Works Approval Application Supporting Document

Murrays Hill Infrastructure Project

Environmental Protection Act 1986

Hancock Prospecting Pty Ltd
ABN 69 008 676 417

Revision Register

[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	Issued for Use

[redacted]

TABLE OF CONTENTS

TABLES

FIGURES

1 Introduction

1.1 Background

Hancock Prospecting Propriety Limited (**HPPL**) (the **Applicant**) intends to construct and operate an iron ore mine at the Murrays Hill deposit, situated approximately 230 km south of Port Hedland and 100 km northeast of Tom Price (refer to Premises Map in **Attachment 2**).

To support mining activities, HPPL proposes to develop a 400-person accommodation camp and associated infrastructure (the **Project**). The scope of the Project comprises:

- Construction and operation of a 400-person accommodation camp and associated infrastructure.
- Water supply bores and pipeline infrastructure.
- Fuel storage facilities.
- Waste Water Treatment Plant (**WWTP**), discharging to an irrigation Spray Field.
- Reverse Osmosis (**RO**) Water Treatment Plant (**WTP**).
- Communications services.
- Contractor compounds consisting of:
    - Laydown areas;
    - Workshops; and
    - Office and administration facilities.
- Associated access and internal roads.

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 Part V of the *Environmental Protection Act 1986* (**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	Attachment 1A
Attachment 1B: ASIC company extract	Attachment 1B
Attachment 1C: Authorisation to act as a representative of the occupier	Not applicable
Attachment 2: Premises map/s	Attachment 2
Attachment 3A: Environmental commissioning plan	To be provided by WWTP supplier on completion of final design and award of contract
Attachment 3B: Proposed activities	Section 2

[redacted]

Section in Application	Where information is presented
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	Attachment 5: Stakeholder consultation register
Attachment 6A: Emissions and discharges	Section 3
Attachment 7: Siting and location	Section 4
Attachment 8: Additional information submitted	Attachment 8A: HanRoy Environmental Policy Attachment 8B: Site Layout Drawings Attachment 8C: HanRoy Environmental Compliance Standard
Attachment 9: Category-specific checklist(s)	Not applicable
Attachment 10: Proposed calculation fee	Attachment 10
Attachment 11: Request for exemption from publication	Not applicable

1.3 Prescribed Premises Categories

The Project comprises the following prescribed premises categories and throughput production/design capacities, as listed in Schedule 1 of the Environmental Protection Regulations 1987 (**EP Regulations**) and outlined in **Table 1.2.**

Table 1.2 Prescribed premises categories applicable to the Project

Category	Description	Production/design capacity threshold	Project production/design capacity
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 per day	120 m^3 per day
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	Up to 100,000 tonnes per year

Other potentially prescribed activities will be carried out as part of the Project but were determined to be below the relevant category production/design capacity threshold, as shown in **Table 1.3.**

Table 1.3 Prescribed premises categories below production/design capacity

Category	Description	Production/design capacity threshold	Project production/design capacity
73	Bulk storage of chemicals etc.	1,000 m^3 in aggregate	200 m^3 (of fuel)
85B	Water desalination plant	0.50 GL or more per year	0.05 GL per year (135 kL per day)

Note: the proposed WTP is 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

HPPL is an independent, privately owned Australian company that has a long history within the iron ore sector and Pilbara region of Western Australia (**WA**). HPPL holds 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 and adjacent Mt Florance and Hooley Station Pastoral Leases since the late 2000s.

HPPL has recently undertaken an internal restructure to consolidate its projects capability in an expert team to deliver project studies, construction and operations readiness, and HanRoy Iron Ore Projects Pty Ltd (ACN 657 533 974) (**HanRoy**) was created as of 1 April 2023. HanRoy will lead the study, design and development of a globally significant pipeline of projects that will provide ongoing supply of critical minerals and energy essential for everyday life. HanRoy, or its delegate, will manage the delivery of construction and operations of the Project, to which contractors will be appointed to fulfill various roles, as required, on HanRoy's behalf.

HPPL holds a 70% majority share in Roy Hill Holdings Pty Ltd (**Roy Hill**). Roy Hill is one of Australia's largest single iron ore mines. Its class-leading operations include dedicated rail and port infrastructure that enables international export of 60 Mtpa of iron ore, with approvals in place for an increase to 70 Mtpa.

HanRoy's Environmental Policy is provided in **Attachment 8A**. To implement this policy, HanRoy will develop an Environmental Management System (**EMS**) for the Project, aligned with that of Roy Hill and to the requirements of ISO 14001. The EMS provides a structured, strategic approach to environmental management, and ensures environmental risks and issues are identified and managed, and regulatory obligations are met in accordance with the HanRoy Environment Policy.

Both HanRoy and 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.

HPPL's details are shown in **Table 1.4** and the Australian Securities & Investments Commission (**ASIC**) company extract is contained in **Attachment 1B**.

1.5 Premises Details

The Premises is encompassed by pending Miscellaneous Licence L45/769 on Mulga Downs Station, which covers a total area of 503.7 ha. The Premises details are provided in **Table 1.5** and the prescribed premises boundary is shown on the Premises Map provided in **Attachment 2**.

Table 1.5 Premises details

Detail	Response
Premises name	Murrays Hill Infrastructure Project
Site description	Miscellaneous Licence L45/769
Site address	Mulga Downs Station
Occupier status	Landowner
Local Government Authority	Shire of Ashburton

The proposed Murrays Hill mine will be located within Mining Tenement M47/1621 (not covered by this application). The activities to be carried out under the miscellaneous licence are for the purposes of access roads, accommodation camp and supporting infrastructure only.

1.6 Occupier Status

The Premises sits wholly within the Mulga Downs Pastoral Station on the western edge of the Chichester Range. The Pastoral Station has been an active pastoral enterprise since the early 20th century. The Mulga Downs Pastoral Station (Leases N049796 and N050370) is independently owned and operated by HPPL and is used for low-intensity cattle grazing.

A copy of the Pastoral Lease is provided in **Attachment 1A.**

1.7 Other Approvals

1.7.1 Environmental Impact Assessment – Referral and Assessment of Proposals

The Murrays Hill Project is a stand-alone, 5 million tonnes per annum (**Mtpa**) direct shipping ore (**DSO**) mine with a life of up to five years (including decommissioning and rehabilitation) proposed by HPPL. The proposal involves above watertable mining of ore from a single open pit, crushing and screening, associated mining infrastructure, accommodation camp and roads.

The Murrays Hill Project was referred to the Environmental Protection Authority (**EPA**) in 2013. The EPA determined that the project did not require environmental impact assessment under Part IV of the EP Act, deferring it to the Department of Mines, Energy, Industry Regulation and Safety (**DEMIRS**) for assessment under Part V of the EP Act and the *Mining Act 1978* (reference: 13-243207, 12 August 2013).

The Premises (as relevant for this Works Approval Application) falls entirely within the development envelope of the Murrays Hill Project as referred to the EPA in 2013. This works approval relates only to the development of the Murrays Hill Infrastructure Project, including the 400-person accommodation camp and associated infrastructure.

1.7.1.1 Mulga Downs Iron Ore Mine

The Premises sits entirely within the development envelope of the proposed Mulga Downs Iron Ore Mine (**MDIOM**). The MDIOM is currently under assessment by the EPA under Part IV of the EP Act (Assessment Number 2326) and the Commonwealth Department of Climate Change, Energy, the Environment and Water (**DCCEEW**) under the *Environmental Protection Act and Biodiversity Conservation Act 1999* (**EPBC Act**) (EPBC Number 2022/09255).

The EPA assessment of the MDIOM excludes the Murrays Hill Project (as detailed in Section 1.7.1) as it has previously been considered by the EPA. However, the EPBC Act assessment includes the Murrays Hill Project; HPPL anticipates receiving Commonwealth approval, inclusive of the Murrays Hill Project, in May 2025.

1.7.2 Environmental Regulation – Clearing of Native Vegetation

HPPL seeks to clear up to 141.40 ha of native vegetation within the larger development envelope of 503.7 ha through a Native Vegetation Clearing Permit (**NVCP**). An application (CPS 10698/1) was submitted to DEMIRS on 26 July 2024.

The clearing area sought through the NVCP application CPS 10698/1 has been refined to include only what is required to construct the accommodation camp and associated infrastructure, including the WWTP and Spray Field. The use of existing cleared areas has also been considered when designing the Project.

Clearing for the Project will be minimised by:

- Clear demarcation of the area of vegetation required to be cleared prior to works commencing.
- All ground disturbing works will be undertaken in accordance with HPPL's Ground Disturbance Procedure.
- Clearing areas will be surveyed for reporting in accordance with NVCP requirements.
- Where possible, work will be conducted in existing cleared areas and disturbances to water courses will be minimised.
- Surface water flow will be considered when clearing native vegetation.

1.7.3 Mining Act – Mining Proposal and Mine Closure Plan

The *Mining Act 1978* requires all mining and related activities to be undertaken in accordance with a Mining Proposal and Mine Closure Plan approved by DEMIRS.

Accordingly, HPPL is preparing a Mining Proposal for the Project in accordance with the *Statutory Guidelines for Mining Proposals* (DMIRS, 2023a) and *Mining Proposal Guidance - How to prepare in accordance with Part 1 of the Statutory Guidelines for Mining Proposals* (DMIRS, 2023b). A Mine Closure Plan for the Proposal is also being prepared in accordance with *Statutory Guidelines for Mine Closure Plans* (DMIRS, 202c).

1.7.4 *Health Act 1911*

HPPL will apply to the Shire of Ashburton and Department of Health (**DoH**) for environmental health approval to construct and install apparatus for the treatment of sewage under the *Health Act 1911*. The application will be supported by a Site and Soil Evaluation (**SSE**).

1.7.5 Dangerous Goods

HPPL will apply for a dangerous goods site licence from DEMIRS under the Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007 for the storage and handling of fuel and chemicals associated with the wastewater treatment process, if the storage quantities exceed the manifest quantities.

1.8 Stakeholder Consultation

1.8.1 Overview of Stakeholder Engagement Strategy

HPPL has actively engaged in stakeholder consultation throughout the planning of the Project, which will continue through the detailed design, construction and operational phases. The methods of consultation vary depending on the forum, subject matter and purpose. The main forms of communication associated with the Project 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.
- 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 Project to avoid or minimise potential impacts, compensation for impairment of rights and interests to land, participation in environmental surveys, employment opportunities and Project 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.
- 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.

1.8.2 Key Stakeholders

The key stakeholders identified for the Project 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 Project.

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).
- DEMIRS - Environment and Mining Divisions.
- Department of Biodiversity, Conservation and Attractions (**DBCA**).
- Department of Planning, Lands and Heritage (**DPLH**).
- DCCEEW.
- Department of Jobs, Tourism, Science and Innovation (**JTSI**).
- Main Roads Western Australia (**MRWA**).
- Pilbara Development Commission (**PDC**).
- Shire of Ashburton.

1.8.2.2 Traditional Owners

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

- Banjima Native Title Aboriginal Corporation RNTBC (**BNTAC**), which is the native title body corporate of the Banjima Native Title determination area.
- Youngaleena Community.
- Wirrilimurra Community.

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

Consultation and engagement with each native title group has commenced, including on-country consultation. Timeframes for consultation are subject to multiple factors including availability of Traditional Owners, ongoing negotiation of agreements, and ongoing archaeological and ethnographical surveys.

HPPL will continue to engage with the Traditional Owners to discuss and seek their input on environmental approval documentation and any other relevant documentation as required. Traditional Owners are provided the opportunity to review and provide feedback, with HPPL taking into consideration these comments and updating documentation accordingly.

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 (**CME**).
- Chamber of Commerce and Industry WA (**CCIWA**).
- Regional Chambers of Commerce WA (**RCCIWA**) - Karratha & Districts CCI (**KDCCI**), Port Hedland CCI (**PHCCI**) and Newman CCI (**NCCI**).
- Association of Mining and Exploration Companies (**AMEC**).
- Fortescue Metals Group (**FMG**).

1.8.2.4 Community

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

- Mulga Downs Station.
- Mt Florance Station.
- Hooley Station.
- Auski Munjina Roadhouse.

1.8.3 Stakeholder Consultation Outcomes

Details of stakeholder consultation undertaken to date for the Project 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 (Attachment 3B)

2.1 Prescribed Premises Infrastructure and Equipment

This section presents the key characteristics of the infrastructure and equipment relevant to this Works Approval.

A list of infrastructure and equipment within the Premises and relevant to this Works Approval Application is provided in **Table 2.1**. Site layout plans for the accommodation camp and schematics for the WWTP are shown in **Attachment 8B**.

2.1.1 Waste Water Treatment Plant

The proposed WWTP will comprise two Sequential Batch Reactor (**SBR**) units that operate through a series of batch processes involving filling and draining a reactor tank, thus allowing for high-quality treatment in a small footprint (refer to example WWTP shown in **Figure 2**:1).

Figure 2:1 Example SBR WWTP (4 x process trains)

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.

2.1.2 Crushing and Screening Equipment

Bulk earthworks associated with the construction of the Project will include the use of one mobile crushing and screening plant for processing of material. Processed material will be used as fill to level the site in preparation for construction activities including the accommodation camp, WWTP and associated infrastructure.

Material to be crushed and screened includes gravel and rock excavated from within the premise boundary. The mobile crushing and screening plant (refer to example shown in **Figure 2:2)** is

proposed to be used at various locations, due to the logistics of construction activities relative to other infrastructure and locations of borrow pits within the premise boundary.

Figure 2:2: Example Mobile Crushing and Screening Plant

Table 2.1 Infrastructure and equipment

Premises infrastructure and equipment	Requirement	Location on site layout plans in Attachment 8B
Camp WWTP	2 x SBR trains to treat up to 120 kL per day of domestic sewage. Each unit comprising:	Premises Map in Attachment 2 1.21 on Mulga Downs Village General Arrangement Drawing
	Duty 2.5 mm inlet bar screen	Site Layout Drawing
	1 x 50 kL polyethylene balance tank	TK-101 on Site Layout Drawing
	SBR tank with heavy-duty submersible aerators and floating decant weir.	TK-102 on Site Layout Drawing
	SBR irrigation tank	TK-103 on Site Layout Drawing
	1 x 50 kL polyethylene sludge tank	TK-104 on Site Layout Drawing
	Balance, decant, sludge and recirculation pumps	Site Layout Drawing
	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	
Spray Field	Minimum 45,000 m²	Premises Map in Attachment 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	
Mobile Crushing and Screening Plant	Annual throughput up to 100,000 tonnes per year	Premises Map in Attachment 2
	Primary equipment comprising:	
	1x Primary crusher (mobile)	
	Up to 2 x Screens (mobile)	
	Up to 3 x Conveyors/Stackers (mobile)	

2.2 Construction Activities

Construction activities are summarised as follows:

- Minor excavation and bulk earthworks associated with the accommodation camp construction and associated infrastructure.
- Mobile crushing and screening activities required for construction materials.
- Mechanical clearing of native vegetation using a bulldozer in accordance with granted NVCP.
- 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 WWTP comprises two process trains, each in containerised, 6 mm steel constructed, 12 m 'plug and play' units with two 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.

Potential impacts associated with construction will be short-duration and limited to within the prescribed premises boundary.

2.3 Environmental Commissioning Activities

Commissioning of the WWTP will be carried out by the supplier's engineers who will ensure the supplied 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 WWTP 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 DoH *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 WWTP is provided in **Table 0.1** along with the validation and verification monitoring that will be carried out during the commissioning period.

Table 0.1 Influent/effluent characteristics and validation and verification monitoring

Parameter	Units	Influent specification	Effluent specification	Influent validation and verification monitoring	Effluent validation and verification monitoring
Hydraulic capacity	kL/d	120	120	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 WWTP is achieved and the target water quality parameters are being met, the Premises will commence time limited operations under the works approval.

2.4 Time Limited Operation Activities

2.4.1 Wastewater Treatment Plant

The WWTP will accept up to 120 m^3 (kL) per day of domestic sewage from the Accommodation Camp at full capacity (approx.400 people) based on an allowance of 300 L per person per day.

[redacted]

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 WWTP 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 WWTP 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 0.2**.

Table 0.2 Operational monitoring

Discharge point	Parameter	Frequency	Averaging period	Unit	Method
Discharge pipe to spray field (post valve V-138 on Site Layout Drawing in Attachment 8)	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 WWTP 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 WWTP will discharge sludge from the 50 kL 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 system is capable of treating approximately 6 kL of sludge per hour.

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 in to 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.

2.4.2 Spray Field

The treated effluent will be pumped to the 45,000 m^2 (minimum) Spray Field and discharged by above-ground hammer cast iron type sprinklers. Irrigation will be automatically controlled by the WWTP irrigation pump.

The location of the Spray Field and irrigation sprayers has been 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 Field 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 the 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 0.3**). Note a maximum discharge rate of 165 kL per day was considered, with 120 kL per day from the WWTP and 40 kL per day from the WTP reject stream.

Table 0.3 Spray Field area calculations

Parameter	Units	Nitrogen	Phosphorous
Effluent criteria (DoH, 2011)	mg/L	30	8
Daily discharge	kg/day	5.0	1.2
Annual discharge	kg/year	1,825	429
Maximum nutrient loading rate (DoW, 2008)	kg/ha/year	480	120
Area required	ha	3.8	3.6
Area available	ha	4.5	

The evaluation shows that the Spray Field is adequately sized for the disposal of treated wastewater from the WWTP.

3 Emissions, Discharges and Waste (Attachment 6A)

3.1 Emissions and Discharges

The key emissions and discharges and associated actual or likely pathways during construction and time-limited operation of the proposed works are detailed in **Table 3.1**. The table also details the proposed control measures to assist in controlling these emissions, where necessary.

Construction and operation of the Project will comply with HanRoy's Environmental Policy (**Attachment 8A**) and Environmental Compliance Standard (**Attachment 8C**).

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 Map in Attachment 2
Construction					
Dust	Clearing of native vegetation Earthworks Civils and WWTP installation Crushing and Screening	Intermittent, fugitive, short duration	Air/wind dispersion causing impacts to health and amenity	Water cart available for dust suppression Vegetation clearing and earthworks during high winds (>50 km/hr) should be avoided. Where vegetation clearing and earthworks is required during high winds, additional dust management measures must be implemented Dust suppressant additives or methods to reduce overall water consumption must be used wherever practicable	Camp Spray Field Borrow Pits
Noise				Minimal construction works required for short duration Regularly inspect, maintain and replace mobile equipment Sufficient separation distance to sensitive receptors	

[redacted]

Emission or discharge type	Source of emission or discharge	Volume and frequency	Potential pathways and impacts	Proposed controls	Location on Premises Map in Attachment 2
Hydrocarbon spills			Overland runoff/migration into surface water ways potentially causing ecosystem disturbance or impacting surface water quality Localised contamination of soils	Regular inspection and servicing of mobile plant and vehicles Fuel must be stored in self-bunded (doubled-skinned) portable steel 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	
Commissioning; and time limited operations					
Noise	Pumps, process plant and vehicles	Continuous, low level	Air/wind dispersion causing impacts to amenity	Small noise footprint with sufficient separation distance to sensitive receptors	Camp
Odour	Upset process conditions Sludge and storage tanks	Intermittent, fugitive	Air/wind dispersion causing impacts to amenity	Containerised system with enclosed vessels and tanks Automated control and visual and audible alarms for upset conditions Daily inspection of WWTP	Camp Spray Field

[redacted]

Emission or discharge type	Source of emission or discharge	Volume and frequency	Potential pathways and impacts	Proposed controls	Location on Premises Map in Attachment 2
Treated wastewater	Irrigation of treated wastewater	Up to 165 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 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	Spray Field

[redacted]

Emission or discharge type	Source of emission or discharge	Volume and frequency	Potential pathways and impacts	Proposed controls	Location on Premises Map in Attachment 2
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 110% of the largest storage vessel within the containment facility, plus 25% of the capacity of all stored individual containers	Camp Spray Field

[redacted]

3.2 Environmental Management

The minimum Environmental Compliance Standard relevant to HanRoy Projects are outlined in **Attachment 8C**. Various management plans and procedures have been developed by HPPL for implementation during construction and operation of the Project dependant on risk and potential impact, including:

- Incident and Hazard Reporting Procedure (HNR-00000-HS-PRO-0023).
- Ground Disturbance Permit Procedure (HNR-00000-GD-PRO-0001).
- Spill Response Procedure (HNR-00000-EN-PRO-0006).

3.3 Records and Reporting

Reporting for the Project 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.
- Environmental commissioning report(s) providing a summary of environmental commissioning activities, including amounts of wastewater treated, treated effluent monitoring results, environmental performance of all infrastructure and equipment, comparison of treated effluent monitoring results against any applicable discharge limits, and assessment of Spray Field performance.
- 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.
- 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.
- The details and dates of any action taken to investigate or respond to any complaint.

[redacted]

4 Location and Siting (Attachment 7)

4.1 Premises Location

The Premises is situated approximately 230 km south of Port Hedland and 100 km northeast of Tom Price, in the Pilbara region of WA (refer to Premises Map in **Attachment 2**). Access to the Premises is via an existing pastoral access track, which is accessed from Great Northern Highway. The Premises sits wholly within the Mulga Downs Pastoral Station on the western edge of the Chichester Range.

4.2 Sensitive Land Uses

The distances to sensitive land uses are detailed in **Table 4.1** and the sensitive receptor locations are shown on the Siting and Location Plan (**Attachment 2**).

Table 4.1 Residential and sensitive receptors

Receptor	Description	Distance and direction from Premises boundary
Wirrilimarra Community	Aboriginal community	~6.4 km southeast
Youngaleena Community	Aboriginal community	~20 km southwest
Yandeyarra Aboriginal Reserve	Reserve managed by Mugarinya Community Association Incorporated	~20 km north
Auski Munjina Village	Roadhouse with accommodation, camping facilities and restaurant	~23 km south
Karijini National Park	DBCA managed park for conservation purposes with recreation values	~21 km south
Mungaroona Range Nature Reserve	DBCA managed area for conservation purposes with recreation values	~21 km northwest

4.3 Environmentally Sensitive Receptors and Aspects

The potential environmental receptors that emissions and discharges from the premises may impact are described in **Table 4.2** and shown on the Siting and Location Plan in **Attachment 2.** More detail is provided in the following sections.

Table 4.2 Environmentally sensitive receptors and aspects

Receptor	Description	Distance and direction from Premises boundary
Environmentally Sensitive Areas	Fortescue Valley	~4.0 km southwest
Threatened and Priority Ecological Communities (**TEC/PEC**)	Four plant assemblages of the Wona Land System (PEC) Freshwater claypans downstream of the Fortescue Marsh -Goodiadarrie Hills on Mulga Downs Station (PEC)	~8.5 km north ~13 km west
Threatened and/or priority fauna	Pilbara leaf-nosed bat (*Rhinonicteris aurantia*)	Identified within the Premises boundary

Receptor	Description	Distance and direction from Premises boundary
Threatened and/or priority flora	Fringed fire-bush (*Seringia exastia*)	Identified within the Premises boundary
Aboriginal and other heritage sites	N/A	No registered heritage sites within the Premises boundary
Public drinking water source areas	Millstream Water Reserve	~84 km west
Rivers, lakes, oceans, and other bodies of surface water, etc.	Various minor non-perennial watercourses	Within premises boundary
Acid sulfate soils (ASS)	N/A	No ASS risk areas mapped in Premises boundary

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 can be described 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 (Bureau of Meteorology, 2024). Rainfall is typically associated with cyclonic and storm weather systems (Van Vreeswyk et al, 2004).

The closest Bureau of Meteorology (**BoM**) weather station with historical climate recording data is Wittenoom (station number 005026), approximately 35 km southwest of the Premises. However, Wittenoom station closed in 2019 and Karijini North (station number 005098), approximately 13 km southeast of Wittenoom and 32 km southwest of the Premises, 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 Project.

4.4.2 Temperature

The mean annual maximum temperature at Wittenoom is 33.0 °C, and the mean annual minimum temperature is 19.8 °C. The mean maximum daytime temperature is highest in December (39.8°C), and the mean minimum winter temperature is lowest in July (11.6°C) (Bureau of Meteorology, 2024). Summary statistics for the mean monthly temperature at Wittenoom are shown in **Table 4.3** and **Figure 4**:1.

Table 4.3 Summary statistics temperature (°C) – Wittenoom

Wittenoom 5026													
Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Maximum	39.5	37.9	36.7	33.3	27.9	24.5	24.4	26.9	31.3	35.5	38.1	39.8	33
Highest	47.6	47.5	45.7	42	37.4	33	32.6	35.3	39.5	44	44.7	47.8	47.8
Mean Minimum	26	25.4	24.4	21.2	16.2	12.8	11.6	13.2	16.9	20.9	23.6	25.5	19.8
Lowest	17.2	15.5	12.8	10.2	5.6	4	1.6	3.4	6.7	6.7	12.2	16.8	1.6

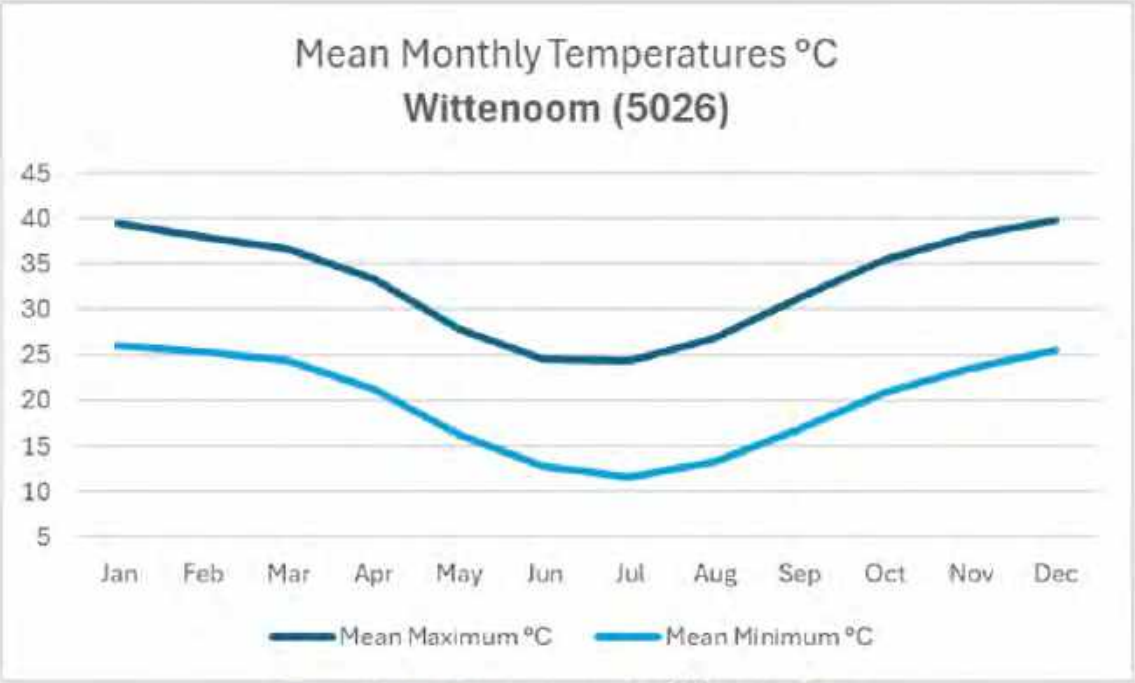

Figure 4:1 Monthly mean temperature (°C) – Wittenoom

The highest monthly mean maximum temperature at Karijini North is 35.4 °C and the lowest is 33 °C. The highest monthly mean minimum temperature is 21.0 °C and the lowest is 19.5 °C. Highest temperatures occur in October through to April with milder temperature in the middle of the year (refer **Table 4.4** and **Figure 4**:2).

Table 4.4 Summary statistics temperature (°C) – Karijini North

Karijini North 5098													
Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Monthly mean maximum temperature													
Lowest	39	35	35.6	32.6	26.5	23.1	25	26.2	29.4	33.3	35.9	37.6	**33**
Highest	42.5	43.5	39.2	36.7	30.9	26.9	27	30.3	35.3	39.4	40.4	43.1	**35.4**
Monthly mean minimum temperature													
Lowest	25.4	24.0	22.6	19.6	15.3	10.9	10.4	13.4	15.6	18.6	20.2	24.5	**19.5**
Highest	28.3	27.8	26.4	23.8	17.5	14.0	13.3	14.8	19.6	24.1	25.2	28.2	**21.0**

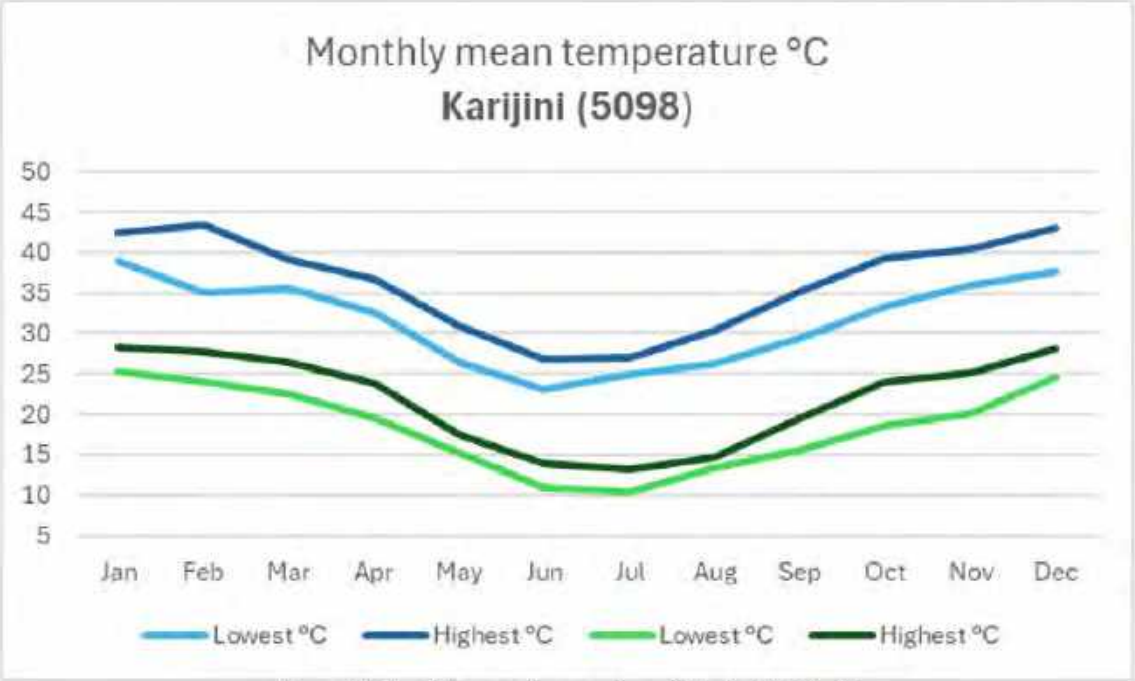

Figure 4:2 Monthly mean temperature (°C) – Karijini North

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.

BoM 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 4.5** and **Figure 4**:3). Lowest rainfalls typically occur between April to November with the lowest mean rainfall at 2.9 mm in September (refer to **Table 4.5**). The highest monthly rainfall recorded at Wittenoom was 470 mm in January 2012 (SLR, 2021).

Table 4.5 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 %ile	17	2.1	2.3	0	0	0	0	0	0	0	0	0.3
10th %ile	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

Wittenoom 5026												
Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
90th %ile	257.6	235.6	173.3	77	71.4	90	38.4	26.1	9.4	12.2	23.8	111.5
95th %ile	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

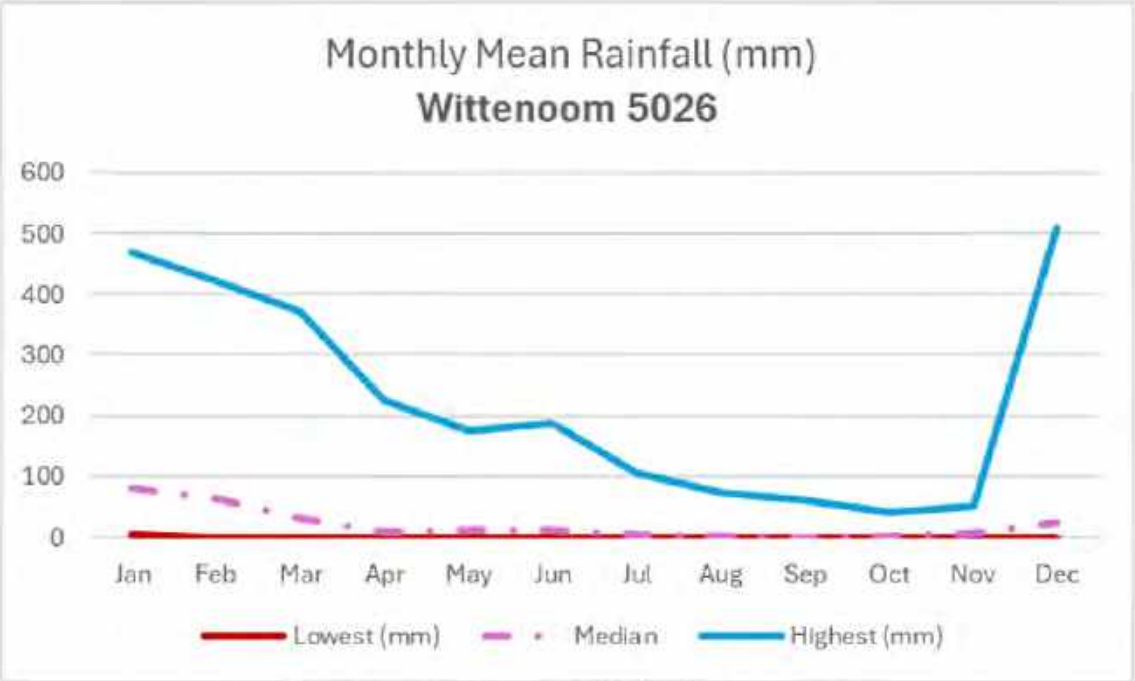

Figure 4:3: Mean Monthly Rainfall (mm) – Wittenoom

4.4.4 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 (McFarlane, 2015).

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, 2020).

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

4.4.5 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**:4. In the Pilbara region, pan evaporation rates vary between

3,200 mm and 4,000 mm per year. Average pan evaporation rates at the Project location are approximately 3,400 mm per year (BoM, 2024).

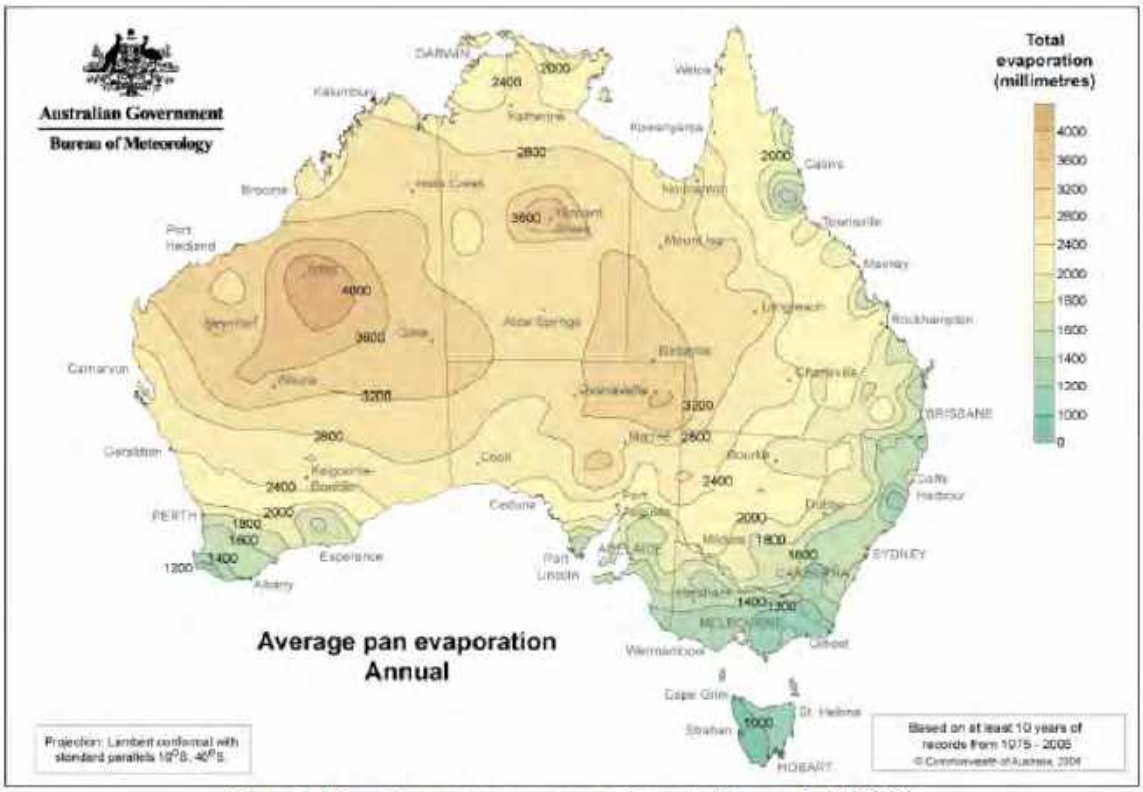

Figure 4:4 Annual average pan evaporation rate (Source: BoM, 2024)

Mean potential evaporation rates across the year for the Pilbara region are shown in **Table 4.6** (Bureau of Meteorology, 2024).

Table 4.6 Potential evaporation

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

4.4.6 Wind

Wind rose data is only available from the Karijini North weather station as shown in **Figure 4:5**. The winds are typically from the east and southwest, with little variation between the wet and dry seasons (SLR, 2021).

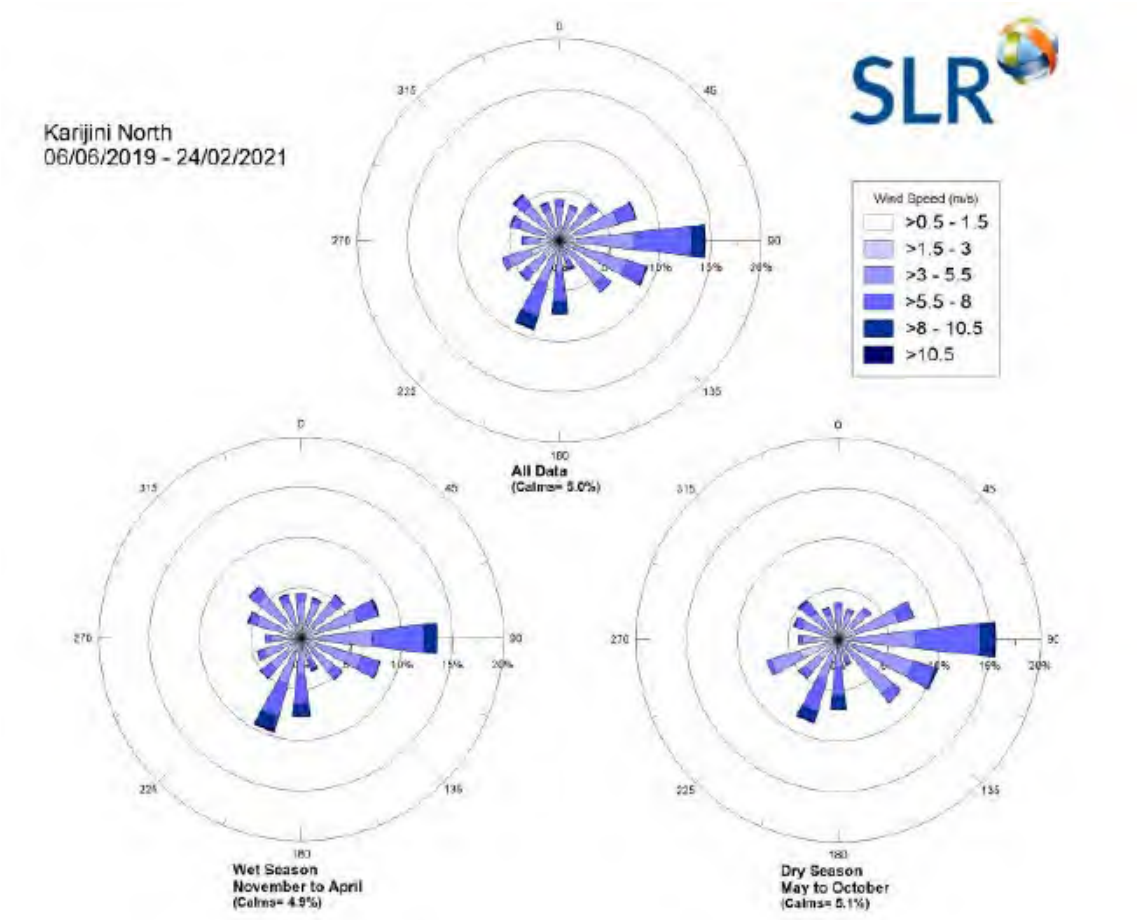

Figure 4:5 Wind data from Karijini North (Station 05098) (Source SLR, 2021)

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 Project is located within the Central Pilbara region of Western Australia 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 premises has a maximum elevation of 440 m AHD, with surrounding land at elevations of 410 m to 420m 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 Premises is located within the Pilbara biogeographic region of IBRA. 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 Project lies entirely within the Fortescue Plains subregion.

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 (DEC, 2003).

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 (**UCL**), 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 Pre-European Vegetation

Remnant vegetation within the Development Envelope is mapped as belonging to the Fortescue Valley Vegetation Association. Two sub-associations are present within the Development Envelope (**Table 4.7**).

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 Development Envelope (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

4.5.4 Land Systems

The Department of Primary Industries and Regional Development (**DPIRD**) has mapped and described the land systems of the Western Australian rangelands, providing a comprehensive description of biophysical resources, including soil and vegetation condition (DPIRD 2022). The Development Envelope is located mostly within the Jamindie System with the remainder in the Newman System (**Table 4.8**).

Table 4.8: Land Systems

Soil Landscape Mapping (DPIRD)	Description	Total Area (ha)	Area in Development Envelope (ha)
Jamindie system	Stony hardpan plains and rises supporting groved mulga shrublands, occasionally with spinifex understorey	50,458.1	404.3
Newman system	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands	11,232.3	101.08

4.5.5 Conservation Areas and Environmental Sensitive Areas

The Project does not overlap any recognised Conservation Areas. Two land areas managed for conservation purposes by DBCA – Karijini National Park (approximately 22.4 km south) and the Mungaroona Range (approximately 22 km northwest) – occur near the Project.

The Premises is located approximately 4 km northeast of the Fortescue Valley, a designated Environmentally Sensitive Area (**ESA**; Fortescue Marshes WA066). There are no Ramsar listed wetlands within the Premises boundary.

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 Premises is located along the northern boundary of the Hamersley Basin Province and within the Pilbara Terrain to the north. The spatial area occupied by these geological provinces is shown in **Figure 4**:6 (Pepper et al., 2013).

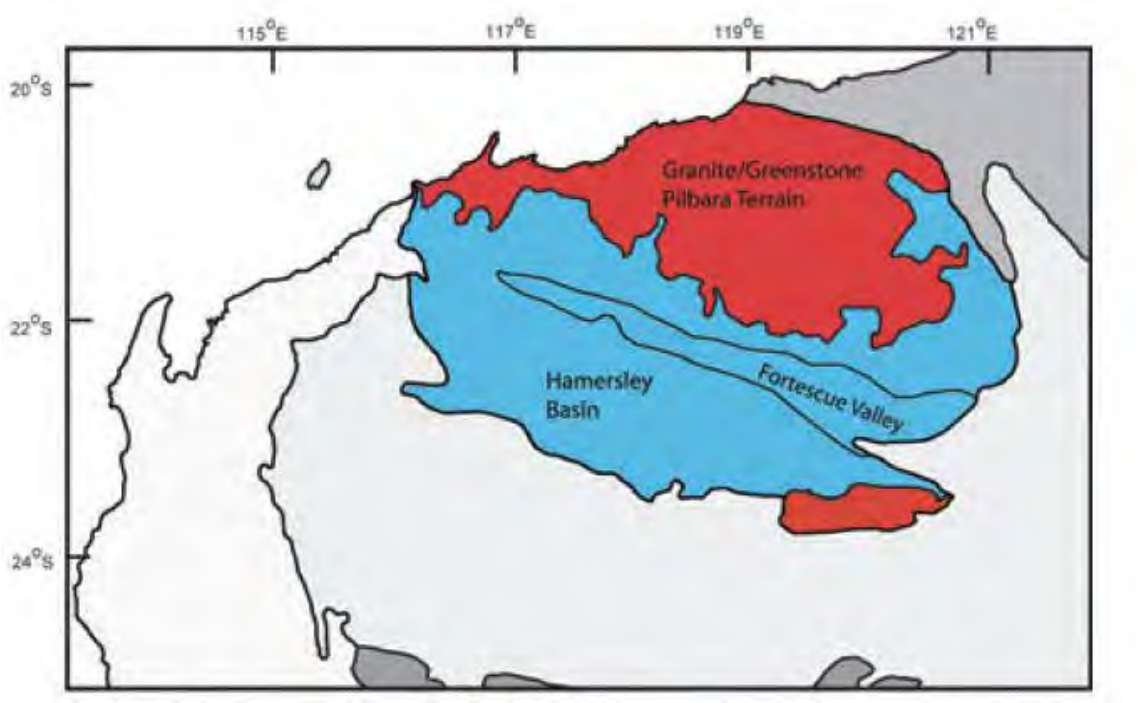

Figure 4:6 Simplified Pilbara geology

4.6.2 Local Geology

The Premises covers part of the Fortescue Valley and Chichester Range (see **Figure 4**:7). The Fortescue Valley (represented as Alluvium in **Figure 4**:7) separates the Hamersley Range to the south from the Chichester Range to the north. The sediments of the Fortescue Group along the Chichester Range are the oldest rocks which cover the Granite-Greenstone Terrain of the Pilbara Craton. The shales and BIFs of the Hamersley Group conformably overlie the Fortescue Group.

The Quaternary and Tertiary sediments (Cainozoic sediments) fill the Fortescue Valley and recent gorges. These sediments include, from youngest to oldest: the alluvium, colluvium, upper calcrete, undifferentiated tertiary (detritals), CID pisolite, basal crete and calcrete of the Oakover Formation. These Quaternary and Tertiary (Cainozoic) sediments overly the older rocks of the Hammersley Group.

The Premises is hosted in the lower part of the Marra Mamba Iron Formation, with secondary mineralisation identified in the transported or detrital materials. The Marra Mamba Iron Formation

outcrops as small-rounded hills in the Mulga Downs area, with the hill slopes commonly covered with Cainozoic (Quaternary and Tertiary) sediments such as alluvium, colluvium and/or detritals.

The Marra Mamba Iron Formation has been identified within the lowermost Nammuldi horizon dominant within the vicinity of the Premises. Iron mineralisation occurs within the upper part of this lowest horizon. The mineralisation does not extend through the entire Nammuldi Formation to the underlying Jeerinah Formation. The shales of Jeerinah Formation that underlie the Nammuldi Member are occasionally observed outcropping mostly in the lower slopes of the rounded hills (HPPL, 2013).

Within the overlying alluvial-colluvial and detrital sequence, iron rich horizons, including pisolite, have been identified in proximity to the underlying Marra Mamba Iron Formation. The relatively flat plain surrounding the low profiled Project area typifies the presence of this alluvial-colluvial and detrital cover. A weathered horizon or hard cap is present in the vicinity of the Premises, which is thin and exhibits elevated iron and occasionally manganese grades (HPPL, 2013).

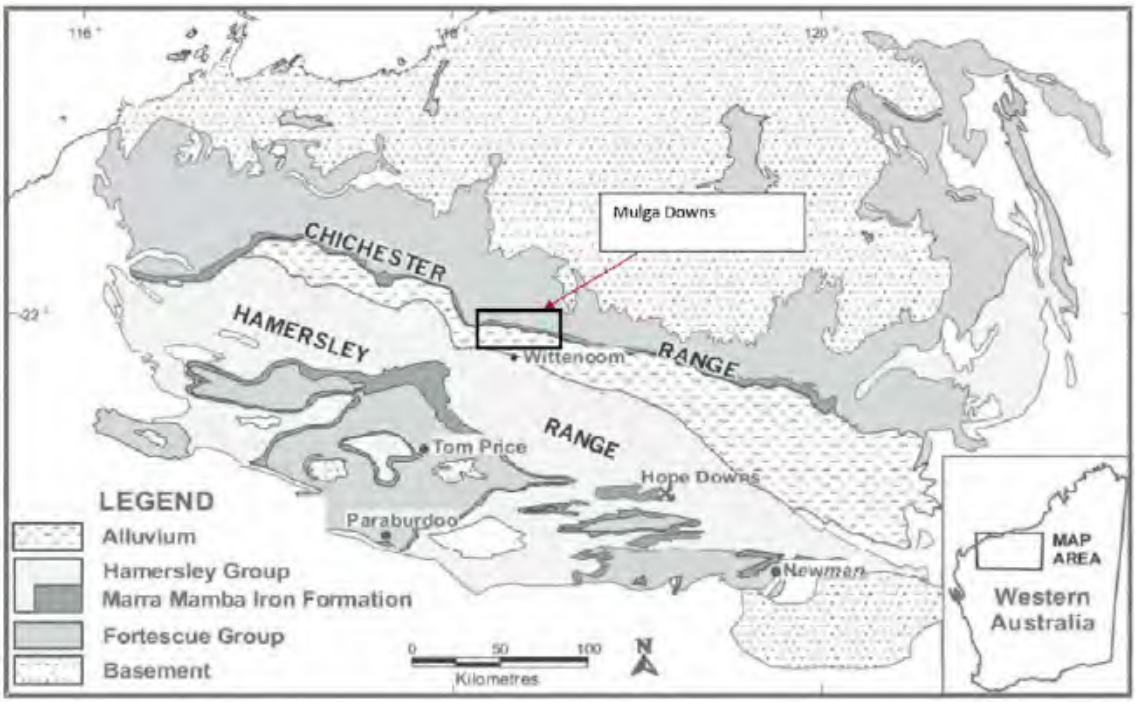

Figure 4:7 Geology and geomorphology

4.6.3 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).

Landloch (2009) undertook a soil and overburden assessment of the development envelope of the Murrays Hill Project and identified two main soil associations – upland soils and lowland soils.

The Landloch (2009) study confirmed that soils across the area have similar properties but are differentiated by soil depth and the presence of rock outcrops. Therefore, soils occurring at the Project are expected to be similar, given its location at the break in slope between the Chichester Ranges and plains. Soils of the area can be described as clay loams that are red in colour and with a clay content ranging from 30-50%. It has been inferred that the clay fraction is predominantly kaolinite, which comprises highly weathered clays that do not shrink and swell and are less prone to erosion. Additionally, the rocky nature of these materials is likely to result in elevated erosion resistance and reduced erosion potential (Landloch, 2009).

Coarse fragments on the surface and within the soil profile are common in both upland and lowland soils; although the abundance of these fragments is more variable in lowland soils. Areas with gradients greater than 30 % are typically dominated by rock outcrops (Landloch, 2009). The depth of soil varies from very shallow (<0.10 m) to deep (>1.0 m) with the shallower profiles generally found in the upland soils. Lowland areas generally exhibit deeper soils where depths can exceed 3.0 m (Landloch, 2009).

Soils are moderately permeable and tend to be moderately well-drained with water movement being limiting by underlying rock. All soils are likely to have moderate plant available water holding capacity. Water repellence was not observed on any soils in the Landloch (2009) study. The surface soils sampled were neutral to mildly alkaline, with pH similar at depth and both field and laboratory analyses corresponding (Landloch, 2009). The study found that the soils in the area have soil pH and salinity levels not likely to cause adverse impacts to vegetation; and soil pH and salinity does not change appreciably with soil depth.

4.6.4 Acid Sulfate Soils

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 Project is not located within an area that is delineated as having ASS risk from the DWER mapping dataset.

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 mapping indicates that there is a Low (Class B) to Extremely Low (Class C) probability of ASS within the Premises (Fitzpatrick et al., 2011).

4.7 Hydrology

4.7.1 Regional and Local Hydrology

The Premises is fully contained 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 cover approximately 70 km and an area of 4,140 km² and is bounded by the Chichester Range to the north and the Hamersley Range to the south. Discharge of

surface water into the Fortescue Valley is from the northern Chichester Range and the southern Hamersley Range and is received as intermittent flows (AQ2, 2020).

4.7.2 Surface Water

The Premises is located within the Pilbara Surface Water Area, which is proclaimed under the *Rights in Water and Irrigation Act 1914* (**RiWI Act**). The Premises is within the Goodiadarrie Swamp sub catchment of the Lower Fortescue River catchment and has a total area of approximately 4,138 km^2 (HPPL, 2013).

There are no Ramsar listed wetlands or wetlands listed in the Directory of Important Wetlands in Australia (**DIWA**) occurring near the Premises. The nearest DIWA listed wetland is the Fortescue Marsh, located approximately 34 km southwest of the Premises.

4.7.3 Groundwater

The groundwater level beneath the Premises varies from approximately 403 m AHD to 405 m AHD. 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.

The generalized hydro stratigraphy across the area consists of Quaternary, Tertiary and fractured rock/bedrock sediments. The Quaternary/Tertiary sediments form an unconfined, unconsolidated sedimentary aquifer, which is highly transmissive and continuous.

Recharge of groundwater in the area occurs from infiltration of rainfall into the aquifer, and subsequently into the underlying Marra Mamba Iron Formations.

4.7.4 Groundwater Quality

Groundwater across the wider area ranges from fresh (180 mg/L TDS) in the upper reaches of the groundwater system, to saline (17,000 mg/L TDS) across the valley area, with salinity profiling data confirming saline groundwater originating from the claypans and extending along the valley (AQ2, 2023).

Groundwater pH levels generally range between 5.9 and 7.9; however, in the northeastern most bores on the Premises, the groundwater is more acidic with values of pH 4.3 and 4.4 recorded at depth (AQ2, 2023).

4.8 Biodiversity

The Premises has been fully surveyed to understand the flora and vegetation values of the area. These surveys commenced in 2008 and include regional, site-specific, and detailed and targeted flora and fauna surveys.

4.8.1 Flora and Vegetation

4.8.1.1 Threatened and Priority Ecological Communities

The Premises does not intersect with any TECs or PECs listed under the EPBC Act or *Biodiversity Conservation Act 2016* (**BC Act**).

4.8.1.2 Groundwater Dependent and Sheet Flow Vegetation

Eco-hydrological assessments conducted to date have concluded that no groundwater dependent vegetation is located within the Premises, nor are likely to occur in the area given that the vegetation is inferred to be disconnected from the groundwater system (AQ2, 2024).

4.8.1.3 Significant Flora

Surveys of the Premises have recorded one Threatened flora species – *Seringia exastia* (Fringed fire-bush; EPBC Act – Critically Endangered).

At the time of writing, this taxon is still listed as Critically Endangered under the EPBC Act. However, as a result of a recent taxonomic study (Binks et al., 2020), *Seringia elliptica* has been synonymised with S. *exastia*. Given the extensive distribution of S. *exastia* (syn. with S. *elliptica*), a nomination has been made to delist the taxa as there are no plausible threats. However, until the changes are officially made to the threatened species list, S. *exastia* remains listed as a Threatened flora species under the EPBC Act.

No Threatened flora species listed under the BC Act or as a Priority species by DBCA have been recorded within the Premises. Numerous individuals of *Hibiscus* sp. Mulga Downs (Priority 1) and *Aristida jerichoensis* var. *subspinulifera* (Priority 3) have been recorded to the south of the Premises.

4.8.2 Terrestrial Fauna

4.8.2.1 Significant Fauna

Surveys of the Premises have recorded one Threatened Fauna species – *Rhinonicteris aurantia* (Pilbara Leaf-nosed Bat; EPBC Act and BC Act – Vulnerable).

No additional Threatened fauna species listed under the EPBC Act, BC Act or as a Priority species by DBCA were recorded within the Premises. Numerous records of the Western Pebble-mound Mouse (Priority 4) were recorded to the north of the Premises.

Five introduced terrestrial fauna species were recorded during surveys:

- Domestic mouse (*Mus musculus*).
- Feral cat (*Felis catus*).
- Feral dog/dingo (*Canis lupus*).
- Domestic cattle (*Bos taurus*).

- 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 all field surveys.

4.8.2.2 Short Range Endemic Invertebrate Fauna

Habitat assessment and mapping was undertaken across the Project area following detailed Short Range Endemic (**SRE**) desktop assessments. Broad SRE habitats were mapped based on aerial imagery and previous survey data, and then were confirmed during field surveys.

Based on the assessment, it was noted that Mulga Woodland and Mixed Eucalypt/Mulga Floodplain found in the area provide favourable SRE habitat types. However, no confirmed or potential SRE invertebrate taxa have been recorded within the Premises. A total of 15 confirmed and 91 potential SRE invertebrate taxa have been recorded within a 40 km radius of the Premises.

4.9 Heritage

4.9.1 Aboriginal Heritage

The Project occurs entirely with the Banjima People Native Title Determination Area (WAD6096/1998). 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. Banjima Traditional Owners maintain day-to-day cultural connections with the land which covers more than 1 million hectares, including the Premises.

HPPL has undertaken extensive consultation with the Banjima Traditional Owners and BNTAC, including several agreement negotiation meetings, Hancock Heritage and Environment Reference Committee Meetings (**HHERCs**) and on-country consultation with consultation continuing throughout the Project lifecycle.

The Aboriginal Cultural Heritage Inquiry System (**ACHIS**) maintained by DPLH was used to research and determine which historical heritage survey reports and site files may be relevant to the Project. The Premises does not contain any registered Aboriginal sites.

HPPL has surveyed the entire Premises for both ethnographic and archaeological heritage values. These surveys have identified additional Aboriginal places of significance within the area. These places are considered sensitive and will be submitted to DPLH for assessment at the discretion of the relevant Traditional Owners.

[redacted]

HPPL is aware of its commitments and obligations under the *Aboriginal Heritage Act 1972*. Construction of the Project will avoid impacts to all sites of heritage significance identified within the area.

4.9.2 Other Heritage

In Western Australia, the *Heritage Act 2018* recognises the importance of, 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.

There are no places of Commonwealth or State heritage significance within the Premises.

5 Risk Assessment

The risk assessment outlined in this section is conducted to assess the environmental, public health and amenity risks associated with the Project.

5.1 Methodology

The objective of the risk assessment is to ensure the potential environmental and social risks associated with the development and operation of the Project are understood and managed appropriately to confirm suitable management measures are in place and there is no unacceptable residual risk.

5.2 Risk Events

The risk events identified for the Project are detailed in Table 3.1, including:

- Sources of environmental risk with the potential to cause significant contamination or harm to the environment or people.
- The pathways of environmental risk by which potential contamination or harm can migrate.

Receptor locations where the contamination or harm could be registered are described in Table 4.1 and Table 4.2.

5.3 Risk Ratings

Risk ratings have been assessed in accordance with the HanRoy risk matrix (Table 5.1 and Table 5.2) for each identified emission source and considers potential source-pathway-receptor linkages as identified in Table 3.1. Where linkages are in-complete, they have not been considered further in the risk assessment.

Table 5.1 Risk consequence and likelihood definitions

Consequence Ranking			Likelihood Ranking		
1	Slight	Limited damage to minimal area of low significance.	A	Almost Certain	The event is expected to occur in most circumstances (May occur multiple times within 12 months)
2	Minor	Minor effect on biology or physical environment.	B	Likely	The event will probably occur in many circumstances (May occur once per year)
3	Moderate	Moderate short-term effects but not affecting ecosystem.	C	Possible	The event is expected to occur at some time (May occur once in 5 years)
4	Major	Serious medium-term environmental effects.	D	Unlikely	The event could credibly occur at some future time (May occur once in 10 years)
5	Severe	Very serious long-term environmental impairment of ecosystems.	E	Rare	The event may occur only in exceptional circumstances (May occur once during Life of Mine)

Table 5.2 Risk assessment categories

Risk Evaluation Matrix (5x5)			Likelihood Rating				
			RARE	UNLIKELY	POSSIBLE	LIKELY	ALMOST CERTAIN
			Residual Risk Rating (RRR)				
Consequence/Impact		Factors	5	7.5	15	20	30
Severity Level	5-SEVERE	10	50*	75*	150	200	300
	4-MAJOR	5	25*	37.5*	75	100	150
	3-MODERATE	2	10	15	30	40	60
	2-MINOR	1	5	7.5	15	20	30
	1-SLIGHT	0.5	2.5	3.75	7.5	10	15

Table 5.3 provides the risk assessment for the Project before and after the implementation of controls.

Table 5.3 Risk assessment

Emission or discharge type	Source of emission or discharge	Potential pathways	Receptors	Consequence	Likelihood	Risk rating	Proposed controls	Consequence	Likelihood	Residual risk rating
Construction										
Dust	Clearing of native vegetation Earthworks Civils and WWTP installation	Air/wind dispersion	Residential and other human receptors	Minor	Possible	15	Refer to Table 3.1	Minor	Unlikely	7.5
Noise				Minor	Possible	15		Minor	Unlikely	7.5
Hydrocarbon spills		Overland runoff/migration into surface water Localised contamination of soils	Local soils and vegetation	Moderate	Possible	30		Moderate	Unlikely	15
Operation										
Noise	Pumps, process plant and vehicles	Air/wind dispersion	Residential and other human receptors	Minor	Unlikely	7.5	Refer to Table 3.1	Minor	Rare	5
Odour	Upset process conditions Sludge and storage tanks	Air/wind dispersion		Minor	Likely	20		Minor	Unlikely	7.5
Treated wastewater	Irrigation of treated wastewater	Overland runoff / migration into surface water and groundwater Localised contamination of soils	Local soils and vegetation	Moderate	Likely	40		Moderate	Unlikely	15
		Air/wind dispersion	Terrestrial fauna	Minor	Possible	15		Minor	Unlikely	7.5

[redacted]

Emission or discharge type	Source of emission or discharge	Potential pathways	Receptors	Consequence	Likelihood	Risk rating	Proposed controls	Consequence	Likelihood	Residual risk rating
Spills/ unintended releases of untreated wastewater, sludge or treatment chemicals	WWTP tanks, vessels and pipes Sludge dewatering and storage Chemical storage	Overland runoff / migration into surface water and groundwater Localised contamination of soils	Local soils and vegetation	Moderate	Possible	30	Refer to Table 3.1	Moderate	Unlikely	15

[redacted]

6 Abbreviations

Table 6.1 Abbreviations

Abbreviation	Definition
ACHIS	Aboriginal Cultural Heritage Inquiry System
AHD	Australian Height Datum
AMEC	Association of Mining and Exploration Companies
ASIC	Australian Securities & Investments Commission
ASS	Acid Sulfate Soils
BAM Act	Biosecurity Agriculture Management Act 2007
BC Act	Biodiversity Conservation Act 2016
BNTAC	Banjima Native Title Aboriginal Corporation RNTBC
BoM	Bureau of Meteorology
CCI	Chamber of Commerce and Industry
CME	Chamber of Minerals and Energy
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety
DIWA	Directory of Important Wetlands in Australia
DoH	Department of Health
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DSO	Direct Shipping Ore
DWER	Department of Water and Environmental Regulation
EMS	Environmental Management System
EP	Equivalent Persons
EP Act	Environmental Protection Act 1986
EP Regulations	Environmental Protection Regulations 1987
EPA	Environmental Protection Authority
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
ESA	Environmentally Sensitive Area
FMG	Fortescue Metals Group
HanRoy	HanRoy Iron Ore Projects Pty Ltd
HHERC	Hancock Heritage and Environment Reference Committee
HPPL	Hancock Prospecting Propriety Limited
IBRA	Interim Biogeographic Regionalisation for Australia
JTSI	Department of Jobs, Tourism, Science and Innovation

Abbreviation	Definition
KDCCI	Karratha & Districts CCI
MDIOM	Mulga Downs Iron Ore Mine
MRWA	Main Roads Western Australia
Mtpa	Million tonnes per annum
NCCI	Newman CCI
NVCP	Native Vegetation Clearing Permit
PDC	Pilbara Development Commission
PEC	Priority Ecological Community
PHCCI	Port Hedland CCI
RCCI	Regional CCI
RiWI Act	Rights in Water and Irrigation Act 1914
RO	Reverse Osmosis
Roy Hill	Roy Hill Holdings Pty Ltd
SBR	Sequential Batch Reactor
SRE	Short Range Endemic
SSE	Site and Soil Evaluation
TDS	Total dissolved solids
TEC	Threatened Ecological Community
UCL	Unallocated Crown Land
WA	Western Australia
WQPN	Water Quality Protection Note
WTP	Water Treatment Plant
WWTP	Waste Water Treatment Plant

7 References

Table 7.1 References

Citation	Reference
AQ2, 2020	AQ2. (2020). Mulga East Baseline Water Studies. Perth: AQ2 Pty Ltd.
AQ2, 2023	AQ2. (2023). Mulga Downs Water Studies Groundwater & Surface Water Impact Assessment. Perth, Western Australia, Australia.
AQ2, 2024	AQ2. (2024). Ecohydrology Assessment. Perth.
Beard 1975	Beard, J.S. The vegetation survey of Western Australia. Plant Ecol 30, 179–187 (1975). https://doi.org/10.1007/BF02389706.
Beard 1990	Beard, J. S. (John Stanley), 1916-2011. (1990). Plant life of Western Australia / J.S. Beard. Kenthurst, N.S.W. : Kangaroo Press.
Binks et al., 2020	Binks, R.M., Wilkins, C.F., Markey, A.S., Lyons, N., and Byrne, M. (2020). Genomic data and morphological re-assessment reveals synonymy and hybridisation among *Seringia* taxa (*Lasiopetaleae, Malvaceae*) in remote north-western Australia. Taxon 69 (2): 307-320, April 2020.
BNTAC, 2013	BNTAC. (2013). Retrieved from Banjima Native Title Aboriginal Corporation RNTBC (ICN-7971): https://bntac.org.au/.
BoM, 2024	BoM. (2024a, April). Monthly mean maximum temperature Wittenom. BoM Climate statistics for Australian locations. Perth, Australia: Bureau of Meteorology. Retrieved April 2024, from http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=36&p_display_type=dataFile&p_startYear=&p_c=&p_stn_num=005026.
Bureau of Meteorology, 2024	Bureau of Meteorology. (2024). Climate Data Online. Retrieved from Bureau of Meteorology: http://www.bom.gov.au/inside/index.shtml?ref=hdr.
CSIRO, 2020	CSIRO. (2020). Climate Change - State of the Climate. Retrieved April 2024, from https://www.csiro.au/en/research/environmental-impacts/climate-change/State-of-the-Climate/Report-at-a-Glance.
DEC, 2003	Department Of Environment and Conservation. (2003). A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002. Perth.
DMIRS, 2023b	DMIRS. (2023b). Mining Proposal Guidance – How to prepare in accordance with Part 1 of the Statutory Guidelines for Mining Proposals. Perth: Government of Western Australia.
DMIRS, 2023c	DMIRS. (2023c). Mine Closure Plan Guidance - How to prepare in accordance with Part 1 of the Statutory Guidelines for Mine Closure Plans. Perth: Government of Western Australia.
DMIRS, 2023a	DMIRS. (2023a). Statutory Guidelines for Mining Proposals. Perth: Government of Western Australia.
DoH, 2011	Department of Health. (2011). Guidelines for the non-potable uses of recycled water in Western Australia. Department of Health, Western Australia.
DoW, 2008	Department of Water. (2008). Water quality protection note 22: Irrigation with nutrient-rich wastewater. Department of Water, Western Australia.
DPIRD, 2022	Department of Primary Industries and Regional Development. (2022.). Rangelands in Western Australia. Government of Western Australia. https://www.agric.wa.gov.au/rangelands/rangelands-western-australia.

[redacted]

Citation	Reference
Fitzpatrick et al, 2011	Fitzpatrick, Rob; Powell, Bernie; & Marvanek, Steve (2011): Atlas of Australian Acid Sulphate Soils. v2. CSIRO. Data Collection. https://doi.org/10.4225/08/512E79A0BC589.
HPPL, 2013	HPPL. (2013, June). Mulga Downs Project Section 38 Referral Supporting Document. Perth, Western Australia, Australia.
Landloch 2009	Landloch. (2009, July). Soil and Overburden Assessment of Murrays Hill, report prepared for Hancock Prospecting Pty Ltd. Perth.
Maia, 2022	Maia. (2022). Mulga Downs Iron Ore Project, Mine and Borefield Study Area Detailed Flora and Vegetation Assessment 2019-2022. Subiaco.
Maslin & van Leeuwen, 2008	Maslin, B. R., & Leeuwen, S. V. (2008). New taxa of Acacia (Leguminosae: Mimosoideae) and notes on other species from the Pilbara and adjacent desert regions of Western Australia.
McFarlane, 2015	McFarlane, D. J. (2015). Pilbara Water Resource Assessment: past, present and future hydroclimate, A report to the Government of Western Australia and industry partners from the CSIRO Pilbara Water Resource Assessment Resource Assessment Resource Assessment. CSIRO Land and Water, Australia.
Mckenzie et al. 2009	McKenzie, N., van Leeuwen, S., and Pinder, A. (2009) Introduction to the Pilbara Biodiversity Survey, 2002 – 2007. Records of the Western Australian Museum, Supplement vol. 78 (3): pp. 3 – 89.
MWH, 2012	MWH. (2012). Murray's Hill Surface Water Investigations Contributions and EPA Referral Document, report prepared for Hancock Prospecting Pty Ltd. (January). Perth, WA.
Pepper et al 2013	Pepper, M., Doughty, P., and Keogh. J. S. (2013) Geodiversity and endemism in the iconic Australian Pilbara region: a review of landscape evolution and biotic response in an ancient refugium. Journal of Biogeography, vol. 40 (7): pp. 1225 – 1239.
SLR, 2021	SLR (2021) Phase 2 Mulga East Iron Ore Project, Ambient Air Quality Monitoring Program, May 2019-Feb 2021, Technical Report, unpublished report prepared for Hancock Prospecting Pty Ltd.
Van Kranendonk et al 2002 in Pepper et al 2013	Van Kranendonk, M., Hickman, A., Smithies, R., and Nelson, D. (2002) Geology and Tectonic Evolution of the Archean North Pilbara Terrain, Pilbara Craton, Western Australia. Economic Geology, vol. 97 (4): pp. 695 – 732.
Van Vreeswyk et al, 2004	Van Vreeswyk, A. M., Payne, A. L., Leighton, K. A., & Hennig, P. (2004). An inventory and condition survey of the Pilbara region, Western Australia. South Perth: Department of Agriculture.

8 Attachments

Attachment 1A – Proof of Occupier Status

[redacted]

[redacted]

[redacted]

Attachment 2 – Premises Maps

[redacted]

Attachment 5 – Stakeholder Consultation Register

[redacted]

Attachment 8A – HanRoy Environmental Policy

[redacted]

Attachment 8B – Site Layout Drawings

[redacted]

Attachment 8C – HanRoy Environmental Compliance Standard

[redacted]

[redacted]

[redacted]

Works approval fee components: premises component

Category	Description	Production capacity	Capacity range
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 per day	Not more than 200 m^3 per day
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	Up to 100,000 tonnes per year

[redacted]

[redacted]