipment movements.

2.5.10.2 Potential Impacts of Erosion and Sedimentation

If left uncontrolled, erosion and sedimentation can reduce water quality due to increased sediment loads. Discharging untreated water to the natural environment has the potential to infill downstream water courses and ponds and smother vegetation, impacting both flora and fauna. In addition to the reduction in water quality, erosion can undermine built infrastructure and cause long term changes to the landscape such as soil degradation and loss of vegetation and habitat.

Erosion and sedimentation impacts that may potentially result from the proposed activities include:

- Erosion due to increased runoff volumes and velocities from the removal of vegetation, land disturbance, the introduction of impervious surfaces on hardstand areas and diversion of surface water around infrastructure footprints;
- Increased sedimentation due to stockpiling of materials and the construction of surface facilities including access roads and tracks;
- Increased scouring during the construction of surface facilities adjacent to watercourses; and
- A decline in water quality and degradation of local amenities through sediment transport to nearby watercourses.

There are two categories of surface water across the premises that will require different management measures to minimise potential impacts on the downstream environment:

- Clean water: runoff from upstream catchments and undisturbed or rehabilitated areas; and
- Dirty water: runoff from disturbed areas including roads, waste dumps, stockpiles and infrastructure pads.

The primary objective of the surface water management measures proposed for the premises is to result in no significant impacts on the local surface water regime in terms of both the quality and quantity of the water.

Treatment of clean water is not necessary as any sediment loads carried will be typical of the area and can be returned, untreated, to the downstream environment. Dirty water runoff from disturbed areas has potential to contain high sediment loads and will be managed using the following measures:

- Direct dirty water runoff from waste dumps and crusher pads directed to sedimentation basins; and
- Design access roads and internal haul roads to minimise any contribution to sediment loads during frequent rainfall events.

Water will generally be treated close to the disturbance areas to reduce the volume of runoff involved and maintain separation from clean water. Runoff will be captured using bunds and open drains to direct it towards sedimentation basins for treatment prior to discharging to the downstream environment. Batter faces of bunds will be designed to minimise the potential for erosion, with rock pitching, vegetation and lining where the water velocity and bund material indicate that erosion is likely.

2.5.10.3 Erosion Controls

The main site infrastructure locations will generally follow the site topography and consist of compacted surfaces with higher gravel content, which will minimise raindrop impact erosion. Controls related to specific items of infrastructure are discussed below.

Stockpiles and Waste Rock Dumps

Topsoil stockpiles will be constructed no higher than 3 m and subsoil stockpiles no higher than 10 m with a slope of ≤ 15°. This will help to minimise erosion from the stockpiles by limiting the length and steepness of the outer stockpile slopes. Stockpiles that will be retained for a period of greater than three months and which have not naturally established a suitable density of groundcover to minimise erosion will be bunded around the perimeter to minimise sediment mobilisation.

Berms and back-sloped berms may be constructed around WRDs to minimise erosion and ensure long term stability of the dumps. The erosion control measures include the following, noting that the methods adopted are dependent on future waste characterisation studies:

- Wide berms;
- Backslope on berms and tops to reduce runoff down batter face;
- Installation of toe bunds where batters are parallel to sensitive receptors (e.g., creeks, etc.);
- Minimise lift heights where possible, depending on stability classification of the construction material; and

- Sedimentation basin.

Haul Roads

Haul roads will be built-up above the natural surface in most areas and designed to be water shedding to avoid pooling and piping which can lead to scouring and erosion of the road surface and embankments. Haul roads will be constructed using compacted competent local soil materials. The proposed roads will require flood ways, culverts and diversion drains to direct the main flow paths upstream and decrease risk of erosion in the roads. Premises access roads will be sealed and unlikely to contribute to sediment loads.

Embankments

Steep slopes and batters will require stabilisation or other methods to reduce erosion, particularly slopes for stockpiles, WRDs, new roadside batters, and flood and drainage channels. Methods such as benching or terracing, geotextile lining, geo-matting, rock mulching, rock armouring, or other methods will be used where required.

2.5.10.4 Drainage

The drainage structures that will be used to control erosion and sedimentation on the premises are described below.

Catch Drains (Clean Water)

Diversion channels will collect and convey clean stormwater around infrastructure, separating it from catchments that produce dirty water. The channels will have well-defined bed and banks that are stabilised with lining or vegetation, depending on the in-situ conditions and design velocity.

Clean water drains will be designed to convey the peak flows from the required design rainfall event. In general, the drains will be trapezoidal in shape with maximum side slopes of 1V:3H and minimum 2 m wide base. Grades more than 1.0% are to include energy dissipation measures to prevent runoff causing scour or erosion in downstream drainage systems.

Diversion channels will be located and designed to minimise the size of the dirty water catchment draining to sedimentation basins.

Catch Drains (Dirty Water)

Catch drains are small open channels that will be used to collect and convey dirty water (i.e., sediment-laden runoff) down slope of a disturbance and direct it to a sediment basin. Catch drains can cause significant erosion issues if overtopped during heavy storms. If high velocities are expected, the drain will be appropriately stabilised with geotextile fabric, erosion control mats/mesh, grass, or rock.

In general, the drains will be trapezoidal in shape with maximum side slopes of 1V:3H and varying depth. Rock protection and energy dissipation structures will be installed at the downstream outlets, where required, to prevent runoff causing scour or erosion in downstream drainage systems.

Levees

Levees will be used to protect critical mine infrastructure and will be designed in conjunction with drains to divert high volumes of clean water, and separate clean and dirty water. Levees will typically be constructed using low permeability material to prevent seepage and be protected from erosion where required.

Subject to future geotechnical investigations, levees will be constructed from compacted low permeability material and operate with little or no seepage. Subject to detailed design, they will typically have a 5 m wide crest, 1V:3H side slopes, and may be armoured where scour could occur.

Sedimentation Basins

Dirty water from disturbed areas will be directed into sedimentation basins to reduce sediment loads prior to discharge into the downstream environment. Sufficient basin depth will be provided to ensure adequate storage for deposited sediment and remove the design sediment load.

Proposed nominal locations of sedimentation basins are shown on, Figure 2-7, and an indicative plan and cross-section is shown on the plan in Attachment 8G. A schedule of the basins, including catchment areas, is provided in Figure 2-7.

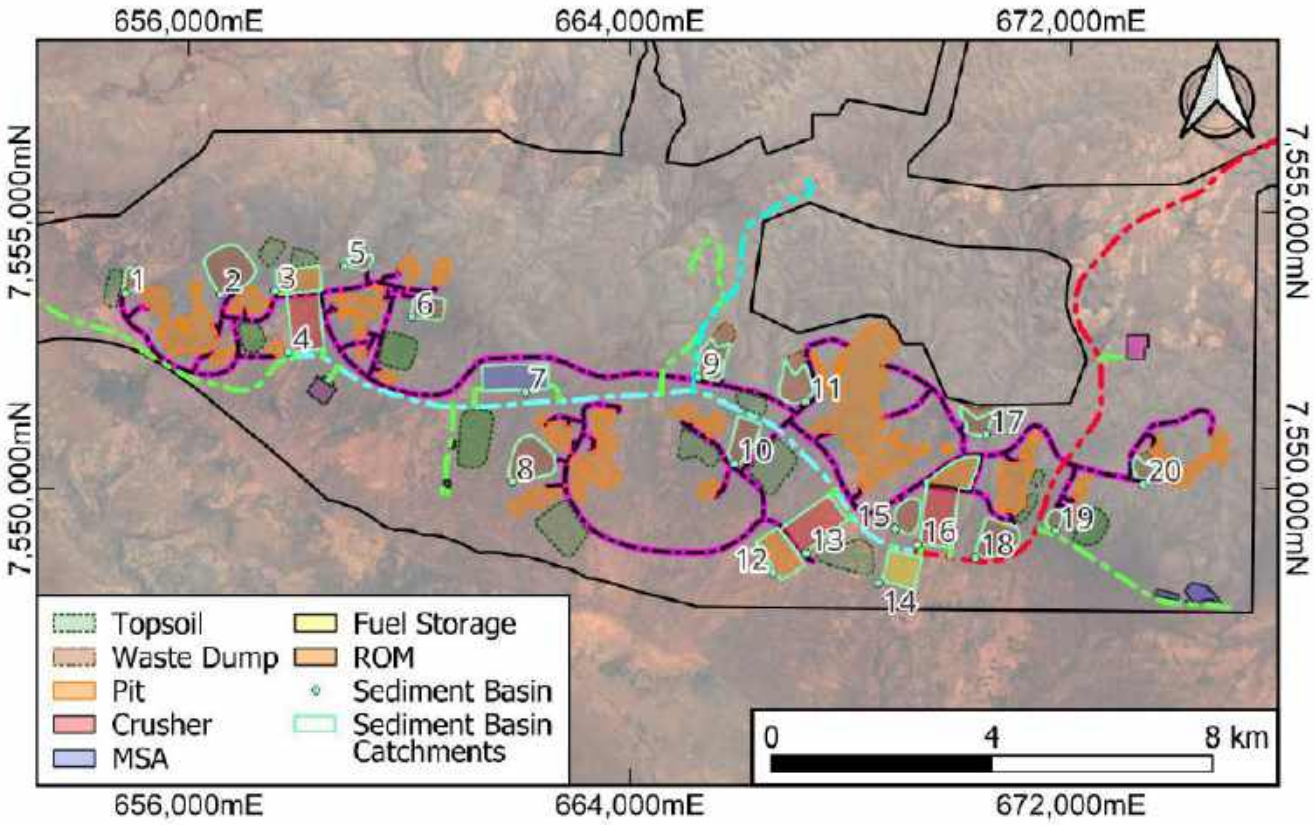

Figure 2-7 Proposed location of sedimentation basins (Agilitus 2025)

Figure 2-7 Design and construction/installation requirements

Id	Catchment	Catchment area (km^2)	Depth (m)	Surface length (m)	Surface width (m)
MD_SP01	Waste dump	0.094	1.5	14	38.4
MD_SP02	Waste dump	0.573	1.57	14	38.4

Id	Catchment	Catchment area (km^2)	Depth (m)	Surface length (m)	Surface width (m)
MD_SP03	Pad	0.349	1.5	14	38.4
MD_SP04	Pad	0.615	1.6	14	38.4
MD_SP05	Waste dump	0.101	1.5	14	38.4
MD_SP06	Waste dump	0.222	1.5	14	38.4
MD_SP07	Pad	0.558	1.56	14	38.4
MD_SP08	Waste dump	0.504	1.52	14	38.4
MD_SP09	Waste dump	0.287	1.5	14	38.4
MD_SP10	Waste dump	0.298	1.5	14	38.4
MD_SP11	Waste dump	0.316	1.5	14	38.4
MD_SP12	Pad	0.418	1.5	14	38.4
MD_SP13	Pad	0.627	1.51	14	38.4
MD_SP14	Pad	0.446	1.5	14	38.4
MD_SP15	Waste dump	0.233	1.5	14	38.4
MD_SP16	Pad	0.973	1.76	14.7	40.5
MD_SP17	Waste dump	0.171	1.5	14	38.4
MD_SP18	Waste dump	0.403	1.5	14	38.4
MD_SP19	Waste dump	0.082	1.5	14	38.4
MD_SP20	Waste dump	0.101	1.5	14	38.4

The basins have been designed to remove 80% of all sediments greater than 125 µm for a 10% AEP 6-hour event. During larger events (such as a 1% AEP event), flow will still be processed through the basins; however, the detention time and sediment removal efficiency will be reduced. During these events, the sediment loads in runoff are naturally elevated and, therefore, dirty water passing through the basins will not adversely impact the downstream environment.

The sediment basin outlet structures consist of a spillway designed for events greater than the 10% AEP. Sediment will be removed from the basin before each wet season, or at other appropriate intervals established from monitoring.

2.5.11 Support Infrastructure

The supporting infrastructure for the MDIOM will include an aerodrome, communications tower, road haul laydown area, and ancillary buildings such as gatehouse, workshops and offices.

Haul and light vehicle roads will be built to access areas of the premises and to allow for ore to be hauled to Port Hedland or rail siding along the Roy Hill rail mainline for export.

3 Emissions and Discharges

The key emissions and discharges and associated actual or likely pathways during construction and time-limited operation of the MDIOM are detailed in Table 3-1. The table also details the proposed control measures to assist in controlling these emissions, where necessary.

3.1 Environmental Management

The minimum Environmental Compliance Standards relevant to HanRoy projects are outlined in Attachment 8H. Various management plans and procedures will be developed by HPPL for implementation during construction and operation of the MDIOM dependant on risk and potential impact, including:

- Event Management and Investigation Procedure (HNR-00000-HS-PRO-0023); and
- Spill Response Procedure (HNR-00000-EN-PRO-0006).

3.2 Records and Reporting

Reporting for the MDIOM will be in accordance with the works approval and is expected to include:

- Environmental compliance report(s) confirming that infrastructure and equipment have been constructed in accordance with the relevant requirements of the works approval and providing as-constructed plans and detailed site plans for each item; and
- Time limited operation report(s) providing a summary of time limited operations, including environmental performance of all infrastructure and equipment, volumes and quality of wastewater treated and discharged to land, and a review of performance and compliance against the conditions of the works approval.

HPPL will maintain accurate and auditable records regarding the works conducted in accordance with the works approval, the maintenance of any infrastructure and equipment, and any monitoring carried out, including:

- Incident report forms;
- Audit and inspection forms;
- Corrective Action Register;
- Monitoring results; and
- Monitoring equipment calibration results.

In addition, HPPL will record relevant information in relation to any complaints received about any alleged emissions from the premises, including:

- The name and contact details of the complainant, (if provided);
- The time and date of the complaint;
- The details of the complaint and any other concerns or other issues raised; and
- The details and dates of any action taken to investigate or respond to any complaint.

Table 3-1 Emissions and discharges

Emission or discharge type	Source of emission or discharge	Volume and frequency	Potential pathways and impacts	Proposed controls	Location on Premises Layout Map (Map 3 n Attachment 2)
Construction					
Dust	Crushing and screening	Fugitive	Crushing, vehicle movement, strong winds generating dust resulting in impact to amenity, and vegetation and flora.	Staged construction works required for short durations. Dust suppression using water cart. Water sprays installed and utilised on crushing and conveying plant. Polymer dust suppression products considered if stockpile or general dust management issues are ongoing. Crushing plant positioned with separation distance to vegetation. Cessation of crushing during periods of strong wind and generation of high dust load. Crushing to be undertaken progressively. Limit driving speeds on unsealed surfaces to the posted speed (60 km/hr upper limit on unsealed roads). Crushing during high winds (>50 km/hr) avoided.	Within prescribed premises boundary
Noise	Crushing and screening. Use of mobile plant.	Fugitive, intermittent	Use of equipment generating noise disrupting fauna activities such as breeding, hunting and foraging which in turn affects ecosystem health.	Staged construction works required for short duration. Noise emissions managed in accordance with the Environmental Protection (Noise) Regulations 1997. Regular inspection and servicing of mobile plant and equipment.	Within prescribed premises boundary

Emission or discharge type	Source of emission or discharge	Volume and frequency	Potential pathways and impacts	Proposed controls	Location on Premises Layout Map (Map 3 n Attachment 2)
Potentially contaminated surface water	Crushing and screening. Use of mobile plant.	Fugitive, intermittent	Poor stormwater management including inadequate design and improper placement of topsoil stockpiles causing sediment runoff and impacts to downstream surface water quality (e.g., sedimentation of the Fortescue Valley and freshwater claypans).	Avoid placing topsoil stockpiles in areas that will interfere with drainage system. Divert clean water from upstream catchments around infrastructure footprints and into downstream flow paths using natural channels as much as possible. Control stockpile heights, reuse topsoil and design batter slopes that minimise potential for erosion. Bund stockpiles to contain sediment runoff and direct to a sediment trap. Stormwater control infrastructure, such as bunding or diversion drains will be installed to minimise topsoil loss through water erosion. All diversions to be returned to the same downstream catchment/ drainage path, where possible.	Within prescribed premises boundary
Hydrocarbons	Use of mobile plant Refuelling of mobile plant. Storage of fuel.	Fugitive, infrequent. Maximum storage capacity at one location (200 kL).	Leak or spill and overland runoff/ migration into surface water impacting surface water quality and causing ecosystem disturbance.	Regular inspection and servicing of mobile plant and equipment. Fuel stored in self-bunded (doubled-skinned) tanks. Spill kits available on mobile plant and at key locations. Spills cleaned up immediately and contaminated soil disposed off-site to a licensed facility.	Within prescribed premises boundary

Emission or discharge type	Source of emission or discharge	Volume and frequency	Potential pathways and impacts	Proposed controls	Location on Premises Layout Map (Map 3 n Attachment 2)
Combustion gases	Temporary diesel fuelled generators	Fugitive, continuous	Air/wind dispersion causing human health and ecological impacts	Small capacity units spread across construction footprint. Modern generators conforming to cotemporary emissions standards. Generators maintained in accordance with manufacturers specifications. Regular inspection and servicing of generators.	Within prescribed premises boundary
Time limited operations					
Dust	ROM stockpiles, crusher plant, conveyor transfer points, stackers and product stockpiles	Fugitive, continuous	Crushing, vehicle movement, strong winds generating dust resulting in impact to amenity, and vegetation and flora.	Dust suppression using water cart. Water sprays installed and utilised on crushing and conveying plant. Polymer dust suppression products considered if stockpile or general dust management issues are ongoing. Infrastructure and equipment will undergo regular maintenance and housekeeping practices to prevent dust build up. Limit driving speeds on unsealed surfaces to the posted speed (60 km/hr upper limit on unsealed roads).	Crusher locations
Noise	Crushing and screening. Use of mobile plant. Pumps and process plant (e.g., WWTP)	Fugitive, intermittent	Use of equipment generating noise disrupting fauna activities such as breeding, hunting and foraging which in turn affects ecosystem health.	Noise emissions managed in accordance with the Environmental Protection (Noise) Regulations 1997. Regular inspection and servicing of plant and equipment.	Crusher locations
Potentially contaminated surface water	Crushing and screening. Use of mobile plant.	Fugitive, intermittent	Poor stormwater management including inadequate design and improper placement of stockpiles causing sediment runoff and impacts to downstream surface water quality	Avoid placing infrastructure in areas that will interfere with drainage system.	Crusher locations

Emission or discharge type	Source of emission or discharge	Volume and frequency	Potential pathways and impacts	Proposed controls	Location on Premises Layout Map (Map 3 n Attachment 2)
			(e.g., sedimentation of the Fortescue Valley and freshwater claypans).	Divert clean water from upstream catchments around infrastructure footprints and into downstream flow paths using natural channels as much as possible. Graded pads (0.5%) and bunds to contain sediment runoff and direct to a sedimentation ponds. Stormwater control infrastructure, such as bunding or diversion drains will be installed to minimise topsoil loss through water erosion. All diversions to be returned to the same downstream catchment/ drainage path, where possible. Vegetation monitoring undertaken in areas at risk of altered surface water quality.	
Hydrocarbons	Use of mobile plant Refuelling of mobile plant. Storage of fuel.	Fugitive, infrequent. Maximum storage capacity at one location (200 kL).	Leak or spill and overland runoff/ migration into surface water impacting surface water quality and causing ecosystem disturbance.	Regular inspection and servicing of mobile plant and equipment. Fuel stored in self-bunded (doubled-skinned) tanks. Spill kits available on mobile plant and at key locations. Spills cleaned up immediately and contaminated soil disposed off-site to a licensed facility.	Within prescribed premises boundary
Groundwater	Dewatering and MAR	Continuous dewatering and MAR during mine operations	Impacts on flora and vegetation and other water users resulting from changes to groundwater levels.	Management as per Water Management Plan under Part IV of EP Act (Attachment 8I) and GWOS (Attachment 8K).	Borefield and mine pits

Emission or discharge type	Source of emission or discharge	Volume and frequency	Potential pathways and impacts	Proposed controls	Location on Premises Layout Map (Map 3 n Attachment 2)
				Abstraction rates and volumes as per RIWI Act licences. Multiple MAR areas to allow flexibility of reinjection. Groundwater monitoring, frequency, analysis, and reporting. Undertake Hydrological assessments (H1 & H2), as required. Regular updates to the groundwater model (via ongoing ecohydrological investigations) All reinjection bores have a shallow control piezo adjacent with automatic shutoff if the groundwater level reaches a level specified in the Water Management Plan; Vegetation monitoring is undertaken in areas at risk of mounding or drawdown.	
Treated wastewater	Irrigation of treated wastewater	Up to 140 kL per day	Overland runoff / migration into surface water and groundwater potentially causing ecosystem disturbance or impacting surface water quality Localised contamination of soils Exposure of humans and fauna to treated wastewater	WWTP operated in accordance with manufacturer specifications Servicing and maintenance of WWTP (including spray field) in line with manufacturer Operation and Maintenance Manual Treatment of wastewater to specified low risk standard Wastewater volumes and camp population monitored to ensure the design capacity of the WWTP is not exceeded	Spray Field

Emission or discharge type	Source of emission or discharge	Volume and frequency	Potential pathways and impacts	Proposed controls	Location on Premises Layout Map (Map 3 n Attachment 2)
				Monitoring of treated wastewater quality Spray Field sized appropriately Irrigation system designed to prevent run-off and spray drift 5 m buffer around Spray Field Perimeter bund around Spray Field to prevent ingress/egress of surface water Irrigation limited during periods of extended heavy rain Spray Field fenced with safety signage limiting access.	
Spills/ unintended releases of untreated wastewater, sludge or treatment chemicals	WWTP tanks, vessels and pipes Sludge dewatering and storage Chemical storage.	Fugitive (up to 50 kL assuming one complete tank rupture), rare event	Overland runoff / migration into surface water and groundwater potentially causing ecosystem disturbance or impacting surface water quality Localised contamination of soils	Containerised system with enclosed vessels and tanks WWTP and tanks installed on concrete hardstand Daily inspection of WWTP and pipelines Sludge dewatering system and storage on bunded hardstand Level indicators (visible and audible) fitted on all sewage storage vessels to indicate that the facility is nearing capacity Chemicals stored in appropriate containers in accordance with Australian Standard 3780-2008 The storage and handling of corrosive substances All secondary containment facilities must have a minimum capacity of	Camp Spray Field

Emission or discharge type	Source of emission or discharge	Volume and frequency	Potential pathways and impacts	Proposed controls	Location on Premises Layout Map (Map 3 n Attachment 2)
				110% of the largest storage vessel within the containment facility, plus 25% of the capacity of all stored individual containers	
Odour	Upset process conditions (WWTP) Sludge and storage tanks (WWTP)	Fugitive; intermittent	Air/windborne pathway causing impacts on amenity at sensitive receptors.	Containerised system with enclosed vessels and tanks Automated control and visual and audible alarms for upset conditions Daily inspection of WWTP.	Accommodation Camp Spray Field
	Disposal of waste in landfill			Waste will be compacted and covered at least weekly.	Landfill site
Litter		Fugitive; intermittent	Air/windborne pathway causing impacts on amenity at sensitive receptors.	The landfill site will be fenced and secured when not in use. No two trenches will be in operation at any one time Waste will be covered at least weekly. Windblown waste will be collected weekly and returned to the landfill site.	
Pest, pathogen and disease vectors		Fugitive; intermittent	Attraction and harbouring of pests causing nuisance and transmission of disease.	Landfill site will be inspected regularly for vermin and fauna. The landfill site will be fenced and secured when not in use. Waste will be covered at least weekly.	
Leachate		Intermittent, low volume	Seepage to land and groundwater causing contamination.	Surface water diverted around the landfill and landfill trenches to prevent infiltration into the waste mass. Waste will be covered at least weekly. Closed trenches will be graded to promote run-off.	
Contaminated stormwater		Intermittent, low volume	Overland flow causing contamination.		

Emission or discharge type	Source of emission or discharge	Volume and frequency	Potential pathways and impacts	Proposed controls	Location on Premises Layout Map (Map 3 n Attachment 2)
Fire (smoke; fire-fighting water)		Fugitive; rare	Air/windborne pathway causing impacts on amenity and health at sensitive receptors. Overland flow causing contamination.	Firebreak of at least 3 m around boundary of landfill site. No burning of waste permitted. Implementation of Landfill Management Procedure.	
Fire (smoke; fire-fighting water)	Storage of used tyres	Fugitive; rare	Air/windborne pathway causing impacts on amenity and health at sensitive receptors. Overland flow causing contamination.	No more than 6,000 used tyres stored. Tyres stored in batches of not more than 100 tyres, with a minimum 6 m separation distance between batches. Used tyres either stacked on their side walls or if stored on treads, secured with a device made of non-combustible material. Tyres disposed of in batches separated from each other by at least 100 mm of soil and each consisting of not more than 1,000 whole tyres. Tyres covered under a final soil cover of not less than 500 mm as soon as practical following the achievement of final waste levels. A firebreak will be maintained around the storage and disposal areas. Implementation of Tyre Storage and Disposal Management Procedure with consideration of DFES Guidance Note: GN02.	Tyre storage and disposal areas

3.3 Noise Emissions

3.3.1 Noise Assessments

Lloyd George Acoustics (LGA 2024) was engaged to undertake an assessment of the potential noise and vibration impacts from the MDIOM on surrounding noise sensitive receptors, including:

- Wirrilimarra and Youngaleena Communities;
- Heritage sites;
- Auski Munjina Roadhouse;
- Munjina East Gorge;
- Karijini Eco Retreat; and
- Mulga Downs Homestead.

Four scenarios were modelled as part of the assessment, which were developed as 'worst-case' to ensure a conservative approach to modelling:

- Scenario 1A: East-Central areas with Conveyors;
- Scenario 1B: East-West areas with conveyors;
- Scenario 2A: East-Central areas with road trains; and
- Scenario 2B: East-West areas with road trains.

The findings of the noise assessment are discussed in the following sections.

3.3.2 Noise Limits

The Environmental Protection (Noise) Regulations 1997 (Noise Regulations) adopt three noise metrics to quantify the noise limits:

- LA_{max} signifies a noise level which is not to be exceeded at any time;
- LA_{1} signifies a noise level which is not to be exceeded for more than 1% of the time; and
- LA_{10} signifies a noise level which is not to be exceeded for more than 10% of the time.

A summary of the applicable noise limits is provided below in Table 3-2. The criteria limit utilised for the assessment of noise levels was "*Noise sensitive premises: any other area than highly sensitive area*".

Table 3-2 Assigned noise limits

Part of premises receiving noise	Time of day	Assigned limit dB(A)		
		LA_{10}	LA_1	LA_{max}
Noise sensitive premises: highly sensitive area	07:00 to 19:00 hours Monday to Saturday	45 dB(A) + Influencing Factor	55 dB(A) + Influencing Factor	65 dB(A) + Influencing Factor
	09:00 to 19:00 hours Sundays and public holidays	40 dB(A) + Influencing Factor	50 dB(A) + Influencing Factor	65 dB(A) + Influencing Factor
	19:00 to 22:00 hours all days	40 dB(A) + Influencing Factor	50 dB(A) + Influencing Factor	55 dB(A) + Influencing Factor
	22:00 hours on any day to 07:00 hours Monday to Saturday and 09:00 hours Sunday and public holidays	35 dB(A) + Influencing Factor	45 dB(A) + Influencing Factor	55 dB(A) + Influencing Factor
Noise sensitive premises: any other area than highly sensitive area	All hours	60 dB(A)	75 dB(A)	80 dB(A)
Commercial premises	All hours	60 dB(A)	75 dB(A)	80 dB(A)
Industrial and utility premises	All hours	65 dB(A)	80 dB(A)	90 dB(A)

3.3.3 Noise Levels

The maximum noise levels for the four scenarios modelled at each of the sensitive receptors considered in the assessment are outlined in Table 3-3.

Operational mining noise from the MDIOM received at the nearest sensitive receptors is predicted to comply at all times with the criteria provided in the Noise Regulations and in worst case scenarios. The sensitive receptors considered in accordance with the Noise Regulations were communities, accommodation villages and tourism sites.

Table 3-3 Noise assessment

Receiver type (nearest receiver)	Approximate nearest distance to receiver	Predicted	Adjusted	Criteria Level	Assessment
Homesteads (Hooley Station)	33 km	-	-	35	Complies
Auski Munjina Village	23 km	-	-	35	Complies
Karajini Eco Retreat	37 km	-	-	35	Complies
Munjina East Gorge	36 km	-	-	35	Complies
Communities (Wirrilimarra)	8.5 km	19	24	35	Complies

Notes:

*Adjusted by +5 dB for tonality when assessing to human receptors.
Cells denoted with a "-" result are greater than 20 km away and not predicted by the computer model.

3.3.4 Noise Monitoring

SLR Consulting (SLR) was engaged to conduct baseline noise monitoring at the Youngaleena Community (the community) located approximately 14 km south of the prescribed premises boundary.

On 31 July 2024, SLR deployed a noise logger and weather station at the community (Figure 3-1). The monitoring location is representative of background noise levels within the community, with minimal interference from community noise (note: noise from the operation of the power station's diesel generator, which operates intermittently, is audible at the monitoring site).

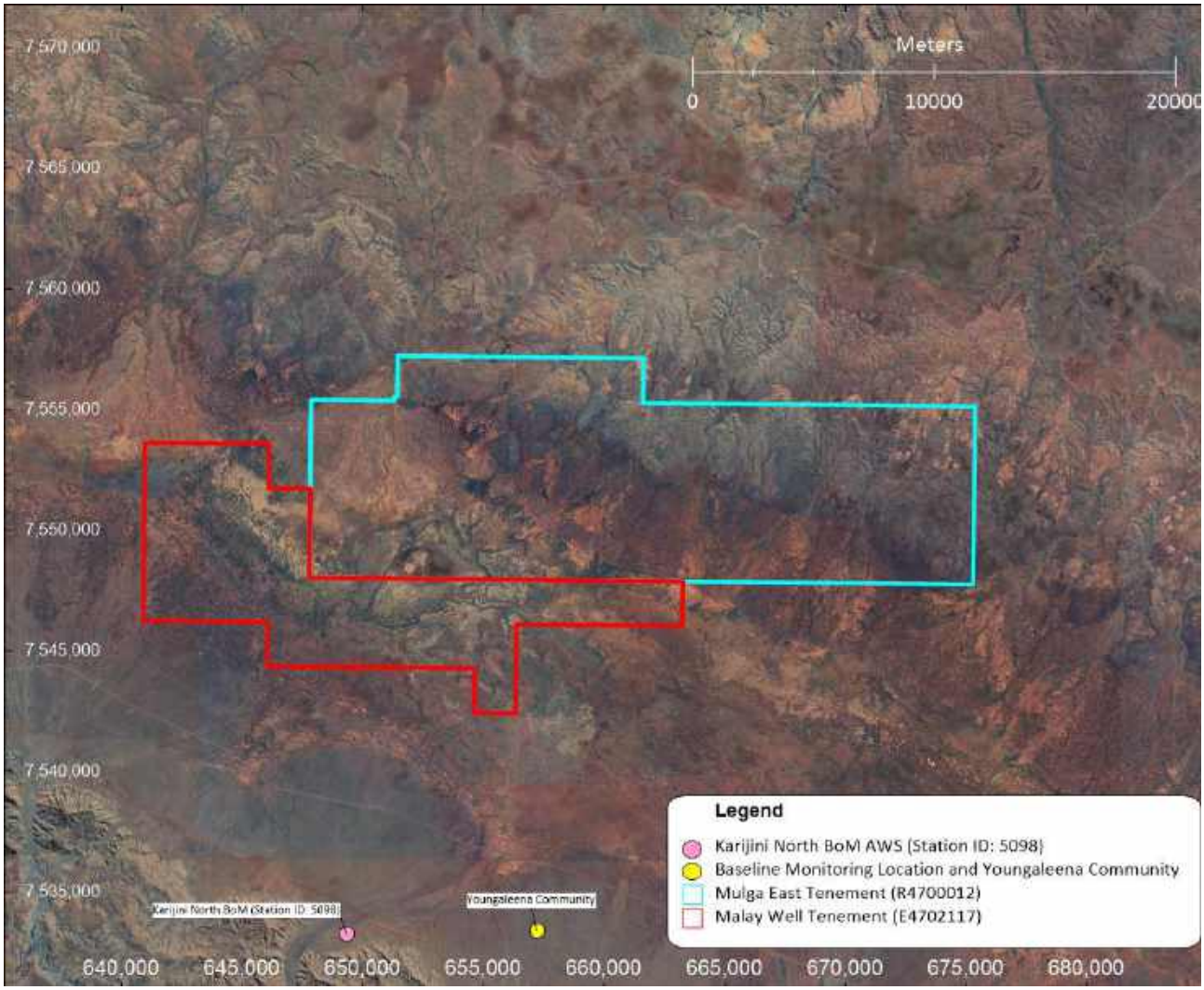

Figure 3-1 Noise monitoring location (SLR 2025a)

The results of the monitoring from 1 August 2024 to 31 July 2025 are provided in Attachment 8L. In summary, the results indicate that:

- Ambient sound levels are linked to seasonal changes, wind activity, local insect activity, and, potentially, operation of the diesel generator that services the community; and

- Ambient sound levels were typically above Assigned Noise Levels (noise limits under the Environmental Protection (Noise) Regulations 1997), for most months and time periods.

If required, HPPL will develop suitable construction and operational design targets for noise using the measured baseline noise levels, which will be conditional on the time, season or live weather conditions.

3.4 Ambient Air Quality

The Pilbara is a naturally dusty environment with wind-blown dust being a significant contributor to the airborne dust levels. In 2000, Sinclair Knight Merz (SKM) was commissioned by the then WA Department of Environmental Protection (DEP) to prepare an Aggregated Emissions Inventory of National Pollutant Inventory (NPI) substances for the Pilbara Airshed for the NPI Database for the 1999 to 2000 financial year (SKM 2003).

The study calculated that approximately 170,000 tonnes of dust were emitted because of wind erosion from open bare areas associated with eroded land on alluvial plains where over grazing and a run of poor seasons had exposed the soil. Where overgrazing had occurred on soils with little stony mantle for protection from wind erosion, severe erosion had occurred with soil loss due to wind action.

3.4.1 Baseline Air Quality Monitoring

SLR was engaged to undertake 12 months of continuous baseline monitoring for fine particulates (as particulate matter with an aerodynamic diameter less than 10 micron [PM_{10}]) at one location and bi-monthly dust deposition at three locations around the MDIOM (Figure 3-2). SLR sited, installed and commissioned the monitoring equipment between 7 May 2019 and 9 May 2019.

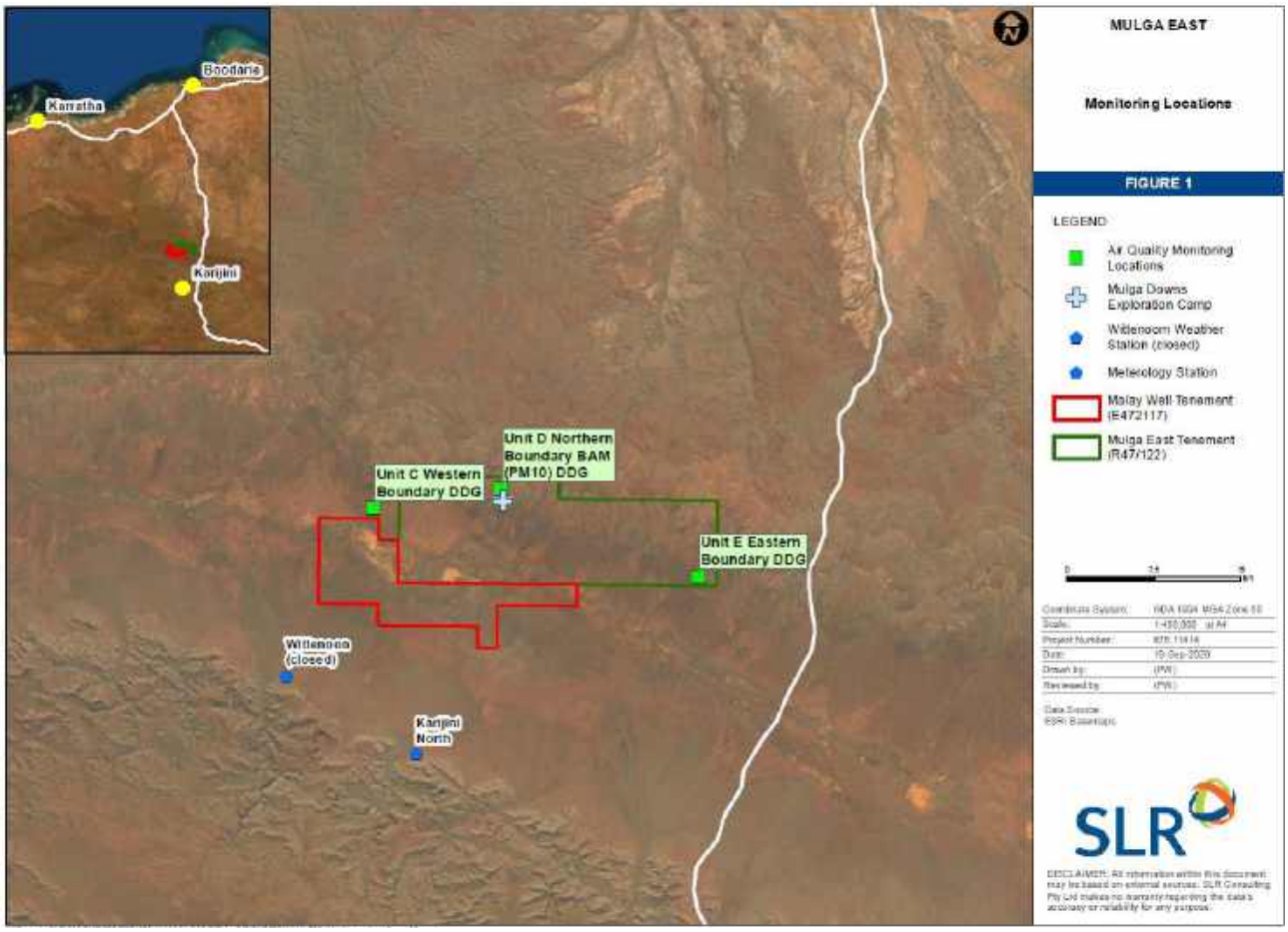

Figure 3-2 Air quality monitoring locations

3.4.1.1 Monitoring criteria

The monitoring data was assessed against relevant assessment criteria, as follows.

The *National Environment Protection Council Act 1994* (Commonwealth) established the National Environment Protection Council (NEPC), which determines and evaluates National Environment Protection Measure (NEPMs) for the nation. The *National Environment Protection Council (Western Australia) Act 1996* is a mirror legislation of the Commonwealth legislation and implements the NEPMs in Western Australia.

Air quality criteria are derived from the National Environment Protection (Ambient Air Quality) Measure (Air NEPM), which provides air quality standards applicable to urban airsheds, including criteria for particles such as PM_{10}. In Western Australia, the Air NEPM criteria are applied to sensitive receptors, defined as residences, hospitals, schools and other places where people may congregate, including sporting and recreational venues. The remoteness, low population and the high ambient dust levels of the local area mean that these criteria are not directly applicable to the MDIOM.

Although DWER does not have generic PM_{10} criteria applicable to remote mining operations, it has previously accepted that the Air NEPM PM_{10} standard cannot be met in the Pilbara region, recognising that the region's arid climate between June and November and areas of low vegetative cover can lead to periodic dust events caused by wind erosion of exposed surfaces. The Port Hedland Dust Management Taskforce, established to plan for and coordinate dust management in the town, recommended an air guideline value (AGV) for PM_{10} of

70 µg/m^3 averaged over 24-hours. The Western Australian Government has endorsed the AGV for residential areas of Port Hedland, and the value has been used to assess other mining projects in the Pilbara region. Therefore, this AGV was selected as the assessment criteria for the MDIOM.

Without a Western Australian-specific guideline for deposited dust rates, the New South Wales EPA dust assessment criteria of 4 g/m^2/month, with a maximum allowable increase of 2 g/m^2/month, were identified (EPA [NSW] 2022). These criteria are based on the outcomes of a study of community perception of coal dust impacts and are frequently adopted as informal assessment criteria in the absence of other guidance. These criteria have also been adopted for the MDIOM.

3.4.1.2 Measured Air Quality

The results of the baseline monitoring concluded that (SLR 2020):

- No PM_{10} concentrations above the adopted 24-hour criteria of 70 µg/m^3 were recorded during the monitoring period, with a maximum concentration of 62 µg/m^3 measured on 1 December 2019.
- Measured dust deposition rates were highest during the start of the wet season, with an average baseline dust deposition rate recorded over the three gauges of 2.1 g/m^2/month recorded during November 2019 to January 2020.
- High PM_{10} concentrations were identified under all wind directions, i.e., there was no correlation between PM_{10} concentration and windspeed or wind direction;
- Both PM_{10} concentrations and dust deposition rates were higher during the wet seasons than during the dry seasons; and
- No significant change in PM_{10} concentrations or dust deposition rates was evident between monitoring years.

3.4.2 Air Quality Assessment

The potential air quality impacts of the MDIOM were determined through a dispersion modelling study, which incorporated prognostic meteorological data and emissions information estimates based on equipment design specifications. The scope of the modelling assessment is summarised in Table 3-4.

Table 3-4 Overview of air quality assessment

Parameter	Description
Modelled meteorological period	12-month period from January 2020 - December 2020
Model selection	WRF/CALMET/CALPUFF model suite
Key pollutants	Particulate matter (PM), including TSP, PM_{10} and $PM_{2.5}$ size fractions, and dust deposition
Meteorological data	Three-dimensional prognostic meteorological data developed using the Weather Research and Forecasting (WRF) model
Background air quality	Published air quality monitoring data for the Pilbara used as a suitable proxy of existing (baseline) concentrations for key pollutants
MDIOM emissions	For the maximum material handling year (2031)
Sensitive receptors	Discrete receptor locations were nominated to represent: Human receptors (health and amenity) Heritage receptors Ecological receptors, including fauna (habitat)

Parameter	Description
Modelled scenarios	Scenario 1: Baseline operational activity in highest tonnage year, without dust abatement . Scenario 2: Baseline operational activity in highest tonnage year, with dust abatement

The key findings of the modelling assessment, in relation to the potential environmental impacts, were that ground level concentrations of all the modelled pollutants at sensitive receptors were below the relevant assessment criteria. Elevated concentrations of all modelled pollutants were predicted to occur at receptors within the MDIOM (e.g., HanRoy employees and contractors) near to mine operations.

The air quality assessment report is provided in Attachment 8M.

3.4.3 Community Dust Monitoring

SLR was engaged to conduct 12 months of baseline air quality monitoring at the Youngaleena Community commencing 31 July 2024. The objective of the baseline monitoring program was to assess the background air quality in the local environment rather than targeting specific emission sources. The monitoring location selected (Figure 3-3) is representative of the community whilst providing an appropriate separation distance from the diesel generator located in the community.

Continuous PM_{10} monitoring was performed using a Met One E-BAM instrument in general accordance with AS/NZS 3580.9.11:2022 *"Methods for sampling and analysis of ambient air: Determination of suspended particulate matter – PM10 beta attenuation monitors"*.

Dust deposition monitoring was conducted with a 60-day changeover frequency in accordance with AS/NZS 3580.10.1:2016 *"Methods for sample and analysis of ambient air – Determination of Particulates – Deposited Matter – Gravimetric method"*. Whilst the standard recommends a nominal 30-day exposure period, it allows for less frequent changeovers appropriate for remote sampling locations like the MDIOM.

Figure 3-3 Air quality monitoring location (SLR 2025b)

The results of the annual monitoring (SLR, 2026 *in prep.*) from 1 August 2024 to 11 November 2025 indicate that:

- Data capture for the monitoring period was above 75%.
- There were no exceedances of the 24-hour PM10 criterion during the periods in which data was successfully collected.
- There were no exceedances of dust deposition during the 12-month monitoring period.

3.5 Surface Water

A surface water monitoring program is defined in the Water Management Plan (Attachment 8I). The surface water monitoring network comprises reference monitoring sites unaffected by mining operations and monitoring sites potentially impacted (disturbed) by development of the MDIOM (Figure 3-4).

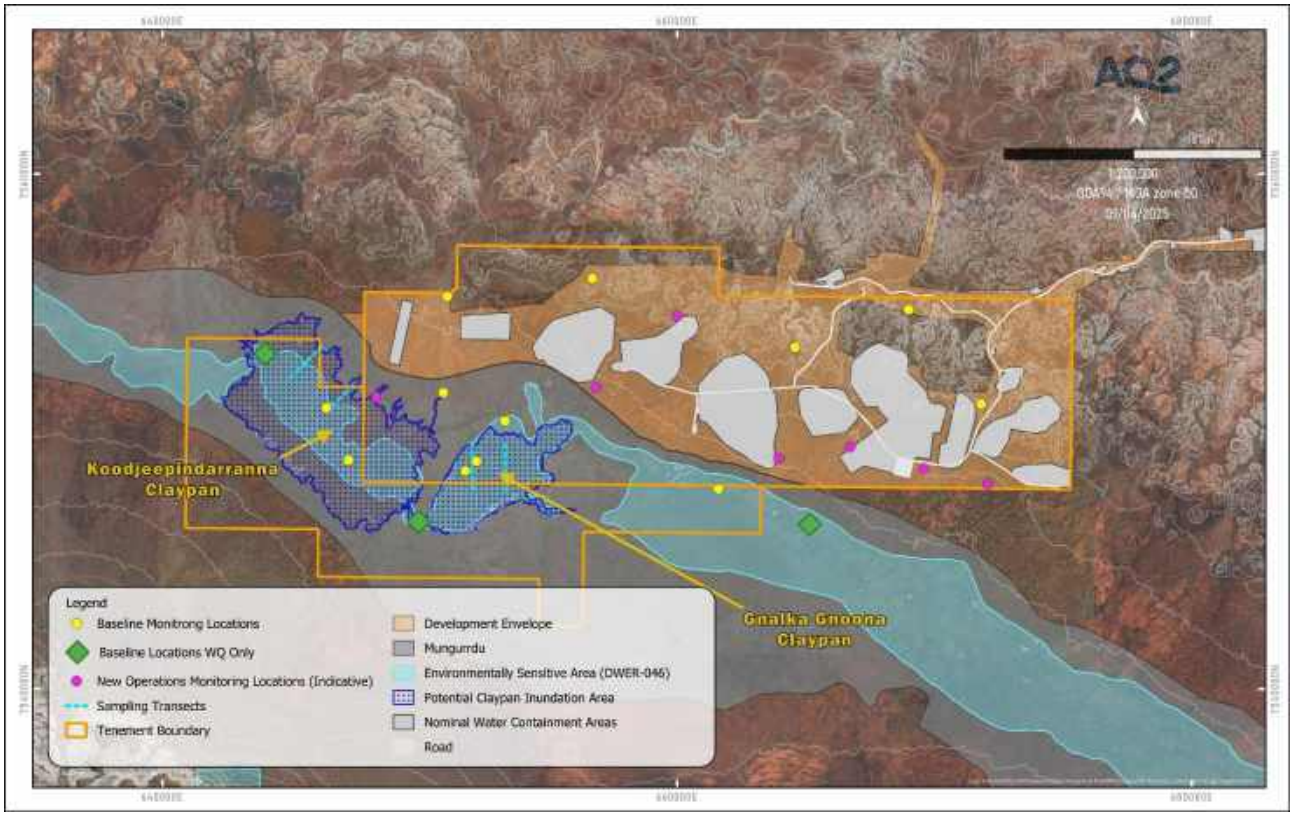

Figure 3-4 Proposed surface water monitoring network

Water quality sample collection from the claypans is proposed to be taken along transects across the claypans, as the exact location for sample collection will be dependent on the level of inundation within the claypan. A single water sample is proposed to be taken from the transect during each monitoring event.

Water quality samples will be collected opportunistically after a substantial rainfall event. Other than the claypans and other ponding locations, the monitoring sites will contain a passive water quality sampling unit installed in the drainage line which will collect a water quality sample when water levels reach a set flow/inundation depth (to avoid collecting first flush samples).

An updated surface water monitoring program will be defined, pending finalised mine design, to assess surface water quality around specified mine areas, mine infrastructure and landforms.

Where specified, surface samples will be analysed at a National Association of Testing Authorities (NATA) certified laboratories. As part of the revised surface water monitoring program, preparation and sampling laboratory methods and appropriate limits of reporting (LORs), as well as other relevant analytical parameters, will be defined an included in the Water Management Plan. Proposed surface water monitoring field parameters are shown in Table 3-5**.**

Table 3-5 Proposed surface water field parameter monitoring

Parameter	Unit of Measurement	Comment
Depth to Water	Metres below ground level (mbgl)	-
pH	-	To be collected where field water quality monitoring is specified
Electrical Conductivity	Microsiemens per centimetre (µS/cm)	
Temperature	Degrees Celsius (°C)	
Dissolved Oxygen	Percentage (%)	To be collected where water quality sampling is specified
Redox Potential	Millivolts (mV)	

3.6 Groundwater

A groundwater monitoring program is defined in the Water Management Plan (Attachment 8I). The proposed groundwater monitoring timing and frequency is provided in Table 3-6. Groundwater sample analytical results will be compared against provisional groundwater quality results identified in the management plan. Proposed groundwater monitoring bores are shown in Figure 3-5.

Table 3-6: Proposed ground monitoring bore information

Bore / Site	Easting	Northing	Stressor	Monitoring Parameter	Receptor	Status	Tenement Status
MDE_MON_1	645718	7556531	MAR	Water Quality - Salinity	Shallow Fresher GW - Other GW Users	Proposed	Tenement Required
MDE_MON_2	654703	7551910	MAR	Water Quality - Salinity	Shallow Fresher GW - Other GW Users	Proposed	On Tenement
MDE_MON_4	665185	7546959	MAR	Water Level - Mounding	Mounding at break of slope	Proposed	Tenement Pending
MDE_MON_5	667964	7545368	MAR	Water Level - Mounding	Mounding at break of slope	Proposed	Tenement Granted
MDE_MON_6	669255	7543432	MAR	Water Level - Mounding	Mounding on valley floor	Proposed	Tenement Required
MDE_MON_7	671873	7543379	Dewatering	Water Level - Drawdown Extent	Other GW Users	Proposed	Tenement Granted
MDE_MON_8	666653	7542993	MAR	Water Level - Mounding	Mounding on valley floor	Proposed	Tenement Pending
MDE_MON_9	675125	7547815	MAR	Water Quality - Salinity	Other GW Users - Wirrilimarra	Proposed	On Tenement
MDE_MON_10	676395	7546188	MAR	Water Quality - Salinity	Other GW Users - Wirrilimarra	Proposed	Tenement Required
MDE_MON_11	669636	7547030	MAR	Water Quality - Salinity	Shallow Fresher GW - Other GW Users	Proposed	Tenement Required
MDE_MON_12	671595	7545400	MAR	Water Quality - Salinity	Shallow Fresher GW - Other GW Users	Proposed	Tenement Required
MDE_MON_13	658610	7537800	Dewatering	Water Level - Drawdown Extent	Other GW Users - Youngaleena	Proposed	On Tenement
MDPZ7449A,B,C	655657	7551787	MAR	Water Level - Mounding	Mounding at break of slope	Existing	On Tenement
MDPZ7450A, B, C	652219	7552541	MAR	Water Level - Mounding	Tracking mounding for break of slope	Existing	On Tenement
MDPZ7451A, B, C	651347	7550579	MAR	Water Level - Mounding	Mounding near Claypans	Existing	On Tenement
MDPZ7456A, B,C	665851	7547907	MAR	Water Level - Mounding	Tracking mounding for break of slope	Existing	On Tenement
MDPZ7460A, B, C	663202	7547987	MAR	Water Level - Mounding	Mounding at break of slope	Existing	On Tenement
MDPZ7461	656010	7542996	Dewatering	Water Level - Drawdown Extent	Other GW Users - Youngaleena	Existing	On Tenement
MDPZ7462A, B, C	644800	7548089	Dewatering	Water Level - Drawdown Extent	Other GW Users	Existing	On Tenement
MDPZ7463	642867	7553588	Dewatering	Water Level - Drawdown Extent	Other GW Users	Existing	On Tenement

Bore / Site	Easting	Northing	Stressor	Monitoring Parameter	Receptor	Status	Tenement Status
MDPZ7464	649944	7552428	MAR	Water Quality - Salinity	Shallow Fresher GW - Other GW Users	Existing	On Tenement
MDPZ7465, MDPZ0757	670005	7547881	MAR	Water Quality - Salinity	Shallow Fresher GW - Other GW Users	Existing	On Tenement
MDPZ7468A, B, C	647191	7551524	MAR	Water Level - Mounding	Koodjeepindarranna Claypan	Existing	On Tenement
MDPZ7469A, B, C	657312	7550011	MAR	Water Level - Mounding	Mounding at break of slope	Existing	On Tenement
MDPZ7470A, B, C	661399	7546377	MAR	Water Level - Mounding	Mounding on valley floor	Existing	On Tenement
MDPZ7471A, B, C	646686	7549394	MAR	Water Level - Mounding	Koodjeepindarranna Claypan	Existing	On Tenement
MDPZ7472	670921	7555275	Dewatering	Water Level - Drawdown Extent	Other GW Users	Existing	On Tenement
MDWB0011	660244	7557808	Dewatering	Water Level - Drawdown Extent	Other GW Users	Existing	On Tenement
MDWB0013	665270	7556265	Dewatering	Water Level - Drawdown Extent	Other GW Users	Existing	On Tenement
MDWB0034	652853	7555585	MAR	Water Quality - Salinity	Shallow Fresher GW - Other GW Users	Existing	On Tenement

A revised groundwater monitoring program, including bore locations will be defined, pending finalised mine design and approvals for land access, to assess groundwater quality around specified mine areas, mine infrastructure and landforms.

All groundwater samples will be analysed at NATA certified laboratories. As part of the revised groundwater monitoring program, preparation and sampling laboratory methods and appropriate LOR, as well as additional hydrogeochemical analytical parameters, will be defined an included in this WMP. Proposed groundwater field parameters are shown in Table 3-7.

Table 3-7 Proposed groundwater field parameter monitoring

Parameter	Unit of Measurement	Comment
Depth to Water	Metres below ground level (mbgl)	-
pH	-	To be collected where field water quality monitoring is specified
Electrical Conductivity	Microsiemens per centimetre (µS/cm)	
Temperature	Degrees Celsius (°C)	
Dissolved Oxygen	Percentage (%)	To be collected where water chemistry sampling is specified
Redox Potential	Millivolts (mV)	

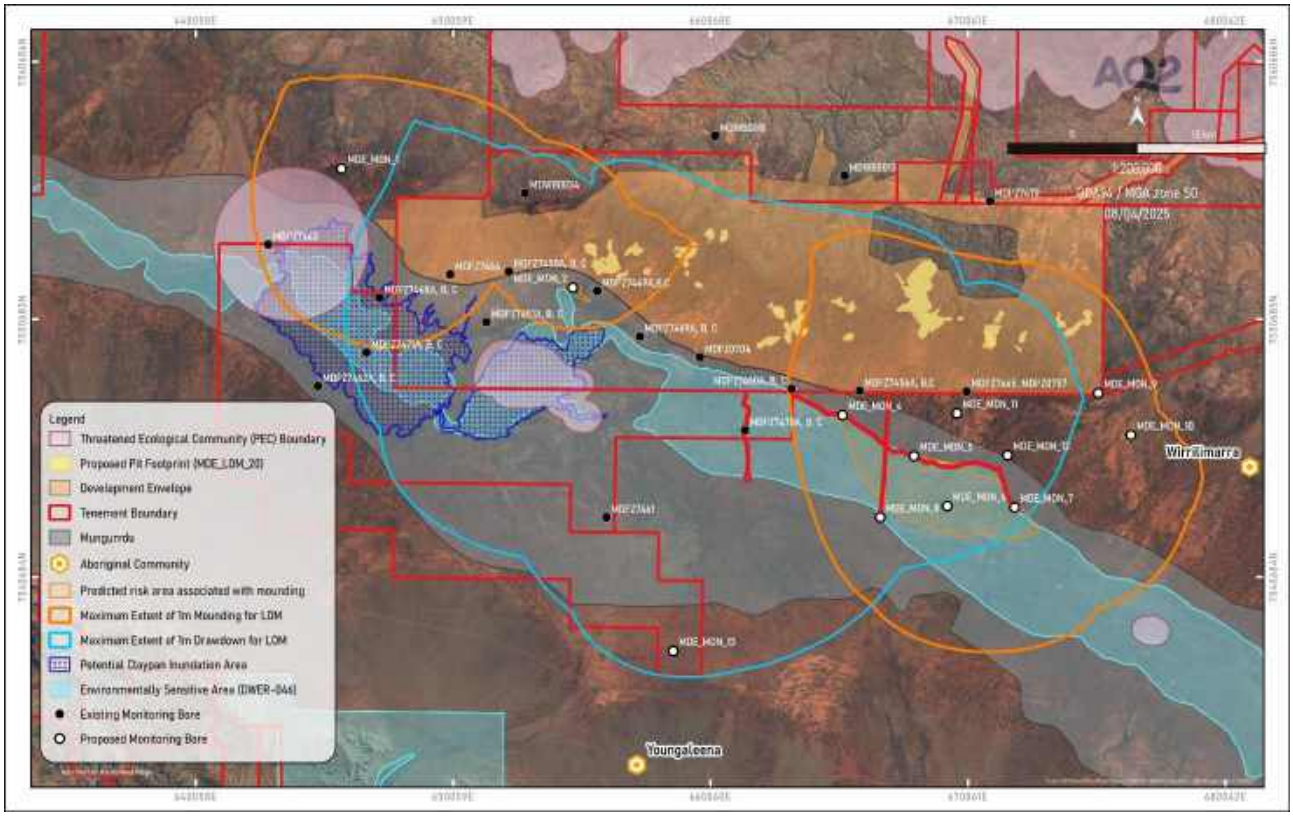

Figure 3-5 Proposed groundwater monitoring network (AQ2 2024)

3.7 Vegetation health monitoring

A vegetation health monitoring program will provide an early-warning system to detect potential indirect impacts from mining activities on sensitive vegetation communities, particularly from groundwater mounding and altered surface water regimes. The monitoring is a component of the Water Management Plan (Attachment 8I).

The monitoring program uses a combined on-ground and remote-sensing approach, supported by a Before-After-Control-Impact (BACI) statistical design to differentiate mining-related changes from natural environmental variability. The monitoring focuses on areas identified as most sensitive to hydrological change, including claypans, riparian vegetation, sheet flow dependent vegetation, and areas potentially affected by groundwater mounding.

At each site, vegetation condition will be measured using multiple indicators, such as plant mortality, crown health, physiological measurements, species composition, soil salinity and remotely sensed canopy condition indices. Monitoring will be conducted annually at the end of the dry season, when vegetation is most likely to show stress effects and when seasonal vegetation interference is minimal.

Findings of the monitoring data will be reported through an annual Vegetation Health Monitoring Report, which will document methods, results and any recommended management responses. Trigger and threshold exceedances identified through monitoring will inform adaptive management actions to prevent or mitigate impacts.

4 Location and Siting

The information presented in this section has been sourced from various baseline surveys and desktop reports undertaken for the MDIOM since 2018, and from publicly available datasets, and describes the regional and local context of environmental values relating to the MDIOM. The ERD prepared by HPPL for the assessment of the MDIOM under Part IV of the EP Act contains more detailed information regarding the environmental setting of the premises, specifically relating to flora and vegetation, terrestrial fauna and inland waters. The ERD can be accessed from the EPA's website[2].

4.1 Premises Location

The MDIOM is located approximately 210 km south of Port Hedland and 180 km northwest of Newman in the Pilbara Region of Western Australia (Map 1 in Attachment 2).

4.2 Sensitive Land Uses

A sensitive land use is a residence or other land use which may be affected by an emission or discharge associated with the proposed activities at the MDIOM. Sensitive land uses identified for the MDIOM and their distance and direction from the prescribed premises boundary are detailed in Table 4-1 and on the Land Use and Sensitive Receptors plan (Map 4 in Attachment 2).

Table 4-1 Sensitive land uses

Receptor	Description	Distance and direction from Premises boundary
Wirrilimarra Community	Aboriginal community	~6.4 km southeast
Youngaleena Community	Aboriginal community	~16 km southwest
Yandeyarra Aboriginal Reserve	Reserve managed by Mugarinya Community Association Incorporated	~5.6 km north/northeast
Auski Munjina Village	Roadhouse with accommodation, camping facilities and restaurant	~23 km south
Karijini National Park	State Government managed park for conservation purposes with recreation values	~16 km south
Mungaroona Range Nature Reserve	State Government managed area for conservation purposes with recreation values	~10 km north

4.3 Environmentally Sensitive Receptors and Aspects

The potential environmental receptors that emissions and discharges from the premises may impact are summarised in Table 4-2 and more detail is provided in the following sections.

[2] Mulga Downs Iron Ore Mine | EPA Western Australia

Table 4-2 Environmentally sensitive receptors and aspects

Receptor	Description	Distance and direction from Premises boundary	Location (Maps in Attachment 2)
Environmentally Sensitive Areas	Fortescue Valley, a designated Environmentally Sensitive Area (Fortescue Marshes WA066).	Approximately 4 km SW.	Map 9
Threatened and Priority Ecological Communities (TEC/PEC)	Threatened Ecological Communities (TEC).	None within the premises or within 20 km of the premises.	N/A
	Freshwater claypans of the Fortescue Valley PEC (Priority 1).	The premises boundary does not intersect the buffer to the PEC, located to the W and SW of the premises.	Map 14
	Four plant assemblages of the Wona Land System PEC (Priority 1-3).	Intersects N and NE part of the premises.	Map 15
Threatened and/or priority flora	Threatened flora.	None mapped within premises.	
	Priority flora.	Several P1-P4 species mapped within the premises and surrounding area.	
Threatened and/or priority fauna	Threatened and Priority fauna.	11 conservation significant fauna species recorded within the premises.	
Aboriginal and other heritage sites	Lodged and Registered Aboriginal heritage places.	The Aboriginal Cultural Heritage Inquiry System (ACHIS) maintained by the DPLH identifies 6 registered sites and 134 lodged heritage places within premises. Further Aboriginal heritage surveys have identified a total of 303 sites of heritage value within the premises.	Map 17
Public drinking water source areas	Priority public drinking water source areas and wellhead protection zones.	None identified.	N/A
Rivers, lakes, oceans, and other bodies of surface water, etc.	Proclaimed areas under the RiWI Act.	The premises is located within the Pilbara Surface Water Area.	Local catchments shown on Map 9
	Ramsar listed wetlands or wetlands listed in the Directory of Important Wetlands in Australia (DIWA).	None within premises. The nearest DIWA listed wetland is the Fortescue Marsh, located approximately 34 km SW of the premises.	Map 9
Acid sulfate soils (ASS)	Acid sulfate soil risk mapping has been developed by DWER and is available for the Pilbara coastline and other limited areas within the region. The MDIOM is not located within an area that is delineated as having ASS risk from the DWER mapping dataset (DWER 2025). Additional, ASS probability mapping is available from the CSIRO Atlas of Australian Acid Sulfate Soils (Fitzpatrick et al 2011). This mapping provides a provisional ASS classification inferred from national and state soils, hydrography, vegetation and landscape coverages mapped at a base scale of 1:2.5 million. The CSIRO mapping is very broad scale and has not involved any ground-truthing. This	Low risk of ASS within the premises.	N/A

Receptor	Description	Distance and direction from Premises boundary	Location (Maps in Attachment 2)
	mapping indicates that there is a Low (Class B) to Extremely Low (Class C) probability of ASS within the MDIOM (Fitzpatrick et al. 2011).		
Other	The MDIOM does not overlap any recognised Conservation Areas. Two land areas managed for conservation purposes by State Government occur near the MDIOM.	Karijini National Park approximately 22 km S Mungaroona Range approximately 22 km NW	Map 1 in Attachment 2

4.4 Climate

4.4.1 Climatic Zone

The premises is located within the inland portion of the Pilbara region of Western Australia. The climate in the Pilbara is as a semi-desert, tropical climate with high summer temperatures, low rainfall and high evaporation. Two distinct seasons occur, comprising a hot summer extending from October to April, where maximum daily temperatures can exceed 35 °C, and a mild winter from May to September (BoM 2024). Rainfall is typically associated with cyclonic and storm weather systems during the hot summer months (Van Vreeswyk et al 2004).

The closest Bureau of Meteorology (BoM) automatic weather station to the MDIOM with historical climate recording data is Wittenoom (station number 005026), approximately 35 km southwest of the mine. However, Wittenoom station closed in 2019 and Karijini North (station number 005098), approximately 13 km southeast of Wittenoom and 32 km southwest of the MDIOM, is now the closest and used for the most recent climate trends in the region. Data from both stations was used to provide temperature statistics for the MDIOM.

4.4.2 Temperature

Average daily maximum temperatures across the Pilbara are typically around 20°C in winter and exceed 30°C across the region in summer and early autumn. Average daily maximum temperatures tend to exceed 35°C from October to March and it is not uncommon to see temperatures more than 40-45°C (AQ2 2024).

4.4.3 Rainfall

Rainfall across the Pilbara region is seasonal and highly variable. It is possible for significant rainfall events to be recorded in one location with minimal rainfall being recorded at the next nearest weather station. Rainfall is typically associated with cyclonic and storm weather systems (van Vreeswyk et al 2004) and can be defined by three broad climatic periods (AQ2 2024):

- From 1900 until approximately 1970 there is an increasingly negative deviation from the long-term average rainfall, which indicates a dry period. There was a similarly increasingly negative deviation from the long-term average maximum temperature. Over this time only, average rainfall at Mulga East was 321 mm/year (compared with 359 mm/year as the long-term SILO average rainfall);
- For a circa 25-year period from 1970 to 1995, rainfall was close to the long-term average. Average rainfall at Mulga East over this period was 378 mm/year. Average maximum temperature was relatively stable; and

- From 1995 to the present, the cumulative deviation became increasingly less negative indicating a wetter than average period. Average rainfall at Mulga East over this period was 445 mm/year. Maximum temperature shows a strongly increasing trend, and mean annual maximum temperature was 0.5°C greater than preceding periods.

Measured data shows that rainfall across the region has been variable since records started in 1950 at the Wittenoom station. The long-term data recorded at Wittenoom shows that rainfall varies significantly between the wet and dry seasons. Highest rainfalls are experienced between December and March, with the highest mean rainfall of 115.9 mm in January (see Table 4-3). Lowest rainfalls typically occur between April to November, with the lowest mean rainfall at 2.9 mm in September. The highest monthly rainfall recorded at Wittenoom was 470 mm in January 2012 (SLR 2021).

Table 4-3 Summary statistic monthly mean rainfall (mm) – Wittenoom

Wittenoom 5026												
Statistic	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Mean	115.9	103.1	68.9	27.3	26.7	29.3	13.7	7.7	2.9	3.9	9.5	48.4
Lowest	2.8	0	0	0	0	0	0	0	0	0	0	0
5th percentile	17	2.1	2.3	0	0	0	0	0	0	0	0	0.3
10th percentile	22.4	7.8	4.2	0	0	0	0	0	0	0	0	1
Median	81.2	63.5	31	9.8	11.2	11	4.8	0.2	0	0.4	5.3	24.4
90th percentile	257.6	235.6	173.3	77	71.4	90	38.4	26.1	9.4	12.2	23.8	111.5
95th percentile	308.6	287.7	277.6	103.5	101.2	105.2	49.2	33.8	14.9	22.1	31.6	124.4
Highest	469.8	422.6	371	225.2	176.5	188.5	105.9	72.7	61.2	40.6	50.2	509.5

Rainfall has also been recorded at Mulga Downs station since 1898, however continuous recording ceased in 2018, and only intermittent data has been available since (BOM 2024). The records show that annual rainfall can vary significantly in this area, consistent with the data from Wittenoom (Table 4-4).

Table 4-4 Average Rainfall, Mulga Downs BoM Station 1898 – 2018 (AQ2 2024)

	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Mean Rainfall (mm)	13.2	6.8	2.4	2.9	8.5	35.1	84.2	77.3	61.4	23.6	24.1	23.2	**362.7**

A plot of the annual total and average rainfall data from Wittenoom and Mulga Downs is shown in Figure 4-1.

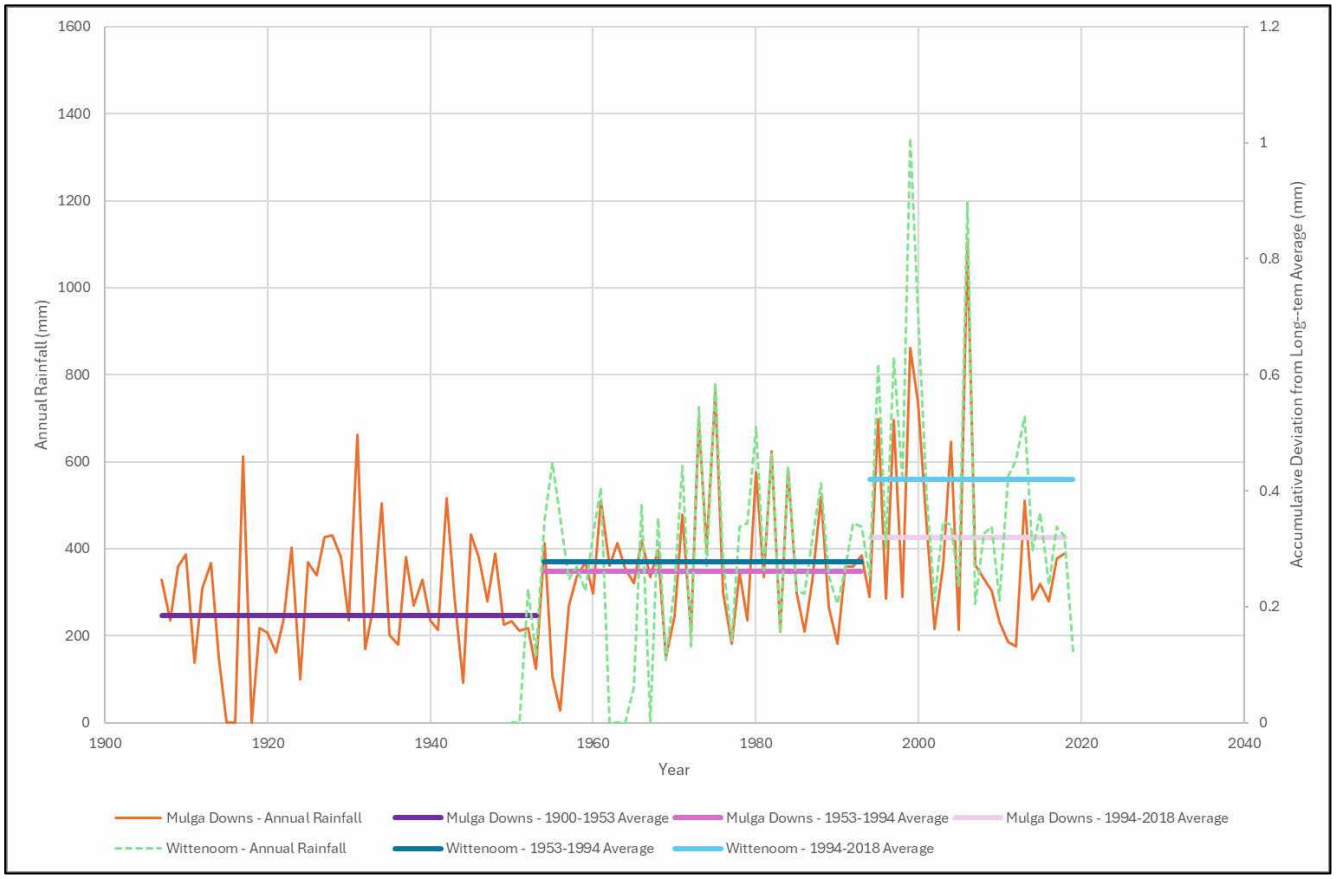

Figure 4-1 Annual Rainfall – Mulga Downs (AQ2 2024)

4.4.4 Evaporation

Potential evaporation exceeds annual rainfall by a factor of at least eight and has a significant influence on both the flora and fauna of the region (Mckenzie et al. 2009). Average pan evaporation data across Australia is illustrated in Figure 4-2. In the Pilbara region, pan evaporation rates vary between 3,200 mm and 4,000 mm per year. Average pan evaporation rates at the MDIOM are approximately 3,400 mm per year (BoM 2024).

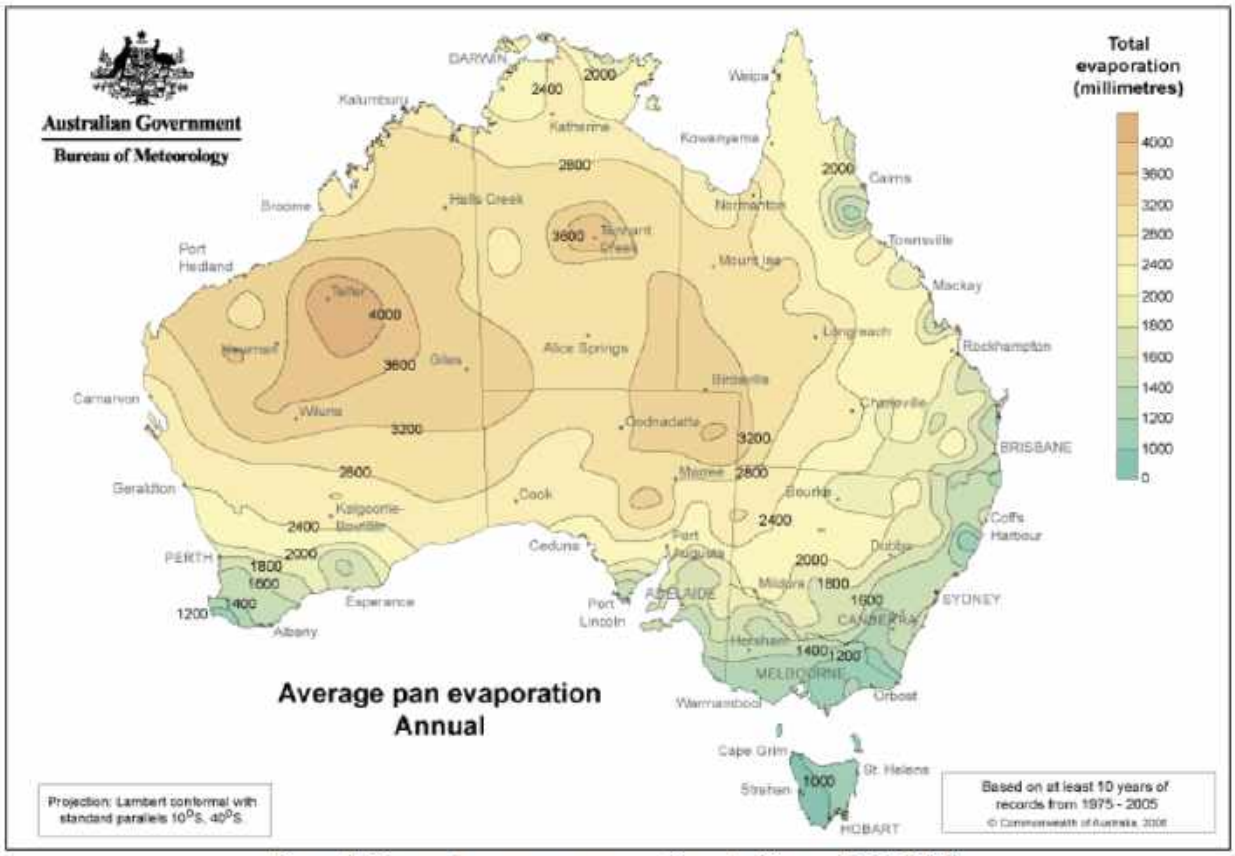

Figure 4-2 Annual average pan evaporation rate (Source: BoM, 2024)

Mean potential evaporation rates across the year for the Pilbara region are shown in Table 4-5 (BoM 2024).

Table 4-5 Potential evaporation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean potential evap. (mm)	150	200	275	350	440	425	375	300	290	275	175	130	3,385

4.4.5 Wind

Wind rose data is only available from the Karijini North weather station as shown in Figure 4-3. The winds are typically from the east and southwest, with little variation between the wet and dry seasons (SLR, 2021).

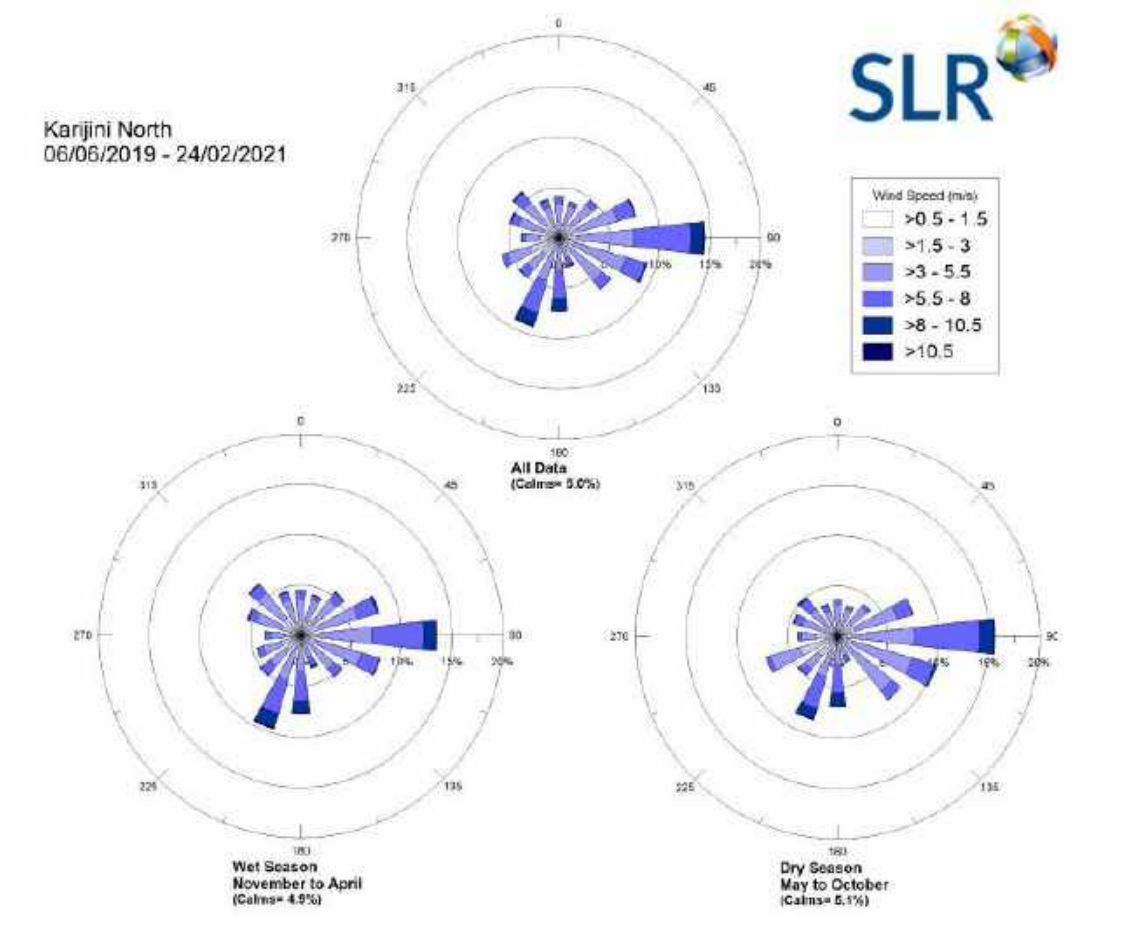

Figure 4-3 Wind data from Karijini North (Station 05098) (SLR, 2021)

4.4.6 Seasonal and Long-Term Climatic Trends

The CSIRO has developed future climate projections for the Pilbara region that suggest the average rainfall will not vary by more than 5% when compared to the long-term average under a median global greenhouse emissions scenario.

Fewer tropical cyclones are expected, but a greater proportion are projected to be high intensity, with ongoing large variations from year to year. Potential evaporation is expected to gradually increase from current levels, in the order of 3% by 2030 and 5% by 2050 (CSIRO 2023).

In summary, the future climate is anticipated to feature an increased moisture deficit with higher evaporation rates and more irregular, higher intensity rainfall.

4.5 Landscape

4.5.1 Regional Landscape

The Pilbara region occupies greater than 178,000 km^2 of Western Australia. It is bordered to the west and east by the more recent sedimentary Carnarvon and Canning basins, respectively. The southern boundary of the Pilbara region is the biogeographic boundary known as the *Acacia-Triodia* line. This line, or more accurately

transition zone, is where woody Acacia vegetation that dominates the landscape to the south transitions to the north where spinifex vegetation dominates (Beard 1975, Beard 1990; Maslin & van Leeuwen 2008).

The MDIOM is located within the Central Pilbara region to the north of the Fortescue River and on the southern side of the Chichester Range, east of the Great Northern Highway. The Chichester Range comprises low-lying hills that rise to approximately 30-40 m above the level of the adjacent flood plains of the Fortescue River to the south and the Yule River to the north.

The Chichester Range forms a watershed between the numerous rivers flowing north to the coast and the Fortescue River in the south at an average elevation of between 400-500 m above Australian Height Datum (AHD). Elevations dip to approximately 400 m AHD along the Fortescue River and Goodiadarrie Swamp to the south (MWH, 2012). The MDIOM has a maximum elevation of 440 m AHD, with surrounding land at elevations of 410 m to 420 m AHD.

4.5.2 Biogeographic Region

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies the land surface of Australia from a range of environmental attributes into bioregions. The bioregions have been developed at the national level to assess and plan for the protection of biological diversity (Thackway and Cresswell 1995). IBRA defines 89 bioregions and 419 subregions in Australia.

Twenty-six bioregions occur in Western Australia, which are then further defined into subregions. Subregions may be defined based on finer differences in geology, vegetation and other landform patterns which are related systems within each bioregion.

The MDIOM is located within the Pilbara biogeographic region of IBRA (assigned the IBRA7 code PIL). The Pilbara bioregion is one of the largest bioregions with an area of 179,287 km^2, which is typical of bioregions situated in remote arid and semi-arid areas (Maia, 2022). There are four subregions within the Pilbara biogeographic region — Chichester, Fortescue Plains, Hamersley, and Roebourne. The MDIOM lies predominantly in the Fortescue subregion with very small sections in the Chichester subregion (Map 5 in Attachment 2).

The Fortescue Plains subregion is characterised as alluvial with river frontages, extensive salt marsh, mulga-bunch grass and short grass communities on the plains in the east. River gum woodlands fringe the drainage lines and extensive calcrete aquifer feeds numerous permanent springs in the central part of the region. The area supports a large permanent wetland with extensive stands of river gum and cajuput (Kendrick & McKenzie 2001).

The Fortescue Plains subregion occupies an area of 2.04 million hectares, with the dominant land uses being grazing of native pastures, conservation areas, unallocated Crown land, Crown reserves and Aboriginal land. The Fortescue Marsh is located within the Fortescue Plains sub-region and is described as an episodically inundated samphire marsh. The marsh covers an area of approximately 1,000 km^2 and is about 100 km long by 10 km wide. The marsh contains various wetland types, including riverine floodplains, river flats, flooded river basins, seasonally flooded grassland, savannah, and palm savannah. The site also consists of seasonal or intermittent freshwater and floodplain lakes (Maia 2022).

4.5.3 Land Systems

The Department of Primary Industries and Regional Development (DPIRD) has mapped and described the land systems of Western Australia's rangelands, providing a comprehensive description of biophysical resources, including soil and vegetation condition (DPIRD 063). The MDIOM contains ten land systems as described in Table 4-6 and shown in Map 6 in Attachment 2.

Table 4-6 Land systems within the premises

Land System	Description	Current Extent in the Pilbara Bioregion (ha)	Extent within MDIOM (ha)	% of mapped extent
Bonney System	Low rounded hills and undulating stony plains supporting soft spinifex grasslands.	74,940.55	61.07	0.08
Boolgeeda System	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.	961,637.09	1,681.94	0.17
Brockman System	Level non-saline alluvial plains with clay soils and gilgai microrelief and flanked by slightly more elevated hardpan wash plains.	74,108.02	91.39	0.12
Hooley System	Level plains of clayey and stony alluvium as a mosaic of surfaces with gilgai microrelief, sometimes stony and non-gilgaied surfaces with abundant stony mantles.	59,081.14	1,578.16	2.67
Jamindie System	Stony hardpan plains and rises supporting groved mulga shrublands, occasionally with spinifex understorey.	192,227.17	6,881.74	3.58
Jurrawarrina System	Plains receiving overland sheet flow and with prominent drainage groves.	66,474.69	17.79	0.03
McKay System	Hills, ridges, plateaux remnants and breakaways of meta sedimentary and sedimentary rocks supporting hard spinifex grasslands with acacias and occasional eucalypts.	426,144.89	1,514.26	0.36
Newman System	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.	1,993,744.45	4,282.30	0.21
Rocklea System	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex and occasionally soft spinifex grasslands with scattered shrubs.	2,881,635.56	156.49	0.005
Wona System	Basalt upland gilgai plains supporting Roebourne Plains grass and Mitchell grass tussock grasslands, minor hard spinifex grasslands or annual grasslands/herbfields.	194,821.41	583.40	0.30
Total		**6,924,814.97**	**16,848.54**	**0.24**

4.5.4 Pre-European Vegetation

Vegetation at a pre-European regional scale has been described by Beard (1975). These vegetation units (vegetation associations) are broad scale and are aligned with landform, soil and topography. The MDIOM comprises four broad pre-European vegetation associations (Table 4-7 and Map 7 in Attachment 2).

Table 4-7 Pre-European vegetation associations

System Association	Pre-European Extent in Pilbara IBRA (ha)	Current Extent Remaining in Pilbara IBRA (ha)	Percentage of Current Extent Remaining (%)	Extent within the premises (ha)
Fortescue Valley 562	103,606.8	103,6060.8	100	15.9
Fortescue Valley 29	1,133,219.8	1,131,712.0	99.87	489.4

4.6 Geology and Soils

4.6.1 Regional Geology

The Pilbara region occupies the northernmost portion of the ancient Western Shield (Beard 1990). It is a distinct geological entity that is very different from the surroundings regions (Pepper et al 2013). The region is defined by the underlying sedimentary, volcanic and igneous rocks of the Pilbara craton some of which are up to 3.72 billion years old (Pepper et al 2013).

To the north, Archaean granites and metamorphosed volcanic rocks of the Pilbara Block form the undulating hills and plains observed throughout the Abydos Plain and Yule and De Grey River catchments. To the south, these older rocks are stratigraphically overlain by Archaean and Proterozoic basalts and iron rich sedimentary rocks (Banded Iron Formation [BIF]) that comprise the Hamersley Basin (Beard 1990; Van Vreeswyk et al 2004; Van Kranendonk et al 2002 in Pepper et al 2013). The Fortescue Valley forms part of the larger Hamersley Basin.

The Hamersley Basin comprises the geological strata that is key to the iron ore sector – the Marra Mamba and Brockman Formations. Both are hard and resistant and typically form dominant features in the landscape. The Hamersley Range forms the dominant geological (and topographic feature) to the south of the MDIOM.

The MDIOM is within the Fortescue Valley, which is between the Hamersley Basin Province to the south and Pilbara Terrain to the north. The spatial area occupied by these geological provinces is shown in Figure 4-4 (Pepper et al. 2013) and Map 8 in Attachment 2.

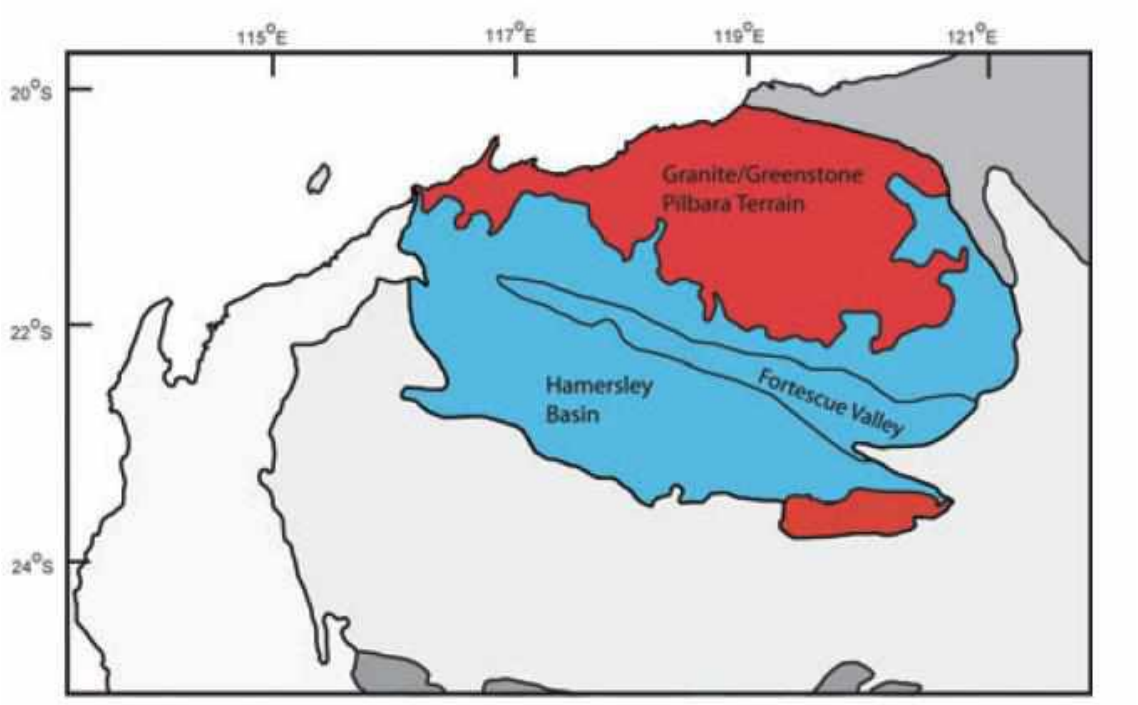

Figure 4-4 Simplified Pilbara geology

4.6.2 Soils

The Pilbara region is characterised by red, shallow soils on hills, ranges, and sandy plains. The soils are highly weathered due to the harsh environment of the region. The dominant soils throughout the region are extensive shallow red soils. Floodplain areas are made up of cracking and non-cracking clays, with duplex soils existing on saline alluvial plains (Van Vreeswyk et al 2004).

Soils are typically skeletal, shallow and stony having been derived either in situ or deposited as colluvial or fluvial materials with finer grained soils being more prevalent in the valleys. The parent geology and subsequent deep weathering of these rocks and leaching of the weathered materials has resulted in the soil being low in nutrients, slightly acidic, and of low fertility (Beard 1990; McKenzie et al 2009). Shallower soils were typically found in upland areas, with lowland soil profiles tending to be deeper (Landloch 2009; Mine Earth 2021).

The most extensive soils within the region comprise shallow stony soils on hills and ranges and sand on the sandplains (Landloch, 2009; Mine Earth 2021 with reference to Van Vreeswyk et al 2004). The dominant Soil Groups occurring in the Land Systems across the MDIOM are:

- Stony soils;
- Red shallow loams;
- Red loamy earths;
- Calcareous shallow loams; and
- Red-brown hardpan shallow loams.

Soils are classified as moderately permeable and tend to be moderately well-drained with water movement being limited by underlying rock. All soils are likely to have moderate plant availability water holding capacity (Mine Earth 2021).

4.7 Hydrology

4.7.1 Surface Water

The Fortescue Valley is dissected by the Goodiadarrie Hills into the Fortescue Marsh to the east, and the Goodiadarrie Swamp to the west. The Upper Fortescue River terminates at the Fortescue Marsh and the Lower Fortescue River rises to the west of Goodiadarrie Hills (Map 9 in Attachment 2).

The Premises is within the Goodiadarrie Swamp catchment which comprises a series of variably interconnected ephemeral swamps, claypans, and floodplains. The Goodiadarrie Swamp catchment forms a wetland mosaic which covers approximately 70 km and an area of 4,140 km² bounded by the Chichester Range to the north and the Hamersley Range to the south (AQ2 2024).

Following rainfall events, surface water runoff reports to the Fortescue Valley from the northern Chichester Range and the southern Hamersley Range for a short duration. Runoff from smaller rainfall events is likely to be contained within the Goodiadarrie Swamp area. Larger rainfall events may result in discharge to the Lower Fortescue River Valley, which flows in a westerly direction towards the Indian Ocean (located approximately 500 km to the west). No permanent surface water sources are mapped within the premises; however, numerous non-perennial water courses are mapped across the area.

The incised drainage lines exit from the Chichester Range across a series of alluvial fans and across the sheetwash plains characterised by the Jamindie Land System. These drainage lines spread out and become braided as they flow into and across the various alluvial fans and claypans that exist along the valley. The multiple discharge points have contributed to the complex surface water environment that exists in this section of the Lower Fortescue River Valley.

The alluvial outwash fan deposits from the various drainage channels (and calcrete deposits) have influenced the evolution of the river valley and location of claypans (Map 10 in Attachment 2). These have interrupted, diverted, and blocked the flow of water leading to the development of the swamp.

4.7.2 Claypans

The Koodjeepindarranna Claypan and Gnalka Gnoona Claypans are not located within the premises (Map 10 in Attachment 2); however, the MDIOM is located within their catchment areas. These two claypans are hydraulically linked by an overflow channel with surface flows from east to west following high rainfall events. Overflow from Gnalka Gnoona claypan into Koodjeepindarranna claypan would occur when water levels are above 402.75 m, Australian Height Datum (AHD).

The Gnalka Gnoona Claypan can form into an extensive (>1,000 ha) waterbody that may persist for extended periods. There are records of these claypans being inundated for several years following continuous favourable climate sequences. In combination with channels and smaller depressions, the claypans form an interconnected mosaic of wetlands supporting biological metacommunities. This is characteristic of arid zone wetlands and the pattern of delayed emergence of dormant biota. These areas are considered significant habitat for migratory, transient and resident birds. They also form vital refugia for many invertebrates (Pinder et al. 2017; Biologic 2023). Maintaining the connection between the two claypans is important in maintaining biodiversity values with a more resilient population developing from a greater gene pool than if isolated for extended periods.

The claypans appear to be inundated on a regular basis and it is likely that hydrologic responses from average, relatively frequent rainfall events are important in maintaining ecosystem function at the claypans (i.e. ecosystem function does not just rely on high magnitude low frequency runoff events).

4.7.3 Groundwater

Hydrogeology across the MDIOM and surrounding area is dominated by four units within the stratigraphic sequence (AQ2 2024):

- Tertiary and Quaternary cover (comprising Basal Crete, CID/Pisolite, Undifferentiated Tertiary and Upper Calcrete);
- Dolomite of the Wittenoom Formation;
- Altered Marra Mamba Iron Formation (including the West Angela member); and
- Fresh Jeerinah and Marra Mamba Iron Formations.

These bedrock and valley units host the groundwater system across the MDIOM and surrounding area. Secondary permeability, which is typically related to mineralisation of the bedrock, fracturing, and weathering is observed throughout the majority of the Marra Mamba Iron Formation and the overlying West Angela Member. Baseline studies and conceptual model indicate that these units are in hydraulic connection and form a transmissive basement aquifer.

The permeable bedrock units are sandwiched between the two aquitards: the underlying Jeerinah Formation and Nammuldi Member, and the overlying Wittenoom Formation within the valley area (as identified during the baseline survey and from the exploration geological records).

The Jeerinah Formation comprises black, pyritic and carbonaceous shales with minor chert beds which weather to a pink, brown and white clay. Together with the overlying Marra Mamba Member, it forms the basement aquitard. The overlying aquitard comprises the light grey, fresh, crystalline and hard Wittenoom dolomite, the majority of which has low permeability. Locally there may be areas or zones of higher permeability because of localised weathering and fracturing of the Paraburdoo Member of the dolomite sequence. Elsewhere in the Pilbara the Paraburdoo Member is considered as a regional aquifer. Baseline survey has demonstrated this is not the case in the vicinity of the premises.

The bedrock sequence is overlain by the Tertiary (and later Quaternary) materials (detrital) that have been derived from the erosion of the adjacent Chichester and Hamersley Ranges and deposited within the Fortescue River valley. This Tertiary detrital form an unconfined aquifer.

Recharge to the groundwater system occurs through infiltration or seepage following rainfall events, typically during the summer wet season (AQ2 2024).

The groundwater levels across the MDIOM vary between 398 m RL to 420 m RL. Depths to groundwater vary between 3-4 m below existing ground level across the river valley to more than 40 m across the upper areas of the Chichester Range. Groundwater flows are from the topographically higher areas in the north and northeast to the river valley in the south, which in turn flows in a westerly direction along the valley (Map 11 in Attachment 2). The groundwater gradient is low in response to the transmissivity of the materials across the MDIOM and surrounding area.

Groundwater across the MDIOM has the following water quality characteristics (AQ2 2024):

- Groundwater quality varies from fresh to saline. The fresher groundwater (total dissolved solids [TDS] 180 mg/L or EC 330 µS/cm) was observed in the upper areas of the groundwater system whilst the more saline groundwater was observed in the valley (TDS 18,000 mg/L or 23,000 µS/cm);
- The saline groundwater is caused by the evaporation in the claypans following periods of rainfall and surface water runoff to the claypans. Mobilisation of salts in the unsaturated zone also contributes to the salinity;
- Groundwater down gradient of the orebodies, in the valley area, is generally chloride and sodium dominant, indicative of an end point ("older") water, suggesting the groundwater has been subject to evapotranspiration and mineral dissolution since it was recharged or it has been affected by the leaching of salts from the claypan areas; and
- Groundwater pH levels generally range between 5.9 and 7.9; however, in the northeastern most bores on the MDIOM, the groundwater is more acidic with values of pH 4.3 and 4.4 recorded at depth (AQ2 2024).

4.8 Biodiversity

The premises has been fully surveyed to understand the flora and vegetation, and fauna values of the area. These surveys commenced in 2012 and include regional, site-specific, and detailed and targeted flora and fauna surveys.

4.8.1 Flora and Vegetation

4.8.1.1 Vegetation Types

A total of 15 vegetation types have been mapped within the MDIOM (Table 4-8 and Map 12 in Attachment 2).

Table 4-8 Vegetation types within the premises

Vegetation type	Vegetation description	Total mapped survey extent (Table 9.2)*	Extent within the premises	
			Area (ha)	Proportion (%)
AaAxSL	Tall Sparse Shrubland of *Acacia aneura* (alliance) and *A. xiphophylla* with a Low Sparse Shrubland of *Eremaea cuneifolia* and a Sparse Hummock Grassland of *Triodia epactia* and/or *T. basedowii*. Potential sheet-flow dependent vegetation.	3,628.68	814.09	4.83
AdEvWL	Low Open Woodland to Low Woodland of *Acacia distans* and *Eucalyptus victrix* sometimes with a Tall Sparse Shrubland of *Acacia stenophylla* or *A. tetragonophylla* and a Shrubland to a Sparse Shrubland of *Duma florulenta*.	12,051.30	4.96	0.03
ASL (1)	Tall Sparse to Open mixed Shrubland mainly of *Acacia synchronicia, A. tetragonophylla, A. xiphophylla* with a mixed Sparse Chenopod Shrubland mainly of *Sclerolaena densiflora, S. cuneata* and *S. costata* and Isolated mixed Tussock Grasses mainly of *Sporobolus australasicus, Enneapogon polyphyllus* and *Dactyloctenium radulans*.	1,854.75	359.51	2.13

Vegetation type	Vegetation description	Total mapped survey extent (Table 9.2)*	Extent within the premises	
			Area (ha)	Proportion (%)
ASL (2)	Mixed Tall Acacia Shrubland mainly of *Acacia tumida var. pilbarensis, A. pyrifolia* and *A. maitlandii* with a Sparse Tussock Grassland of *Themeda triandra* and Low Isolated Trees of *Corymbia hamersleyana* and / or *Eucalyptus victrix.*	4,283.22	1,378.13	8.18
AWL (1)	Low Woodland / Tall Shrubland to Low Isolated Trees / Shrubs of *Acacia aneura* (complex) with a mixed Low Sparse Shrubland mainly of *Dodonaea petiolaris, Eremophila forrestii* and *Abutilon otocarpum* and Isolated Low Trees of *A. pruinocarpa.*	14,111.52	5,654.28	33.56
AWL (2)	Low Woodland / Tall Shrubland to Low Isolated Trees / Tall Shrubs of *Acacia aneura* (complex) *A. synchronicia* and *A. tetragonophylla* with a mixed Low Sparse Shrubland mainly of *Solanum lasiophyllum, Abutilon otocarpum* and *Sida platycalyx* and a Sparse Tussock Grassland to Isolated Tussock Grasses mainly of *Sporobolus australasicus, Enneapogon cylindricus* and *Aristida contorta.*	7,240.06	105.67	0.63
AWL (3)	Low Woodland of *Acacia aneura* (complex) mainly *Acacia aptaneura, A. aneura* and *A. incurvaneura* with a mixed Tall Shrubland mainly of *A. synchronicia, A. tetragonophylla* and *Hakea lorea subsp. lorea* with a Sparse Tussock Grassland to Isolated Tussock Grasses mainly of *Sporobolus australasicus, Enneapogon cylindricus* and *Aristida contorta.*	4,066.26	32.12	0.19
AxAsSL	Tall Sparse Shrubland of *Acacia xiphophylla* and / or *A. synchronicia* with a mixed Sparse Chenopod Shrubland mainly of *Sclerolaena cuneata, S. bicornis, S. cornishiana* and a Sparse Tussock Grassland of *Eragrostis xerophila.*	9,779.72	1,381.93	8.20
MSW	Mixed Shrublands and Woodland of Drainage Lines. Shrublands and woodlands of *Eucalyptus spp., Atalaya hemiglauca, Melaleuca* and *Acacia* species associated with drainage lines. Potential Groundwater Dependent Vegetation.	2,433.38	141.97	0.84
MTG (1)	Mixed Tussock Grassland mainly of *Eragrostis xerophila, Eulalia aurea* and **Cenchrus setiger* with a mixed Tall Sparse Shrubland mainly of Acacia coriacea subsp. pendens, *A. tetragonophylla* and *A. synchronicia* with a Low mixed Sparse Shrubland mainly of *Pluchea rubelliflora, Pterocaulon sphacelatum* and *Salsola australis.*	576.38	241.96	1.44
MTGW	Tussock grasslands and shrublands of the 'Four plant assemblages of the Wona Land System' P1 (PEC) Mixed tussock grasslands of *Eragrostis xerophila, Aristida latifolia* and *Astrebla pectinate*, with patches of *Triodia spp.* and sparse mixed shrubs.	3,162.29	403.50	2.39

Vegetation type	Vegetation description	Total mapped survey extent (Table 9.2)*	Extent within the premises	
			Area (ha)	Proportion (%)
THG (1)	Mixed Hummock Grassland mainly of *Triodia basedowii*, *Triodia brizoides* and *T. vanleeuwenii* with a Tall Sparse Shrubland of mixed Acacia species mainly *Acacia atkinsiana*, *A. maitlandii*, *A. ancistrocarpa* with Low Isolated Trees of *Eucalyptus leucophloia*.	21,015.77	5,236.74	31.08
THG (2)	Mixed Hummock Grassland mainly of *Triodia basedowii*, *Triodia brizoides* and *T. vanleeuwenii* with a Tall Sparse Shrubland of mixed Acacia species mainly *Acacia atkinsiana*, *A. maitlandii*, *A. ancistrocarpa* with Low Isolated Trees of *Eucalyptus leucophloia*.	5,732.79	707.14	4.20
THGB	*Triodia* Hummock Grassland on Basaltic Terrain *Triodia epactia* and *T. brizoides* hummock grassland with sparse *Acacia inaequilatera* and *Grevillea pyramidalis* subsp. *leucadendron*	4,697.16	197.03	1.17
TvHG	Hummock Grassland of *Triodia veniciae* with Isolated Shrubs of *Acacia marramamba* and *A. atkinsiana*.	122.15	24.85	0.15
Cleared / Disturbed		1,412.89	164.63	0.98
Total		**96,168.32**	**16,848.53**	**100**

*Note: area calculations are based on multiple surveys with some overlap and as a result some figures may be an overestimate.

4.8.1.2 Vegetation Condition

The condition of each vegetation type was assessed using the vegetation condition scale for the Eremaean and Northern Botanical Provinces recommended in EPA guidance (EPA 2016). The majority (99.01%) of vegetation in the MDIOM is in 'Good' to 'Excellent' condition based on Keighery's (1994) vegetation condition scale (Map 13; Table 4-9). Areas cleared for drill lines, access tracks, fence lines and existing infrastructure were mapped as 'Cleared', 'Completely Degraded' or 'Disturbed' (Maia 2022) (refer to Map 13 in Attachment 2).

Vegetation mapped as 'Excellent' condition showed little to no disturbance from exploration or cattle grazing. Vegetation mapped as 'Very Good' condition showed impacts from current and historical grazing pressures and exploration activities, with numerous weed populations throughout. Vegetation mapped as 'Good' condition was mostly confined to an area close to the Mulga Downs Homestead and cattle yards and contained large numbers of weeds present with little to no understorey plants. Vegetation mapped as 'Degraded' is associated with areas cleared for exploration and small borrow areas (Maia 2022).

Evidence of fire was noted in some areas, mainly on the low rolling hills and plains adjacent to Roebourne-Wittenoom Road. The condition of the vegetation within floodplains is mostly rated as 'Very Good' to 'Good', as large numbers of cattle tend to graze in these areas. Several weed species (**Malvastrum americanum*, **Cenchrus ciliaris*, **C. setiger* and **Vachellia farnesiana*) have been recorded in high numbers in vegetation types associated with the Fortescue River, including its smaller tributaries and adjacent floodplains.

Table 4-9 Vegetation condition within the premises

Vegetation Condition	Extent in premises (ha)	Proportion of premises (%)
Excellent	6337.25	37.61
Very Good	8,363.23	49.64
Good	1,981.71	11.76
Sub-Total (Good to Excellent)	*16,682.19*	*99.01*
Degraded	158.91	0.94
Completely Degraded	7.43	0.04
Total	**16,848.53**	**100**

4.8.1 Significant Vegetation

Significant vegetation is defined in EPA (2016d) as vegetation which:

- Is identified as a TEC or PEC;
- Has a restricted distribution;
- Has a degree of historical impact from threatening processes;
- Has a role as a refuge; or
- Provides an important function which is required to maintain ecological integrity of a significant ecosystem.

The remaining extent of the pre-European vegetation associations within the MDIOM and within the Pilbara bioregion is greater than 99%. Based on the remaining extent, the regional significance of the pre-European vegetation associations present is considered low.

4.8.1.1 Threatened Ecological Communities

There are no TECs listed under the *Biodiversity and Conservation Act 2016* (BC Act) within the MIDOM or within 20 km of the mine.

4.8.1.2 Priority Ecological Communities

Conservation significant ecological communities are shown on Map 14 in Attachment 2 and described as follows:

Freshwater Claypans of the Fortescue Valley (Priority 1)

The Freshwater claypans of the Fortescue Valley PEC (Priority 1) includes a series of claypans in the Fortescue Valley and include the Gnalka Gnoona Claypan and the Koodjeepindarranna Claypans. The premises does not intersect the DBCA designated buffer of the 'Freshwater Claypans of the Fortescue Valley' Priority 1 PEC.

Four plant assemblages of the Wona Land System (Priority 1-Priority 3)

Within the premises, the vegetation type 'MTGW' has been mapped and described as Mixed Tussock Grasslands of *Eragrostis xerophila, Aristida latifolia* and *Astrebla pectinate*, with patches of *Triodia spp*. and sparse mixed shrublands (Maia, 2022). This habitat/vegetation type lacks shrubs and has very little vegetative cover during

the dry season. During the wet season, an array of ephemeral/annuals and short-lived perennials emerge, many of which are poorly known and range-end taxa. A total of 403.50 ha of MTGW occurs within the premises and is mapped as the *'Four plant assemblages of the Wona Land System'* PEC. Of this, 69.98 ha occurs within the Indicative disturbance footprint of the premises.

Vegetation type 'ASL(2)' shares similar species to MTGW and may also be associated with the PEC and, therefore, has been conservatively considered a PEC. A total of 4 ha of ASL(2) is mapped within the *'Four plant assemblages of the Wona Land System'* PEC buffer. Of this, 0.33 ha occurs within the indicative disturbance footprint of the premises.

Table 4-10 Four plant assemblages of the Wona Land System PEC

Vegetation Type	Extent in premises (ha)	Extent in Indicative Footprint
MTGW	403.50	69.98
ASL(2)	4.00	0.33
Total	**407.50**	**70.31**

4.8.1.3 Sheet Flow Dependant Vegetation

Vegetation potentially dependent on sheet flow (overland/surface water flow) is present within the MDIOM. *Acacia aneura* and closely related co-occurring species are commonly referred to as Mulga vegetation (Mulga) (Page and Grierson 2010). Mulga has been found to be highly dependent on sheet flow (Winkworth, 1973 and Tongway and Hindley 2004 cited in Maia 2022) and sensitive to any changes to sheet flow. The changes can be natural, such as following rainfall events, where the natural fluvial channels may be altered from erosional processes.

Across the Pilbara, sheet flow vegetation typically comprises banded Mulga and non-banded Mulga, which is most commonly associated with the Jamindie land system.

The vegetation types listed in Table 4-11 may represent sheet flow dependent vegetation types and have been mapped within and surrounding the MDIOM. They are identified as potential sheet flow vegetation solely due to the dominant presence of Mulga species, such as *Acacia aneura* (Maia 2022). Soil type and gradient has not been considered in the identification of these potential sheet flow dependent communities.

Table 4-11 Potential sheet flow vegetation

Potential sheet flow Vegetation	Known mapped extent*	Extent in premises (ha)	Extent in Indicative Footprint (ha)
AaAxSL - tall sparse shrubland of Acacia aneura (alliance)	3,628.68	814.09	68.53
ASL (1) - Acacia tall shrubland	1,854.75	359.51	64.95
ASL (2) - Acacia tall shrubland	4,283.22	1378.13	253.47
AWL (1) - Acacia low woodland or tall shrubland	14,111.52	5654.28	2087.41
AWL (2) - Acacia low woodland or tall shrubland	7,240.06	105.67	35.98

Potential sheet flow Vegetation	Known mapped extent*	Extent in premises (ha)	Extent in Indicative Footprint (ha)
AWL (3) - Acacia low woodland or tall shrubland	4,066.26	32.12	8.83
AxAsSL - Acacia tall sparse shrubland	9,779.72	1381.63	454.33
Total	**44,964.21**	**9,725.43**	**2,973.51**

*Note: area calculations are based on multiple surveys with some overlap and as a result some figures may be an overestimate.

4.8.1.4 Groundwater Dependant Vegetation

Based on a detailed assessment of vegetation using remote sensing methods and other eco-physiological studies, it is considered highly unlikely that groundwater dependent vegetation occurs within or in proximity to the premises (AQ2 2024) due to the following:

- Groundwater underlying the Fortescue Valley is generally brackish/saline and, therefore, does not constitute a favourable water source for the vegetation;
- In most areas, plant roots cannot readily access groundwater as there is calcrete or dense impermeable clay beneath the soil and above the groundwater table, which plants roots cannot easily penetrate;
- There are no areas of persistently high greenness as measured by time series Normalized Difference Vegetation Index (NDVI) imagery in the MDIOM. Greenness reflects photosynthetic activity, which relies on water availability. To maintain persistently high greenness, vegetation would likely need a persistent water source even during dry seasons, such as groundwater;
- Time-series pre-dawn leaf water potentials indicate the tree-root zones are in unsaturated media. Also taking into consideration the potential influence of brackish groundwater, this precludes the roots being in groundwater or at the capillary fringe; and
- Water balance modelling supported by on-ground vegetation measurements, used to estimate tree water use relative to water availability, estimated that surface water inputs are sufficient to support the density of trees occurring in the Fortescue Valley *E. victrix* woodland communities. The denser woodland stands are associated with better structured soils with relatively higher plant-available water storage capacity. This provides further support to the conclusion that the vegetation is unlikely to be reliant on groundwater.

4.8.1.5 Riparian Vegetation

One mapped riparian vegetation type (AdEvWL) was identified within the premises, which is restricted to the Fortescue River and associated habitats (Maia 2022). Vegetation type AdEvWL supports species that only occur in seasonally inundated habitats (Maia 2022). AdEvWL was mapped in 4.96 ha (0.03 %) of the premises (Table 4-8).

4.8.1.6 Flora

Threatened Flora

Under section 26(2) of the BC Act, flora that are classified as either critically endangered, endangered or vulnerable are listed as threatened species. Four Threatened flora species currently have records in the Pilbara bioregion (WAH 1998-):

- *Aluta quadrata* (Endangered); found in three geographically separated locations in the Hamersley Range, approximately 225 km southwest of the premises;
- *Quoya zonalis* (Endangered) previously known as *Pityrodia sp. Marble Bar* (G. Woodman & D. Coultas GWDC Opp 4); found in Chichester subregion approximately 130 km northwest;
- *Thryptomene wittweri* (Vulnerable, BC Act); records are from the Hamersley; and
- *Synostemon hamersleyensis* (Endangered); restricted to the Hamersley subregion (Telford and Naaykens 2015).

All four species occur some distance from the premises with very different habitat preferences to those mapped in the MDIOM. Except for *Q. zonalis,* with records in the Chichester*,* the other three taxa occur within the Hamersley subregion. Searches in extensive surveys did not yield any records of these taxa (Maia 2022).

Priority Flora

Conservation significant flora relevant to the MDIOM are shown on Map 15 in Attachment 2. The conservation categories definitions for WA flora as defined by DBCA (2023) are:

- Priority 1 species are known from one or a few locations (generally five or less) and are species that are potentially at risk. All occurrences are either very small or on lands not managed for conservation, for example, agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or are otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements for threatened listing and appear to be under immediate threat from known threatening processes.
- Priority 2 (poorly known) species are identified from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g., national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet the adequacy of survey requirements and appear to be under threat from known threatening processes.
- Priority 3 (poorly known) species are known from several locations and do not appear to be under imminent threat; or are from few but widespread locations with either large population sizes or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes are present that could affect them.
- Species that are adequately known, meet criteria for near threatened, are rare but not threatened, or that have been recently removed from the threatened species list or conservation dependent or other specially protected fauna lists for other than taxonomic reasons, are classed as Priority 4.

The desktop assessment for the MDIOM identified 108 Priority flora species in the study area. This includes 21 Priority 1 (P1), 19 Priority 2 (P2), 59 Priority 3 (P3) species and 9 Priority 4 (P4) species. Of these, 16 Priority flora species were previously recorded by surveys within the desktop study area:

- *Calotis squamigera* (Priority 1);
- *Helichrysum oligochaetum* (Priority 1);
- *Josephinia* sp. Woodstock (A.A. Mitchell PRP 989) (Priority 1);
- *Rhodanthe ascendens* (Priority 1);

- *Triodia veniciae* (Priority 1);
- *Teucrium pilbaranum* (Priority 2);
- *Eragrostis crateriformis* (Priority 3);
- *Eragrostis* sp. Erect spikelets (P.K. Latz 2122) (Priority 3);
- *Euphorbia australis* var. *glabra* (Priority 3);
- *Glycine falcata* (Priority 3);
- *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (Priority 3);
- *Lotasperma sessilifolium* (Priority 3);
- *Rostellularia adscendens* var. *latifolia* (Priority 3);
- *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) (Priority 3);
- *Triodia basitricha* (Priority 3); and
- *Bulbostylis burbidgeae* (Priority 4).

Field Surveys

A total of 749 taxa from 60 families and 206 genera were recorded during field surveys by Maia (2022). The surveys recorded 88% of the estimated flora taxa within the survey area as determined by species accumulation analysis. This is greater than most other studies recorded within the local area (Maia 2022) and highlights the large survey effort undertaken. This demonstrates that an adequate level of survey has been undertaken throughout the MDIOM with respect to flora species detection. The plant families most frequently recorded were:

- Fabaceae: 130 taxa;
- Poaceae: 127 taxa;
- Malvaceae: 81 taxa;
- Asteraceae: 53 taxa; and
- Amaranthaceae: 35 taxa.

The findings are generally consistent with the flora assemblages expected for the Chichester and Fortescue Plains subregions (Kendrick & McKenzie 2001).

Following completion of the Maia (2022) survey, two additional survey areas (ASA) within the premises were identified, being the Road Deviation Area, the Solar Farm and the Water Pipeline covering a total area of 241.6ha. A targeted flora and vegetation assessment of the ASA was subsequently undertaken by Maia in February 2023 (Maia, 2023).

In total, 79 taxa from 45 genera and 22 families were recorded from the ASA; comprising 97% perennial taxa and 3% annual taxa. The families with the highest number of tax recorded were:

- Fabaceae: 29 taxa;
- Poaceae: 10 taxa; and
- Malvaceae: 9 taxa.

No Threatened flora species listed under the BC Act were recorded in the premises (Maia 2022; 2023) and nine confirmed Priority flora species were identified.

4.8.2 Vertebrate Fauna

Consolidated desktop and literature assessments identified 384 species of vertebrate fauna that have previously been recorded in, or have potential to occur within, the desktop study area. This comprised:

- 49 mammals (43 native species and six introduced species);
- 188 birds;
- 134 reptiles; and
- 13 amphibians.

Of these, 36 were considered conservation significant fauna and are listed in Table 4-12.

Table 4-12 Conservation significant species identified from desktop and literature assessments

Scientific Name	Common Name	BC Act Status[1]	DBCA Status[1]
Mammals			
Dasycercus blythi	Brush-tailed Mulgara	-	P4
Dasyurus hallucatus	Northern Quoll	EN	-
Leggadina lakedownensis	Northern Short-tailed Mouse	-	P4
Pseudomys chapmani	Western Pebble-mound Mouse	-	P4
Macrotis lagotis	Greater Bilby	VU	-
Macroderma gigas	Ghost Bat	VU	-
Rhinonicteris aurantia (Pilbara form)	Pilbara Leaf-nosed Bat	VU	-
Birds			
Apus pacificus	Fork-tailed Swift	MI	-
Calidris acuminata	Sharp-tailed Sandpiper	MI	-
Calidris ferruginea	Curlew Sandpiper	CR	-
Calidris melanotos	Pectoral Sandpiper	MI	-
Calidris ruficollis	Red-necked Stint	MI	-
Charadrius veredus	Oriental Plover	MI	-
Elanus scriptus	Letter-winged Kite	-	P4
Falco hypoleucos	Grey Falcon	VU	-
Falco peregrinus	Peregrine Falcon	OS	-
Gelochelidon nilotica	Gull-billed Tern	MI	-
Glareola maldivarum	Oriental Pratincole	MI	-
Hirundo rustica	Barn Swallow	MI	-

Scientific Name	Common Name	BC Act Status[1]	DBCA Status[1]
Hydroprogne caspia	Caspian Tern	MI	-
Motacilla cinerea	Grey Wagtail	MI	-
Motacilla flava	Yellow Wagtail	MI	-
Pandion haliaetus cristatus	Eastern Osprey	MI	-
Pezoporus occidentalis	Night Parrot	CR	-
Plegadis falcinellus	Glossy Ibis	MI	-
Rostratula australis	Australian Painted Snipe	EN	-
Sternula albifrons	Little Tern	MI	-
Tringa glareola	Wood Sandpiper	MI	-
Tringa nebularia	Common Greenshank	MI	-
Actitis hypoleucos	Common Sandpiper	MI	
Reptiles			
Anilios ganei	Gane's Blind Snake	-	P1
Liasis olivaceus barroni	Pilbara Olive Python	VU	-
Ctenotus nigrilineatus	Pin-striped Finesnout Ctenotus	-	P1
Ctenotus uber johnstonei	Spotted Ctenotus	-	P2
Notoscincus butleri	Lined Soil-crevice Skink	-	P4
Underwoodisaurus seorsus	Pilbara Barking Gecko	-	P2

[1] Biodiversity Conservation Act: P1: Priority One, P2: Priority Two, P3: Priority Three, P4: Priority Four, OS: Other specially protected species, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, MI = Migratory.

A total of 236 terrestrial fauna species were recorded cumulatively from surveys undertaken by *ecologia*, Biologic and Spectrum. Records included 28 mammals, 121 birds, 84 reptiles and two amphibians (Attexo 2023; Spectrum 2023). Native taxa recorded account for 79% of the species identified during the desktop assessment as occurring within the vicinity of the MDIOM.

The 28 mammal species recorded within the survey area included 13 species of native ground dwelling mammals, nine species of bat and five introduced mammals. Ground dwelling mammal species recorded account for 57% of regional mammal species identified in database searches. Bat species recorded account for 75% of regional bat species identified in database searches.

The 121 bird species recorded from the surveys represent 63% of the regional bird species identified from database searches as having the potential to occur. A total of 63 species were predominantly woodland/shrubland canopy species, 18 species were ground dwelling, 17 species were nocturnal birds of prey, and 22 species were wading birds. One species was introduced – Zebra Dove (*Geopelia striata*) (Attexo 2023; Spectrum 2023).

The 84 species of reptile recorded during the surveys represent 63% of regional reptile species identified from database searches as having the potential to occur.

Two amphibian species, Little Red Treefrog (*Litoria rubella*) and Sheep Frog (*Cyclrana maini*) were recorded from the surveys representing 15% of regional amphibian species identified in the database searches as having the potential to occur.

Five introduced terrestrial fauna species were recorded during the surveys. This includes the domestic mouse (*Mus musculus*), feral cat (*Felis catus*), feral dog/dingo (*Canis lupus*), domestic cattle (*Bos taurus*) and the European red fox (*Vulpes vulpes*). Introduced species occur broadly across the Pilbara region and are not restricted to specific habitat types. Cats and foxes are classed as declared pests under the *Biosecurity Agriculture Management Act 2007* (BAM Act). As the premises is located around active pastoral leases, cattle were regularly observed during surveys.

4.8.2.1 Conservation Significant Fauna

A total of 11 conservation significant fauna (as categorised by the BC Act and under DBCA classification) have been recorded within the premises (Attexo 2023; Spectrum 2023). This includes four migratory birds, which were recorded within the Gnalka Gnoona and Koodjeepindarranna claypans. These claypans are part of the Freshwater Claypans of the Fortescue Valley P1 PEC but are not located within the premises. However, the MDIOM has the potential to alter the hydrological regimes of the claypans and, therefore, the fauna species associated with these features have been considered in the assessment.

A further six species are considered likely to occur based on historical records, although two species were considered to have a low likelihood based on habitat type – the Night Parrot and the Greater Bilby (Table 4-13).

Table 4-13 Conservation significant fauna within the premises (recorded and likely to occur)

Species		Conservation Status[1]		Occurrence
Scientific Name	Common Name	BC Act Status	DBCA Status	
Mammals				
Rhinonicteris aurantia (Pilbara form)	Pilbara Leaf-nosed Bat	VU	-	Recorded
Macroderma gigas	Ghost Bat	VU	-	Recorded
Dasyurus hallucatus	Northern Quoll	EN	-	Recorded
Pseudomys chapmani	Western Pebble-mound Mouse	-	P4	Recorded
Dasycercus blythi	Brush-tailed Mulgara	-	P4	Likely
Leggandina lakedowensis	Northern Short-tailed Mouse	-	P4	Likely
Macrotis lagotis	Greater Bilby	VU	-	Likely (Low)
Birds				
Falco hypoleucos	Grey Falcon	VU	-	Recorded
Falco peregrinus	Peregrine Falcon	OS	-	Recorded
Calidris ruficollis	Red-necked Stint	MI	-	Recorded

Species		Conservation Status[1]		Occurrence
Scientific Name	Common Name	BC Act Status	DBCA Status	
Tringa glareola	Wood Sandpiper	MI	-	Recorded
Tringa nebularia	Common Greenshank	MI	-	Recorded
Plegadis falcinellus	Glossy Ibis	MI	-	Likely
Pezoporus occidentalis	Night Parrot	CR	-	Likely (Low)
Reptiles				
Anilios ganei	Gane's Blind Snake	-	P1	Recorded
Liasis olivaceus barroni	Pilbara Olive Python	VU	-	Recorded
Ctenotus uber johnstonei	Spotted Ctenotus	-	P2	Likely

[1] Biodiversity Conservation Act: P1: Priority One, P2: Priority Two, P3: Priority Three, P4: Priority Four, OS: Other specially protected species, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, MI = Migratory.

4.8.2.2 Vertebrate Fauna Habitat

Basic fauna habitat assessments were conducted throughout the premises to broadly describe areas of habitat that were distinguishable by vegetation, soil characteristics and land features. The identified habitats were considered likely to support different fauna assemblages to those found in adjoining habitat types. The assessment of the premises paid particular attention to the likelihood of conservation significant fauna to be present in each habitat type. Extensive ground truthing of habitat types during subsequent surveys allowed fauna habitat mapping within the premises to be further refined.

Nine broad terrestrial fauna habitat types were identified within the premises (Attexo 2023):

- Stony Spinifex Plains and Hillslopes;
- Rocky Hills;
- Gibber Cracking Clay;
- Drainage Line/Floodplain;
- Mulga Woodland;
- Chenopod/Cracking Clay Floodplain
- Cracking Clay;
- Snakewood; and
- Rocky Plains and Footslopes.

The condition of the habitats within the premises ranged from 'Degraded' to 'Excellent' (Attexo 2023). Areas identified as 'Degraded' were primarily disturbed by cattle grazing. The Mulga Downs Station has been an operational pastoral lease for over 100 years; as a result, there are long-term impacts to vegetation from overgrazing, trampling and the spread of weeds. The most impacted are the Chenopod/Cracking Clay Floodplain, Drainage Line and Mulga Woodland habitats, which have a lower rating of 'Good'. The lower rating in habitat

condition for the Mulga Woodland is a result of exploration activities, with areas cleared for drill lines (Attexo 2023).

4.9 Heritage

4.9.1 Aboriginal Heritage

The MDIOM occurs entirely with the Banjima People Native Title Determination Area (WAD6096/1998) (Map 16 in Attachment 2). The *Native Title Act 1993* recognises the rights and interests of Aboriginal and Torres Strait Islander people in land and waters, according to their traditional laws and customs. The Banjima Traditional Owners are represented by BNTAC.

The known archaeological record of the inland Pilbara region within the respective Traditional Owner Countries extend back to over 43,000 years before the present day. The Banjima Traditional Owners maintain day-to-day cultural connections with the land which covers more than 1 million hectares, including the Premises (BNTAC, 2025).

The Aboriginal Cultural Heritage Inquiry System (ACHIS) was used to research and determine which historical heritage survey reports and site files may be relevant to the premises. Within the MDIOM, there six 'registered' sites and 134 'lodged' heritage places (refer to Map 17 in Attachment 2). Of these, five registered sites and 33 lodged heritage places intersect the indicative disturbance footprint of the mine.

HPPL has surveyed the majority of the premises and surrounding area for both ethnographic and archaeological heritage sites. These surveys have been undertaken in consultation with Banjima Traditional Owners and confirmed the presence of Aboriginal cultural heritage values within the Development Envelope. The heritage surveys undertaken to date have identified 303 sites of heritage value within the premises (refer to Table 4-14).

Table 4-14 Sites of heritage value identified to date within the premises

Heritage Value Type (simplified for clarity)	Premises
Artefact Scatter	235
Culturally Modified Tree	37
Rockshelter	26
Ethnographic	1
Historical	1
Grinding patch	3
Total	**303**

Koodjeepindarrnna and Ngarlganoona Pools

There are two pools located 3-4 km south of the MDIOM – Koodjeepindarrnna and Ngarlganoona. These sites have been identified through heritage surveys with the Banjima People. The Koodjeepindarrnna and Ngarlganoona pools are seasonal claypans that do not have a persistent expression of water and instead. Baseline studies (AQ2 2025) on the hydrology and hydrogeology of these pools concluded that they are supported by direct rainfall and surface water flows and are not groundwater dependent. Based on consultation with Traditional Owners, their cultural significance is considered high. The Koodjeepindarrnna and Ngarlganoona

pools are also habitats for migratory and local birds and invertebrate species during inundation, which also have cultural significance to Traditional Owners (ACHM 2024).

Mungurrdu Heritage Site (40484)

The Mungurrdu heritage site has been lodged with DPLH and covers a significant portion of the Fortescue River Valley. Mungurrdu is located outside but immediately south of the MDIOM (Map 17 in Attachment 2). According to the lodgement record, Mungurrdu is import for the following reasons:

- Burial;
- Birthplace;
- Camp;
- Ritual/Ceremonial;
- Creation/Dreaming Narrative;
- Hunting Place;
- Meeting Place;
- Other;
- Plant Resource; and
- Water Source.

4.9.2 Other Heritage

In Western Australia, the *Heritage Act 2018* recognises the importance and promotes understanding and appreciation of Western Australia's cultural heritage and provides for the identification and documentation of places of cultural heritage significance and for the conservation, use, development and adaptation of such places. Places of cultural heritage significance are documented within the State Register of Heritage Places, which is organised by the Heritage Council of WA within the 'inHerit' database.

The Mulga Downs shearing shed (place number 01745) was identified in a search of the 'inHerit' database. The shed is not located within the MDIOM; however, it is close to the boundaries of the Mulga Downs Station and homestead (Map 4 in Attachment 2). The Mulga Downs Station and homestead have heritage value for the following groups:

- Banjima Traditional Owners: many of the people who worked and lived on the station were members of the Banjima Traditional Owners. There are known heritage restricted zones for the Banjima across the pastoral station; and
- Hancock Family: the station has been owned by and associated with the Hancock family since 1915. Members of the family are buried in the homestead graveyard.

Places of Commonwealth heritage significance are protected under Part 15 of the EPBC Act and include World Heritage properties, National Heritage places and Commonwealth Heritage places. There are no identified Commonwealth or State listed historic heritage sites within or immediately adjacent to the MDIOM (DCCEEW 2025).

4.10 Land Use

The MDIOM is located in the Shire of Ashburton. The nearest town is Tom Price, which is located approximately 110 km to the southwest. Port Hedland is located approximately 210 km to the north, whilst Newman is located approximately 180 km to the east.

Transport infrastructure, notably the Great Northern Highway, connects to the east of the MDIOM, and the Wittenoom-Mujina Road is 17 km south of the boundary. The Roebourne-Wittenoom Road is approximately 8 km west of the MDIOM.

There are several existing rail alignments in the area. The Pilbara Infrastructure Solomon Rail traverses north of the MDIOM before crossing the Great Northern Highway.

4.10.1 Pastoralism

Land uses surrounding the MDIOM are shown on Map 4 in Attachment 2**.** The primary land use within the vicinity of the mine is currently pastoral, involving free-range grazing of stock. In the Pilbara, pastoralism commenced in the 1860s and continues to contribute to the Pilbara economy, providing employment in the region.

The MDIOM is located within the boundary of the Mulga Downs Pastoral Station. Access agreement negotiations are proposed to be undertaken for these areas.

4.10.2 Tourism

The nearest major tourist attraction is Karijini National Park, which covers almost 630,000 ha of the Hamersley Range. The northern boundary of the National Park is located approximately 16 km to the southwest of the MDIOM. This conservation area is an important tourism asset with accommodation, hiking trails and other ecotourism facilities.

The Mungaroona Range Nature Reserve is approximately 13 km north of the MDIOM and extends over an area of 105,842 ha.

The Auski Roadhouse, which includes overnight accommodation and camping facilities, is located 23 km to the southwest of the MDIOM at the junction of Great Northern Hwy and Nanutarra-Munjina Road.

These areas are shown in Map 4 in Attachment 2.

4.10.3 Communities

There are two remote communities within the vicinity of the MDIOM: Youngaleena and Wirrilimarra communities, located 16 km south and 6.5 km southeast of the MDIOM, respectively (Map 4 in Attachment 2**).** In addition, there are several named meeting places of significance and heritage restricted zones within and outside the MDIOM.

The Yandeyarra Reserve is located approximately 6 km to the north of the MDIOM and comprises an area of 473,529 ha managed by the Mugarinya Community Association Incorporated (Map 4 in Attachment 2). The Mugarinya (Yandeyarra) Community is located 87.5 km to the northeast of the MDIOM.

4.10.4 Wittenoom Asbestos Management Area

The Wittenoom Asbestos Management Area (WAMA) is a registered contaminated site located approximately 13 km to the southwest of the MDIOM (Map 4 in Attachment 2). There is no community at Wittenoom as the town was degazetted in 2007 and closed in 2013 (DPLH 2022). The MDIOM does not intersect the WAMA.

5 Abbreviations

Table 5-1 Abbreviations

Abbreviation/Acronyms	Definition
ACHIS	Aboriginal Cultural Heritage Inquiry System
ACN	Australian Company Number
AH Act	*Aboriginal Heritage Act 1972* (WA)
AHD	Australian Height Datum
ALARP	As low as reasonably practical
ASS	Acid Sulfate Soils
BACI	Before-After-Control-Impact
BIF	Banded Iron Formation
BNTAC	Banjima Native Title Aboriginal Corporation
BoM	Bureau of Meteorology
CEO	Chief Executive Officer
CS Act	*Contaminated Sites Act 2003* (WA)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSS	Closed Side Setting
Cth	Commonwealth
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEED	Department of Energy and Economic Diversification
DFES	Department of Fire and Emergency Services
DLGIRS	Department of Local Government, Industry Regulation and Safety
DMPE	Department of Mines, Petroleum and Exploration
DoH	Department of Health
DPIRD	Department of Primary Industries and Regional Development
DSO	Direct Shipping Ore
DWER	Department of Water and Environmental Regulation
EMS	Environmental Management System
EP Act	*Environmental Protection Act 1986* (WA)
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ERD	Environmental Review Document
ESA	Environmentally Sensitive Area
ESCP	Erosion and Sediment Control Plan
ESD	Environmental Scoping Document
FEL	Front End Loader
FY	Financial Year

Abbreviation/Acronyms	Definition
GL/a	Gigalitres per Annum
ha	Hectares
HanRoy	HanRoy Iron Ore Project Pty Ltd
HPPL	Hancock Prospecting Pty Ltd
IBRA	Interim Biogeographic Regionalisation of Australia
IPCC	Intergovernmental Panel on Climate Change
kL	Kilolitres
kL/d	Kilolitres per day
km	Kilometres
LoM	Life of Mine
LoR	Limit of Reporting
m	Meters
m RL	Meters Relative Level
MAR	Managed Aquifer Recharge
MDCP	Mining Development and Closure Proposal
MDI	Mulga Downs Investments Pty Ltd
MDIO	Mulga Downs Iron Ore Pty Ltd
MDIOM	Mulga Downs Iron Ore Mine
MDIOP	Mulga Downs Iron Ore Proposal
MIH	Mulga Iron Holdings
MNES	Matters of National Environmental Significance
MSA	Maintenance and Service Area
Mt	Million tonnes
Mtpa	Million tonnes per annum
NAF	Non-acid Forming
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
PAF	Potential Acid Forming
PEC	Priority Ecological Community (WA listing)
PM	Particulate Matter
RHI	Roy Hill Infrastructure Pty Ltd
RiWI Act	*Rights in Water and Irrigation Act 1914*
RO	Reverse Osmosis
RoM	Run of Mine
Roy Hill	Roy Hill Holdings Pty Ltd
SBR	Sequence Batch Reactor
TDA	Tyre Disposal Area

Abbreviation/Acronyms	Definition
TDS	Total Dissolved Solids
TEC	Threatened Ecological Community
TSA	Tyre Storage Area
WA	Western Australia
WAMA	Wittenoom Asbestos Management Area
WMP	Water Management Plan
WoNS	Weeds of National Significance
WQPN	Water Quality Protection Note
WRD	Waste Rock Dump
WRF	Weather Research and Forecasting
WTP	Water Treatment Plant
WWTP	Waste Water Treatment Plant

6 References

Table 6-1 References

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7 Attachments

Attachment 1A – Proof of Occupier Status

Attachment 1B – ASIC Company Extract

Attachment 2 – Premises Maps

Attachment 5 – Stakeholder Consultation Register

Attachment 8A – HanRoy Environmental Policy

Attachment 8B – Process Flow Diagram

Attachment 8C – Crusher Pad Drawings

Attachment 8D – Landfill Drawings

Attachment 8E – Bulk Fuel Storage Drawings

Attachment 8F – Conceptual Erosion and Sediment Control Plan

Attachment 8G – Sedimentation Basin Drawings

Attachment 8H – HanRoy Environmental Compliance Standards

Attachment 8I – Water Management Plan

Attachment 8J – Turkey Nest Design

Attachment 8K: Groundwater Operating Strategy

Attachment 8L: Community Noise Monitoring

Attachment 8M: Air Quality Assessment

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