Level 18, Central Park
152-158 St Georges Terrace
PERTH WA 6000

Tel: +61 (0) 8 [redacted]

[redacted]
Manager Resource Industries
Department of Water and Environmental Regulation
Locked Bag 10
Joondalup DC WA 6919

2 October 2025

Our reference: RTIO-1128019

Dear [redacted]

Rhodes Ridge Iron Ore Project – Works Approval W6932 Amendment

Please find attached supporting documentation for a Works Approval Amendment Application (WAAA) relating to W6932/2024/1.

The scope of this WAAA is to:

- Increase of approved waste water treatment plant 1 (WWTP 1) output from 75m^3/day to 94.25m^3/day to allow for the addition of reverse osmosis (RO) reject water (post treatment) to the sprayfield
- Increase to WWTP 1 sprayfield from 2.28ha to 2.86ha to support this increase
- Addition of WWTP 2 (design throughput of 199 m3/day – 142m^3/day wastewater and 57m^3/day RO reject water)
- Addition of a 6.05ha sprayfield irrigation area to service WWTP 2 (in addition to the WWTP 1 sprayfield)
- Amendment from category 85 to category 54 to support the increase
- Amend condition 12 (a) and/or (b) of W6932 to reflect the need for an extended time limited operation (TLO) timeframe for WWTP 1 infrastructure (to align with the licence application occurring post WWTP 2 TLO)
- Extension of expiry date by 12 months (new expiry 26/09/2028) to allow for WWTP 2 construction, commissioning and TLO

Background

Works Approval Application (WAA) W6932/2024/1 was approved by DWER on the 26 September 2024 for the construction and TLO of a 75m3 WWTP and sprayfield to support a temporary 220 person regional exploration camp (herein referred to WWTP 1). An administrative amendment was submitted on 10 June 2025 to increase the discharge criteria for Total Nitrogen (TN) from <30 mg/L to <40mg/L

to align with designed WWTP output and to increase the prescribed premise boundary to allow for slight flexibility in the spray field design. This amendment was approved on 12 August 2025.

Due to an increase in planned exploration activity and personnel numbers, coupled with the reduced ability to use alternative accommodation facilities, there is a requirement to increase the capacity of the regional exploration camp (from 220 person to 600 person). This will require an additional WWTP and sprayfield.

Additionally, there is a requirement to increase the approved output from WWTP 1 (already approved under W6932) to accommodate the blending of RO reject water with the treated wastewater prior to discharge to the approved sprayfield. This adjustment is necessary to improve holistic water management on site and optimise operational performance.

There is no change proposed to the prescribed premises boundary.

Enclosed is an Application Form and Works Approval Supporting Document. The supporting document provides detailed information regarding the proposed infrastructure, including a project description, risk identification and assessment, and proposed controls for the management of potential emissions. If you require any further information or would like to discuss the attached, please do not hesitate to contact Tahlia Walsh on 0436947277 or at tahlia.walsh@riotinto.com in the first instance.

Yours sincerely

Senior Advisor, Government Approvals

Attachments

1. *Application Form: Works Approval Application Form IR-F09*
2. *Attachment 1A - Proof of occupier status*
3. *Attachment 1B - ASIC Company Extract - Rhodes Mgmt*
4. *Attachment 1C: Authorisation to Act as a Representative of the Occupier*
5. *Attachment 2: Prescribed Premise Boundary Map*
6. *Attachment 3A - WWTP 2 Commissioning Plan*
7. *Attachment 8A: Works Approval Amendment Supporting Document – Rhodes Ridge WWTP & Sprayfield Stage 2*

Application form: Works Approval Application Form IR-F09

Application form: Works Approval / Licence / Renewal / Amendment / Registration

Part V Division 3, *Environmental Protection Act 1986*
Environmental Protection Regulations 1987

Part 1: Application type

INSTRUCTIONS:

- **Completion of this form is a statutory requirement under s.54(1)(a) of the *Environmental Protection Act 1986* (WA) (EP Act) for works approval applications; s.57(1)(a) for licence and licence renewal applications; s.59B(1)(a) for applications for an amendment; and under r.5B(2)(a) of the Environmental Protection Regulations 1987 (WA) (EP Regulations) for applications for registration of premises.**
- **The instructions set out in this application form are general in nature.**
- **A reference to 'you' in these instructions is a reference to the applicant.**
- **The information provided to you by the Department of Water and Environmental Regulation (DWER) in relation to making applications does not constitute legal advice. DWER recommends that you obtain independent legal advice.**
- **Applicants seeking further information relating to requirements under the EP Act and/or EP Regulations are directed to the Parliamentary Counsel's Office website (www.legislation.wa.gov.au). Schedule 1 of the EP Regulations contains the categories of prescribed premises.**
- **For prescribed premises where activities fall within more than one category, ALL applicable categories must be identified. This applies for existing prescribed premises seeking renewal or amendment, as well as new prescribed premises.**
- **The application form must be completed with all relevant information attached. Attachments can be combined and submitted as one or more consolidated documents if desired, provided it is clear which section of the application form the information / attachments relate to. Where attachments are submitted separately, avoid duplicating information. Ensure that any cross-references between the application form and the supporting document(s) are accurate.**
- **If an application form has been submitted which is incomplete or materially incorrect, the Chief Executive Officer of DWER (CEO) will decline to deal with the application and advise the applicant accordingly.**
- **On completing this application form, please submit it to DWER in line with the instructions in Part 15 of the form.**

1.1	**This is an application for:** *[Select one option only. Your application may be returned if multiple options are selected.]* under Part V, Division 3 of the EP Act. Please see the: • *Guideline: Industry Regulation Guide to Licensing* • *Procedure: Prescribed premises works approvals and licences* for more information to assist in understanding DWER's regulatory regime for prescribed premises.	☐ Works approval ☐ Licence Existing registration number(s): [ ] Existing works approval number(s): [ ] ☐ Renewal Existing licence number: [ ] ☒ Amendment Number of the existing licence or works approval to be amended: [W6932] ☐ Registration (works approval already obtained) Existing works approval number(s): [ ]
1.2	**For a works approval amendment or licence amendment, are there less than 90 business days until the expiry of the existing works approval or licence?** Only active instruments can be amended. Applications to amend a works approval or licence must be made 90 business days or more prior to the existing works approval or licence expiring to ensure there is adequate time to assess the amendment.	**Yes** ☒

Part 1: Application type

1.3	**This application is for the following categories of prescribed premises:** *(specify all prescribed premises category numbers)*	Rhodes Ridge Management Services Pty Ltd (the Licensee) is proposing to amend the approved works approval W6932/2024/1. The scope of this works approval amendment is to; • Increase of approved waste water treatment plant 1 (WWTP 1) output from 75m^3/day to 94.25m^3/day to allow for the addition of reverse osmosis (RO) reject water • Increase to WWTP 1 sprayfield from 2.28ha to 2.86ha • Addition of WWTP 2 (design throughput of 199 m3/day inclusive of RO reject water) • Addition of a 6.05ha sprayfield irrigation area to service WWTP 2. • Amendment to category 54 is sought • Amend condition 12 (a) and/or (b) of W6932 to reflect the need for an extended time limited operation (TLO) timeframe for WWTP 1 infrastructure (to align with the licence application occurring post WWTP 2 TLO). • Extension of expiry date by 12 months (new expiry 26/09/2028) to allow for WWTP 2 construction, commissioning and TLO
	☒	All activities that meet the definition of a prescribed premises as set out in Schedule 1 of the EP Regulations have been specified above (tick, if yes).

Completion Matrix
The matrix below explains what sections are required to be completed for different types of applications.

Application form section	New application / registration	Renewal	Amendment
Part 1: Application type	•	•	•
Part 2: Applicant details	•	•	•
Part 3: Premises details	•	•	Δ
Part 4: Proposed activities	•	•	•
Part 5: Index of Biodiversity Surveys for Assessment and Index of Marine Surveys for Assessment	If required.	If required.	If required.
Part 6: Other DWER approvals	•	•	•
Part 7: Other approvals and consultation	•	•	•
Part 8: Applicant history	•	•	Δ
Part 9: Emissions, discharges, and waste	•	•	Δ
Part 10: Siting and location	•	•	Δ
Part 11: Submission of any other relevant information	•	•	If required.
Part 12: Category checklist(s)	•	•	•
Part 13: Proposed fee calculation	•	•	•
Part 14: Commercially sensitive or confidential information	•	•	•
Part 15: Submission of application	•	•	•
Part 16: Declaration and signature	•	•	•
Attachment 1A: Proof of occupier status	•	•	N/A
Attachment 1B: ASIC company extract	•	•	N/A

Attachment 1C: Authorisation to act as a representative of the occupier	•	•	•
Attachment 2: Premises map/s	•	•	Δ
Attachment 3A: Environmental commissioning plan	If required.	N/A	If required
Attachment 3B: Proposed activities	•	•	Δ
Attachment 3C: Map of area proposed to be cleared (only applicable if clearing is proposed)	•	•	•
Attachment 3D: Additional information for clearing assessment	If required.	If required.	If required.
Attachment 4: Marine surveys (only applicable if marine surveys included in application)	•	•	•
Attachment 5: Other approvals and consultation documentation	•	•	Δ
Attachment 6A: Emissions and discharges	If required.	If required.	If required.
Attachment 6B: Waste acceptance	If required.	If required.	If required.
Attachment 7: Siting and location	•	•	Δ
Attachment 8: Additional information submitted	If required.	If required.	If required.
Attachment 9: Category-specific checklist(s)	•	If required.	If required.
Attachment 10: Proposed fee calculation	•	•	•
Attachment 11: Request for exemption from publication	If required.	If required.	If required.

Key:

•	Must be completed / submitted.
Δ	To the extent changed / required in relation to the amendment.
N/A	Not required with application, but may be requested subsequently depending on DWER records.
"If required"	Sections for applicants to determine.

Part 2: Applicant details

INSTRUCTIONS:

- **The applicant (the occupier of the premises) must be an individual(s), a company, body corporate, or public authority, but not a partnership, trust, or joint-venture name. Applications made by or on behalf of business names or unincorporated associations will not be accepted.**
- **If applying as an individual, your full legal name must be provided.**
- **If applying as a company, body corporate, or public authority, the full legal entity name must be inserted.**
- **Australian Company Number's (ACN) must be provided for all companies or body corporates.**
- **DWER prefers to send all correspondence electronically via email. We request that you consent to receiving all correspondence relating to instruments and notices under Part V of the EP Act (Part V documents) electronically via email, by indicating your consent in Section 2.3.**
- **Companies or body corporates making an application must nominate an authorised representative from within their organisation. Proof of authorisation must be submitted with the application (see Section 2.10). If you are applying as an individual, you are the representative.**
- **Details of a contact person must be provided for DWER enquiries in relation to your application. This contact person can be a consultant if authorised to represent the applicant. Written evidence of this authorisation must be provided.**
- **Details of the occupier of the premises must be provided. One of the options must be selected and if you have been asked to specify, please provide details. For example, if 'lease holder' has been selected, please specify the type of lease (for example, pastoral lease, mining lease, or general lease) and provide a copy of the lease document(s). Note that contracts for sale of land will not be sufficient evidence of occupancy status.**

2.1	**Applicant name/s (full legal name/s):** The proposed holder of the works approval, licence or registration.	RHODES RIDGE MANAGEMENT SERVICES PTY LTD
	ACN (if applicable):	[redacted]
2.2	**Trading as (if applicable):**	

Part 2: Applicant details					
2.3	**Authorised representative details:** The person authorised to receive correspondence and Part V documents on behalf of the applicant under the EP Act. Where 'yes' is selected, all correspondence will be sent to you via email, to the email address provided in this section. Where 'no' has been selected, Part V documents will be posted to you in hard copy to the postal / business address specified in Section 2.4, below. Other general correspondence may still be sent to you via email.	Name	[redacted]		
		Position			
		Telephone			
		Email			
		I consent to all written correspondence between myself (the applicant) and DWER, regarding the subject of this application, being exclusively via email, using the email address I have provided above.		**Yes** ☒	**No** ☐
2.4	**Registered office address, as registered with the Australian Securities and Investments Commission (ASIC):** This must be a physical address to which a Part V document may be delivered.	Level 18, Central Park 152-158 St Georges Terrace Perth, 6000 WA			
2.5	**Postal address for all other correspondence:** If different from Section 2.4.				
2.6	**Contact person details for DWER enquiries relating to the application (if different from the authorised representative):** For example, could be a consultant or a site-based employee.	Name			
		Position			
		Organisation			
		Address			
		Telephone			
		Email			
2.7	**Occupier status:** Occupier is defined in s.3 of the EP Act and includes a person in occupation or control of the premises, or occupying a different part of the premises whether or not that person is the owner. Note: if a lease holder, the applicant must be the holder of an executed lease, not just an agreement to lease.	Registered proprietor on certificate of title.			☐
		Lease holder (please specify, including date of expiry of lease).			☒
		TR 70/4882 granted pursuant to the Iron Ore *(Rhodes Ridge) Agreement Authorisation Act 1972 (WA)* – Commenced on 17/10/1969, no expiry date.			
		Public authority that has care, control, or management of the land.			☐
		Other evidence of legal occupation or control (please specify – for example, joint venture operating entity, contract, letter of operational control, or other legal document or evidence of legal occupation).			☐

Part 2: Applicant details				
Attachments			**N/A**	**Yes**
2.8	**Attachment 1A: Proof of occupier status**	Copies of certificate of title, lease, or other instruments evidencing proof of occupier status, including the expiry date or confirmation that there is no expiry date, have been provided and labelled as Attachment 1A.	☐	☒
2.9	**Attachment 1B: ASIC company extract**	A current company information extract (not the company information summary) purchased from the ASIC website(s) for all new applications / registrations has been provided and labelled as Attachment 1B.	☐	☒
2.10	**Attachment 1C: Authorisation to act as representative of the occupier**	A copy of the documentation authorising the applicant to act on the occupier's behalf as their authorised agent/representative has been provided and labelled as Attachment 1C.	☐	☒

Part 3: Premises details

3.1	**Premises description (whole or part to be specified):** Include the land description (volume and folio number, lot, or location number/s); Crown lease or reserve number; pastoral lease number; or mining tenement number (as appropriate), of all properties, as shown on title details registered with Landgate.	
	Premises street address Include the suburb.	Rhodes Ridge - approximately 40 km north-west of Newman
	Premises name (if applicable):	Rhodes Ridge
3.2	**Local Government Authority area:** City, Town, or Shire.	Shire of East Pilbara

3.3 **GPS (latitude and longitude) coordinates:**

GPS coordinates determined using the GDA 2020 (Geographic latitude / longitude) coordinate system and datum must be provided for all points around the proposed premises boundary, where the entirety of the cadastre (land parcel) or mining tenements are not used as the premises boundary.

Corner	MGA 94 Easting	MGA 94 Northing	GDA2020 Easting	GDA2020 Northing
1	731118	7437012	731119	7437013
2	732298	7436746	732299	7436747
3	732394	7436653	732395	7436654
4	732390	7436501	732391	7436502
5	731987	7436501	731988	7436502
6	731984	7436246	731985	7436247
7	731960	7436205	731961	7436206
8	730626	7436492	730627	7436493
9	730925	7436966	730926	7436967

Attachments			N/A	Yes
3.4	**Attachment 2: Premises map(s)**	You must provide as an attachment to this application form, labelled Attachment 2, either: 1. an aerial photograph, map, and site plan of sufficient scale showing the proposed prescribed premises boundary *or* 2. where available, a map of the proposed premises boundary and site plan as an ESRI shapefile (accepted file types include .dbf, .shp, .prj, and .shx) with the following properties (provided on a suitable portable digital storage device, if submitting application in hard copy form): • Geometry type: Polygon Shape • Coordinate system: GDA 2020 (Geographic latitude / longitude) • Datum: GDA 2020 (Geocentric Datum of Australia 2020). You must also provide a map or maps of the prescribed premises, clearly identifying and labelling: • layout of key infrastructure and buildings, clearly labelled; • the premises boundary (where the premises boundary does not align with the entirety of the cadastral boundary, identify the Lot Number for which the premises is part of); • emission and discharge points (with precise GPS coordinates where available);	☐	☒

Part 3: Premises details		
• monitoring points (with precise GPS coordinates where available); • sensitive receptors and land uses • all areas proposed to be cleared (if applicable). Maps must contain a north arrow, clearly marking the area in which the activities are carried out. The map or maps must be of reasonable clarity and have a visible scale.		

Part 4: Proposed activities

INSTRUCTIONS:

- **You must provide a description and the scope, size and scale of all prescribed activities of Schedule 1 to the EP Regulations including the maximum production or design capacity of each prescribed activity.**
- **If applying for a works approval or licence amendment involving the construction of new infrastructure, you must provide information on infrastructure to be constructed and how long construction is expected to take. You must confirm if commissioning is to occur and how long it will take.**
- **If applying for a works approval or licence amendment *not* involving the construction of new infrastructure, provide details of the proposed amendment.**
- **You must identify all emission sources on the premises map/s.**
- **You must also provide information on activities which directly relate to the prescribed premises category which have, or are likely to result in, an emission or discharge.**
- **If clearing activities are proposed provide a description and details. If a relevant exemption under Schedule 6 of the EP Act or r.5 of the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (WA) (Clearing Regulations) may apply, provide details.**
- **Note that in some cases, DWER may require that the clearing components of a works approval or licence (or amendment) application be submitted separately through the clearing permit application process. Refer to the *Procedure: Prescribed premises works approvals and licences* for further guidance.**
- **Please note that the requested information is critical to DWER's understanding of the proposed activities. The more accurate, specific, and complete the information provided in the application, the less uncertainty that DWER may identify in the application, therefore facilitating completion of the assessment in a more efficient and timely manner.**

4.1 **Prescribed premises infrastructure and equipment**

In Table 4.1 (below), provide a list of all items of infrastructure and equipment within the boundary of the prescribed premises relevant to this application, and include the following details for each:

- **relevant categories (if known) –** the categories of prescribed premises (as listed under Schedule 1 of the EP Regulations) that relate to that infrastructure or equipment;
- **site plan reference –** the location of that infrastructure or equipment (with reference to the site plan map or maps provided above in Section 3.4 and labelled as Attachment 2 – e.g. use GPS coordinates or a clear description such as *"labelled as [label on premises map] on Map A"*);
- **is it critical containment infrastructure (CCI)? –** indicate if the identified infrastructure or equipment would be categorised as CCI. Refer to the *Guideline: Industry Regulation Guide to Licensing* for further information on CCI; and
- **is environmental commissioning required? –** indicate if environmental commissioning is intended to be undertaken for that item of infrastructure or equipment. Refer to the *Guideline: Industry Regulation Guide to Licensing* for further information on environmental commissioning.

Add additional rows to Table 4.1 (below) as required.

Table 4.1: Infrastructure and equipment

	Infrastructure and equipment	Relevant categories (if known)	Site plan reference	CCI? (mark if yes)	Environmental commissioning? (mark if yes)
1.	Sewage pump station	54	Attachment 2 and 8a	☐	☒
2.	Inlet bar screen	54	Attachment 2 and 8a	☐	☒
3.	Balance tank x 2	54	Attachment 2 and 8a	☐	☒
4.	Sedimentation tank	54	Attachment 2 and 8a	☐	☒
5.	(Mixed Liquor Recycle) MLR tank (anoxic tank)	54	Attachment 2 and 8a	☐	☒
6.	Rotating Biological Contactor RBC tanks	54	Attachment 2 and 8a	☐	☒
7.	Break tank	54	Attachment 2 and 8a	☐	☒
8.	Lamella clarifier x 2	54	Attachment 2 and 8a	☐	☒
9.	Treated Water Irrigation tanks	54	Attachment 2 and 8a	☐	☒
10.	Sprayfield	54	Attachment 2 and 8a	☐	☒

Part 4: Proposed activities		
4.2	**Detailed description of proposed activities or proposed changes (if an amendment):** You must provide details of proposed activities relevant to this application within the boundary of the prescribed premises, identifying: • scope, size, and scale of the project, including details as to production or design capacity (and/or frequency, if applicable); • key infrastructure and equipment; • description of processes or operations (a process flow chart may be included as an attachment); • emission / discharge points; • locations of waste storage or disposal • activities occurring during construction, environmental commissioning, and operation (if applicable). If assessment and imposition of conditions to allow environmental commissioning to be undertaken are requested, please provide an environmental commissioning plan as Attachment 3A (see 4.11 below). Additional information relating to the proposed activities may be included in Attachment 3B (see 4.12 below).	
	Construction activities (if applicable):	
	Refer to section 4.2 and 4.3 of Supporting document (Attachment 8A)	
	Environmental commissioning activities (if applicable): Refer to the *Guideline: Industry Regulation Guide to Licensing* for further guidance.	
	Refer to section 4.4 of Supporting document (Attachment 8A)	
	Time limited operations activities (if applicable): Different elements of the premises may require time limited operations to commence at different times. In these circumstances, please specify the infrastructure and/or equipment for which time limited operations authorisation is being applied for. If time limited operations are expected to differ from future licensed operations, specify how and why this would be the case. Refer to the *Guideline: Industry Regulation Guide to Licensing* for further guidance.	
	Refer to section 4.5 of Supporting document (Attachment 8A)	
	Operations activities (for a licence):	
	N/A	
4.3	**Estimated operating period of the project / premises (e.g. based on estimated infrastructure life):**	~3 years
4.4	**Proposed date(s) for commencement of works (if applicable):**	June 2026
4.5	**Proposed date(s) for conclusion of works construction (if applicable):** This date should coincide with the submission to DWER of an Environmental Compliance Report(s) and/or a Critical Containment Infrastructure Report(s) as required. Refer to the *Guideline: Industry Regulation Guide to Licensing*.	September 2026
4.6	**Proposed date(s) for environmental commissioning of works (if applicable):** Refer to the *Guideline: Industry Regulation Guide to Licensing*.	September 2026

<table>
<tr><th colspan="4">Part 4: Proposed activities</th></tr>
<tr><td>4.7</td><td colspan="2">Proposed date/s for commencement of time limited operations under works approval (if applicable):
Refer to the Guideline: Industry Regulation Guide to Licensing.</td><td>December 2026</td></tr>
<tr><td>4.8</td><td colspan="2">Maximum production or design capacity for each category applied for (based on infrastructure operating 24 hours a day, 7 days a week):
Provide figures for all categories listed in Section 1.2.
Units of measurement must be the same as the units of measurement associated with the relevant category as identified in Schedule 1 of the EP Regulations.</td><td>Category 54
Increase of approved waste water treatment plant 1 (WWTP 1) output from 75m3/day to 94.25m3/day

Maximum design capacity of WWTP 2 will be 199m^3/day inclusive of RO reject water.

WWTP 1 and WWTP 2 will result in total design capacity of 293.25m^3/day

The WWTP will be operational 24 hours per day, seven days a week</td></tr>
<tr><td>4.9</td><td colspan="2">Estimated / actual throughput for each category applied for:
Provide figures for all categories listed in Section 1.2.
Units of measurement must be the same as the units of measurement associated with the relevant category as identified in Schedule 1 of the EP Regulations.</td><td>Category 54
293.25m^3/day
<table><tr><th></th><th>WWTP Effluent (m3/day)</th><th>RO WTP Effluent (m3/day)</th><th>WWTP and RO WTP blend going to sprayfield (m3/day)</th></tr><tr><td>WWTP 1</td><td>75</td><td>19.25</td><td>94.25</td></tr><tr><td>WWTP 2</td><td>142</td><td>57</td><td>199</td></tr><tr><td>TOTAL</td><td>217</td><td>76.25</td><td>293.25</td></tr></table></td></tr>
<tr><th colspan="3">Attachments</th><th>N/A</th><th>Yes</th></tr>
<tr><td>4.10</td><td>Attachment 2: Premises map</td><td>Emission/discharge points are clearly labelled on the map/s required for Part 3.4 (Attachment 2).</td><td>☐</td><td>☒</td></tr>
</table>

Part 4: Proposed activities				
4.11	**Attachment 3A: Environmental commissioning plan**	If applying to construct works or install equipment, and environmental commissioning of the works or equipment is planned, an environmental commissioning plan has been included in Attachment 3A. The environmental commissioning plan is expected to include, at minimum, identification of: • the sequence of commissioning activities to be undertaken, including details on whether they will be done in stages; • a summary of the timeframes associated with the identified sequence of commissioning activities; • the inputs and outputs that will be used in the commissioning process; • the emissions and/or discharges expected to occur during commissioning; • the emissions and/or discharges that will be monitored and/or confirmed to establish or test a steady-state operation (e.g. identifying emissions surrogates, etc.), including a detailed emissions monitoring program for the measurement of those emissions and/or discharges; • the controls (including management actions) that will be put in place to address the expected emissions and/or discharges; • any contingency plans for if emissions exceedances or unplanned emissions and/or discharges occur • how any of the above would differ from standard operations once commissioning is complete. Note that DWER will not include conditions on a granted instrument that authorise environmental commissioning activities where it is not satisfied that the risks associated with environmental commissioning can be adequately addressed.	☐	☒
4.12	**Attachment 3B: Proposed activities**	Additional information relating to the proposed activities has been included in Attachment 3B (if required).	☐	☐

Clearing activities 4.13 to 4.19 are only required if the application includes clearing of native vegetation.		
4.13	**Proposed clearing area (hectares and/or number of individual trees to be removed):**	N/A – CPS 9751/1 will be used as the clearing instrument. Up to 7 hectares will be cleared using this instrument.
4.14	**Details of any relevant exemptions:** Refer to DWER's *A guide to the exemptions and regulations for clearing native vegetation*.	N/A
4.15	**Proposed method of clearing:**	Mechanical
4.16	**Period within which clearing is proposed to be undertaken:** For example, May 2020 – June 2020.	Clearing has already been undertaken as part of WWTP 1 construction. Minimal additional clearing required for WWTP 2.
4.17	**Purpose of clearing:**	
	Mining camp and associated activities	

Clearing activities – Attachments	**N/A**	**Yes**

Part 4: Proposed activities				
4.18	**Attachment 3C: Map of area proposed to be cleared**	You must provide: an aerial photograph or map of sufficient scale showing the proposed clearing area and prescribed premises boundary *OR* if you have the facilities, a suitable portable digital storage device of the area proposed to be cleared as an ESRI shapefile with the following properties: • Geometry type: Polygon Shape • Coordinate system: GDA 2020 (Geographic latitude / longitude) • Datum: 2020 1994 (Geocentric Datum of Australia 2020).	☒	☐
4.19	**Attachment 3D: Additional information for clearing assessment**	Additional information to assist in the assessment of the clearing proposal may be attached to this application (for example, reports on salinity, fauna or flora studies or other environmental reports conducted for the site).	☒	☐

Part 5: Index of Biodiversity and Marine Surveys for Assessments (IBSA and IMSA)

INSTRUCTIONS:

- **Biodiversity surveys should be submitted through the IBSA Submissions Portal at ibsasubmissions.dwer.wa.gov.au**
- **Biodiversity surveys submitted to support this application must meet the requirements of the EPA's *Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA)*.**
- **Marine surveys submitted to support this application must meet the requirements of the EPA's Instructions for the preparation of data packages for the Index of Marine Surveys for Assessments (IMSA).**
- **If these requirements are not met, DWER will decline to deal with the application.**

Attachments				N/A	Yes
5.1	**Biodiversity surveys** Please provide the IBSA number(s) (or submission number(s) if IBSA number has not yet been issued) in the space provided. Note that a submission number is not confirmation of acceptance of a biodiversity survey and is not the same as an IBSA number. IBSA numbers are only issued once a survey has been accepted. Once an IBSA number is issued, please notify the department.	All biodiversity surveys submitted with this application meet the requirements of the EPA's *Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA)*.		☒	☐
		Submission number(s)	N/A - Supplied to DWER in application for approved CPS 9751/1		
		IBSA number(s)	N/A - Supplied to DWER in application for approved CPS 9751/1		
5.2	**Attachment 4: Marine surveys**	All marine surveys submitted with this application meet the requirements of the EPA's *Instructions for the preparation of data packages for the Index of Marine Surveys for Assessments (IMSA)*.		☒	☐

Part 6: Other DWER approvals

INSTRUCTIONS:

- **If you have applied, or intend to apply, for other approvals within DWER that may be relevant to this application, you must provide relevant details.**
- **If you have referred, or intend to refer, your proposal to the Environmental Protection Authority (EPA), you must provide the requested details.**

Pre-application scoping

6.1	**Have you had any pre-application / pre-referral / scoping meetings with DWER regarding any planned applications?**	☐ No ☒ Yes – provide details: Discussed in quarterly engagement meetings held with DWER. Most recent meeting held on 10 September 2025.

Environmental impact assessment (Part IV of the EP Act)

6.2	**Have you referred or do you intend to refer the proposal to the EPA?** Section 37B(1) of the EP Act defines a 'significant proposal' as *"a proposal likely, if implemented, to have a significant effect on the environment"*. If DWER considers that the proposal in this application is likely to constitute a 'significant proposal', DWER is required under s.38(5) of the EP Act to refer the proposal to the EPA for assessment under Part IV, if such a referral has not already been made. If a relevant Ministerial Statement already exists, please provide the MS number in the space provided.	☐ Yes (referred) – reference (if known): [ ] ☐ Yes – intend to refer (proposal is a 'significant proposal')☐ Yes – intend to refer (proposal will require a s.45C amendment to the current Ministerial Statement): MS [ ] ☐ No – a valid Ministerial Statement applies: MS [ ] ☒ No – not a 'significant proposal'

Clearing of native vegetation (Part V Division 2 of the EP Act and *Country Area Water Supply Act 1947*)

6.3	**Have you applied or do you intend to apply for a native vegetation clearing permit?** In accordance with the *Guideline: Industry Regulation Guide to Licensing* and *Procedure: Native vegetation clearing permits*, where clearing of native vegetation: • is exempt under Schedule 6 of the EP Act or the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (WA) (refer to *A guide to the exemptions and regulations for clearing native vegetation*) • is being assessed by a relevant authority which would lead to an exemption under Schedule 6 of the EP Act, or • has been referred under s.51DA of the EP Act and a determination made that a clearing permit is not required (refer to the *Guideline: Native vegetation clearing referrals*), the clearing will not be reassessed by DWER or be subject to any additional controls by DWER. If the proposed clearing action is to be assessed in accordance with, or under, an *Environment Protection and Biodiversity Conservation Act* (Cth) (EPBC Act) accredited process, such as the assessment bilateral agreement, the clearing permit application *Form Annex C7 – Assessment bilateral agreement* must be completed and attached to your clearing permit application.	☐ Yes – clearing application reference (if known): CPS [] ☒ Yes – a valid EP Act clearing permit already applies: CPS [9751/1] ☐ No – this application includes clearing (please complete Sections 4.13 to 4.19 above) ☐ No – permit not required (no clearing of native vegetation) ☐ No – permit not required (clearing referral decision): CPS [ ] ☐ No – an exemption applies (explain why):

Part 6: Other DWER approvals		
6.4	**Have you applied or do you intend to apply for a *Country Area Water Supply Act 1947* licence?** If a clearing exemption applies in a *Country Area Water Supply Act 1947* (CAWS Act) controlled catchment, or if compensation has previously been paid to retain the subject vegetation, a CAWS Act clearing licence is required. If yes, contact the relevant DWER regional office for a Form 1 *Application for licence*. Map of CAWS Act controlled catchments	☐ Yes – application reference (if known): [ ] ☐ No – a valid licence applies: [ ] ☒ No – licence not required
Water licences and permits (*Rights in Water and Irrigation Act 1914*)		
6.5	**Have you applied, or do you intend to apply for:** **1. a licence or amendment to a licence to take water (surface water or groundwater); or** **2. a licence to construct wells (including bores and soaks); or** **3. a permit or amendment to a permit to interfere with the bed and banks of a watercourse?** For further guidance on water licences and permits under the *Rights in Water and Irrigation Act 1914*, refer to the *Procedure: Water licences and permits*.	☐ Yes –application reference (if known): [ ] ☒ No – a valid licence / permit applies: [(GWL) 211767, GWL 211768 and GWL 211767] ☐ No – an exemption applies (explain why): ☐ No – licence / permit not required

Part 7: Other approvals and consultation

INSTRUCTIONS:

- **Please provide copies of all relevant documentation indicated below, including any conditions, exclusions, or expiry dates.**
- **"Major Project" means:**
  - **A State Development Project, where the lead agency is the Department of Jobs, Tourism, Science and Innovation (including projects to which a State Agreement applies); or**
  - **A Level 2 or 3 proposal, as defined in the Department of Premier and Cabinet's *Lead Agency Framework*.**

		N/A	No	Yes
7.1	**Is the proposal a Major Project?**		☒	☐
7.2	**Is the proposal subject to a State Agreement Act?**		☐	☒
	If yes, specify which Act:	*Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972* (WA),		
7.3	**Has the proposal been allocated to a "Lead Agency" (as defined in the *Lead Agency Framework*)?**		☒	☐
	If yes, specify Lead Agency contact details:			
7.4	**Has the proposal been referred and/or assessed under the EPBC Act (Commonwealth)?**	☒	☐	☐
	If yes, please specify referral, assessment and/or approval number:			
7.5	**Has the proposal obtained all relevant planning approvals?**	☐	☐	☒
	If planning approval is necessary but has not been obtained, please provide details indicating why:			
	An application to construct an apparatus for the treatment of sewage will be submitted to the Shire of East Pilbara for assessment.			
	If planning approval is not necessary, please provide details indicating why:			

Part 7: Other approvals and consultation				
7.6	**For renewals or amendment applications, are the relevant planning approvals still valid (that is, not expired)?**	☐	☐	☒
7.7	**Has the proposal obtained all other necessary statutory approvals (not including any other DWER approvals identified in Part 6 of this application)?**	☒	☐	☐
	If no, please provide details of approvals already obtained, outstanding approvals, and expected dates for obtaining these outstanding approvals:			
		N/A	**No**	**Yes**
7.8	**Has consultation been undertaken with parties considered to have a direct interest in the proposal (that is, interested parties or persons who are considered to be directly affected by the proposal)?** DWER will give consideration to submissions from interested parties or persons in accordance with the *Guideline: Industry Regulation Guide to Licensing*.	☐	☐	☒
Attachments			**N/A**	**Yes**
7.9	**Attachment 5: Other approvals and consultation documentation** — Details of other approvals specified in Part 7 of this application, including copies of relevant decisions and any consultation undertaken with direct interest stakeholders have been provided and labelled Attachment 5.		☒	☐

Part 8: Applicant history				
Note: • **DWER will undertake an internal due diligence of the applicant's fitness and competency based on DWER's compliance records and the responses to Part 8 of the form.** • **If you wish to provide additional information for DWER to consider in making this assessment, you may provide that information as a separate attachment (see Part 11).**				
		N/A	**No**	**Yes**
8.1	If the applicant is an individual, has the applicant previously held, or do they currently hold, a licence or works approval under Part V of the EP Act?	☒	☐	☐
8.2	If the applicant is a corporation, has any director of that corporation previously held, or do they currently hold, a licence or works approval under Part V of the EP Act?	☐	☒	☐
8.3	If yes to 8.1 or 8.2 above, specify the name of company and/or licence or works approval number:			
8.4	If the applicant is an individual, has the applicant ever been convicted, or paid a penalty, for an offence under a provision of the EP Act, its subsidiary legislation, or similar environmental protection or health-related legislation in Western Australia or elsewhere in Australia?	☒	☐	☐
8.5	If the applicant is a corporation, has any director of that corporation ever been convicted, or paid a penalty, for an offence under a provision of the EP Act, its subsidiary legislation, or similar environmental protection or health-related legislation in Western Australia or elsewhere in Australia?	☐	☒	☐
8.6	If the applicant is a corporation, has any person concerned in the management of the corporation, as referred to in s.118 of the EP Act, ever been convicted of, or paid a penalty, for an offence under a provision of the EP Act, its subsidiary legislation, or similar environmental protection or health-related legislation in Western Australia or elsewhere in Australia?	☐	☒	☐
8.7	If the applicant is a corporation, has any director of that corporation ever been a director of another corporation that has been convicted, or paid a penalty, for an offence under a provision of the EP Act, its subsidiary legislation, or similar environmental protection or health-related legislation in Western Australia or elsewhere in Australia?	☐	☒	☐

Part 8: Applicant history				
8.8	With regards to the questions posed in 8.4 to 8.7 above, have any legal proceedings been commenced, whether convicted or not, against the applicant for an offence under a provision of the EP Act, its subsidiary legislation, or similar environmental protection or health-related legislation in Western Australia or elsewhere in Australia?	☐	☒	☐
8.9	Has the applicant had a licence or other authority suspended or revoked due to a breach of conditions or an offence under the EP Act or similar environmental protection or health-related legislation in Western Australia or elsewhere in Australia?	☐	☒	☐
8.10	If the applicant is a corporation, has any director of that corporation ever had a licence or other authority suspended or revoked due to a breach of conditions or an offence under the EP Act or similar environmental protection or health-related legislation in Western Australia or elsewhere in Australia?	☐	☒	☐
8.11	If the applicant is a corporation, has any director of that corporation ever been a director of another corporation that has ever had a licence or other authorisation suspended or revoked due to a breach of conditions or an offence under the EP Act or similar environmental protection or health-related legislation in Western Australia or elsewhere in Australia?	☐	☒	☐
8.12	If yes to any of 8.4 to 8.11 above, you must provide details of any charges, convictions, penalties paid for an offence, and/or licences or other authorisations suspended or revoked:			

Part 9: Emissions, discharges, and waste			
INSTRUCTIONS: • **Please see *Guideline: Risk Assessments* and provide all information relating to emission sources, pathways and receptors relevant to the application.** • **You must provide details on sources of emissions (for example, kiln stack, baghouses or discharge pipelines) including fugitive emissions (for example, noise, dust or odour), types of emissions (physical, chemical, or biological), and volumes, concentrations and durations of emissions.** • **The potential for emissions should be considered for all stages of the proposal (where relevant), including during construction, commissioning and operation of the premises.**			
		No	**Yes**
9.1	**Are there potential emissions or discharges arising from the proposed activities?**	☐	☒
	If yes, identify all potential emissions and discharges arising from the proposed activities and complete Table 9.1: Emissions and discharges (below).		

Part 9: Emissions, discharges, and waste

☐ Gaseous and particulate emissions (e.g. emissions from stacks, chimneys or baghouses)

☒ Dust (e.g. from equipment, unsealed roads and/or stockpiles, etc.)

☒ Wastewater discharges (e.g. treated sewage, wash water, or process water discharged to lands or waters)

☐ Waste and leachate (e.g. emissions through seepage, leaks and spills of waste from storage, process and handling areas, etc.)

☒ Noise (e.g. from machinery operations and/or vehicle operations)

☒ Odour (e.g. from wastes accepted at putrescible landfills, storage or processing of waste or other odorous materials, etc.)

☐ Contaminated or potentially contaminated stormwater (e.g. stormwater with the potential to come into contact with chemicals or waste materials, etc.)

☐ Electromagnetic radiation[1]

☐ Other (please specify): [ ]

[1] Note that for electromagnetic radiation, copies/details of other relevant approvals (such as from the Department of Mines, Industry Regulation and Safety or the Radiological Council) must be provided where applicable.

Details of any pollution control equipment or waste treatment system, including any control mechanisms used to ensure proper operation of this equipment, must be included in the proposed controls column of the 'Emissions and discharges table' below. Details of management measures employed to control emissions should also be included. Please provide / attach any relevant documents (e.g. management plans, etc.).

Additional rows may be added as required and/or further information may be included as an attachment (see Section 9.3).

Table 9.1: Emissions and discharges

	Source of emission or discharge	Emission or discharge type	Volume and frequency	Proposed controls (include in Attachment 6A if extensive or complex)	Location (on site layout plan – see 3.4)
1.	*Please refer to Section 10 and 11 of Attachment 8A for more information*				
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

9.2	**Waste-related activities at the premises[2]** Answer "yes" or "no" for the following questions and complete Table 9.2 (below).	**No**	**Yes**
(a)	Is waste accepted at the premises?	☒	☐
(b)	Is waste produced on the premises?	☐	☒
(c)	Is waste processed on the premises?	☐	☒
(d)	Is waste stored on the premises?	☐	☒

Part 9: Emissions, discharges, and waste

(e)	Is waste buried on the premises?	☒	☐
(f)	Is waste recycled on the premises?	☒	☐
(g)	Is any of the waste listed in Table 9.2 (below) also considered a 'dangerous good' for the purposes of the Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007?[3]	☒	☐
	Specify, if yes:		

[2] Copies / details of any other relevant approvals (e.g. from the Department of Health) must be provided where applicable.

[3] Wastes derived from the storage, handling, and use of dangerous goods may be considered hazardous and may need to be handled with the same precautions. Please refer to the Department of Mines, Industry Regulation and Safety's *Dangerous Goods Safety information sheet* for more information.

Solid waste types must be described with reference to *Landfill Waste Classification and Waste Definitions 1996* (as amended from time to time) and the Environmental Protection (Controlled Waste) Regulations 2004 (Controlled Waste Regulations).

Liquid waste types must be described with reference to the Controlled Waste Regulations.

For further guidance on the definition of waste, refer to *Fact Sheet: Assessing whether material is waste*.

Detail must be provided on storage type (for example, hardstand and containment infrastructure), capacity, likely storage volumes, and containment features (for example, lining and bunding).

Additional rows may be added as required and/or further information may be included as an attachment (see Section 9.4).

Table 9.2 Waste types

	Waste type	Quantity (e.g. tonnes, litres, cubic metres)	Waste activity infrastructure (including specifications)	Monitoring (if applicable)	Location (on site layout plan – see 3.4)
1.	*Please refer to Section 11 of Attachment 8A for more information*				
2.					
3.					
4.					
5.					

Attachments			N/A	Yes
9.3	**Attachment 6A: Emissions and discharges** (if required)	If required, further information for Section 9.1 has been included as an attachment labelled Attachment 6A.	☒	☐
9.4	**Attachment 6B: Waste acceptance** (if required)	If required, further information for Section 9.2 has been included as an attachment labelled Attachment 6B.	☒	☐

Part 10: Siting and location

10.1 **Sensitive land uses**

What is/are the distance(s) to the nearest sensitive land use(s)?

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.

Please refer to Section 8 of Attachment 8A.

10.2 **Nearby environmentally sensitive receptors and aspects**

Identify in Table 10.2 (below):

- all instances of environmentally sensitive receptors that are known or suspected to be present within, or within close proximity to, the proposed prescribed premises boundary;
- the nature of the sensitive receptors (e.g. type of Threatened Ecological Community, species or threatened flora or fauna, etc.);
- their actual or approximate known distance and direction from the premises boundary (at the closest point/s); and
- if applicable, what measures have been or will be taken to ensure that sensitive receptors are not adversely impacted by any emissions or discharges from the premises.

Part 10: Siting and location

Refer to the *Guideline: Environmental siting* for further guidance.

Table 10.2: Nearby environmentally sensitive receptors and aspects

Type / classification	Description	Distance + direction to premises boundary	Proposed controls to prevent or mitigate adverse impacts (if applicable)
Environmentally Sensitive Areas [1]	*Please refer to Section 8 Attachment 8A for more information*		
Threatened Ecological Communities			
Threatened and/or priority fauna			
Threatened and/or priority flora			
Aboriginal and other heritage sites [2]			
Public drinking water source areas [3]			
Rivers, lakes, oceans, and other bodies of surface water, etc.			
Acid sulfate soils			
Other			

[1] Environmentally Sensitive Areas are as declared under the *Environmental Protection (Environmentally Sensitive) Notice 2005.* Refer to DWER's website ("Environmentally Sensitive Areas") for further information.

[2] Refer to the Department of Planning, Lands and Heritage website for further information about Aboriginal heritage and other heritage sites.

[3] Refer to *Water Quality Protection Note No.25: Land use compatibility tables for public drinking water source areas* for further information.

10.3 **Environmental siting context details**

Provide further information including details on topography, climate, geology, soil type, hydrology, and hydrogeology at the premises.

Please refer to Section 9 of Attachment 8A for more information

Attachments			N/A	Yes
10.4	**Attachment 7: Siting and location**	You must provide details and a map describing the siting and location of the premises, including identification of distances to sensitive land uses and/or any specified ecosystems.	☐	☒

Part 11: Submission of any other relevant information

Attachments			No	Yes
11.1	**Attachment 8: Additional information submitted**	Applicants seeking to submit further information may include information labelled Attachment 8. If submitting multiple additional attachments, label them 8A, 8B, etc. Where additional documentation is submitted, please specify the name of documents below.	☐	☒
	List title of additional document(s) attached:	Attachment 8A - Works Approval Supporting Document: Rhodes Ridge WWTP 2 & Sprayfield		

Part 12: Category checklist(s)				
Attachments			**N/A**	**Yes**
12.1	**Attachment 9: Category checklist(s)**	DWER has developed category checklists to assist applicants with preparing their application. These checklists are available on DWER's website. The relevant category-specific checklist(s) must be completed and included with the application, labelled as Attachment 9. If attaching multiple category checklists, label them 9A, 9B, etc. Do not select "N/A" unless: • a relevant category checklist is not yet published on DWER's website, or • the application is for an amendment that does not propose changes to the method of operation, or change the inputs, outputs, infrastructure, equipment, emissions, or discharges of / from the premises. Note that that a category checklist(s) may still be required for renewal applications. You will be advised in your renewal notification letter (sent approximately twelve months before the licence expiry date) if you are required to provide the information identified in a category checklist. Where a category checklist is submitted, please specify which checklist(s) in the space below.	☒	☐
	List title(s) of category checklists attached:			

Part 13: Proposed fee calculation

INSTRUCTIONS:

Please calculate the prescribed fee using the relevant online fee calculator linked below.

- **Licence: www.der.wa.gov.au/LicenceFeeCalculator**
- **Works approval: www.der.wa.gov.au/WorksApprovalFeeCalculator**
- **Amendment: https://www.wa.gov.au/government/publications/works-approval-and-licence-amendment-fee-calculator**

Different fee units apply for different fee components. Fee units may also have different amounts depending on the period in which the calculation is made.

Once DWER has confirmed that the application submitted meets the relevant requirements of the EP Act, you will be issued an invoice with instructions for paying your application fee.

Further information on fees can be found in the *Fact Sheet: Industry Regulation fees*, and on DWER's website.

13.1	Only the relevant fee calculations are to be completed as follows: *[mark the box to indicate sections completed]*	☐ Section 13.3 for works approval applications ☐ Section 13.4 for licence / renewal applications ☐ Section 13.5 for registration applications ☒ Section 13.6 for amendment applications ☐ Section 13.7 for applications requiring clearing of native vegetation
13.2	All information and data used for the calculation of proposed fees has been provided in accordance with Section 13.8.	☒

13.3 Proposed works approval fee

Proposed works approval fee (see Schedule 3 of the EP Regulations)

Fees relate to the cost of the works, including all capital costs (inclusive of GST) associated with the construction and establishment of the works proposed under the works approval application. This includes, for example, costs associated with earth works, hard stands, drainage, plant hire, equipment, processing plant, relocation of equipment and labour hire.

Costs exclude:

- the cost of land
- the cost of buildings to be used for purposes unrelated to the purposes in respect of which the premises are, or will become, prescribed premises
- costs for buildings unrelated to the prescribed premises activity or activities
- consultancy fees relating to the works.

Fee component	Proposed fee

13.4 **Proposed licence fee (new licences and licence renewals)**

Detailed licence fee calculations

Part 1 Premises component (see r.5D and Part 1 of Schedule 4 of the EP Regulations)

The production or design capacity should be the maximum capacity of the premises. For most categories, the production or design capacity refers to an annual rate. The figure should be based on 24 hour operation for 365 days, unless there is another regulatory approval or technical reason that restricts operation.

The premises component fee applies to the category in Part 1, Schedule 4 incurring the higher or highest amount of fee units in accordance with r.5D(2) of the EP Regulations.

List all categories (insert additional rows as required). Use only the higher or highest amount of fee units to determine the Part 1 fee component.

Category	Production or design capacity	Fee units
Using the higher or highest amount of fee units, Part 1 component subtotal		$

Part 2 Waste (see r.5D(1a)(b) and Part 2 of Schedule 4 of the EP Regulations)

If your premises includes one or more of the following categories specify any applicable Part 2 waste amounts. Do not include Part 3 waste components of these discharges in the below calculations.

Categories: 5, 6, 7, 8, 9, 12, 14, 44, 46, 53, 54A, 70, 80, or 85B

Part 2 waste means waste consisting of –

(a) tailings; or
(b) bitterns; or
(c) water to allow mining of ore; or
(d) flyash; or
(e) waste water from a desalination plant.

If the premises does not fall into one of the categories listed above, or there are no applicable Part 2 waste amounts, the sub total for this section will be $0.

Insert additional rows as required. Sum all Part 2 waste fees to determine the sub total.

Discharge quantity (tonnes/year)	Fee units
Part 2 component subtotal	$

Part 3 Waste – Discharges to air, onto land, into waters (see Part 3 of Schedule 4 of the EP Regulations)

Choose the appropriate location of the discharge and enter the discharge amount(s) in the units specified in the EP Regulations. This should be the amount of waste expected to be discharged over the next 12 months, expressed in the units and averaging period applicable for that waste kind (for example, g/minute or kg/day). Amounts can be measured, calculated, or estimated and can be based on data acquired over the previous 12 months, but should be based on the maximum premises capacity and not the forecast operating hours.

Where there are discharges, all prescribed waste types must be considered in the fee calculation. If a specified waste type is not present in the discharge, this must be justified using an appropriate emission estimation technique (for example, sampling data, industry sector guidance notes, National Pollution Inventory guides and emission factors).

Discharges to air			
Discharges to air	Discharge rate (g/min)	Discharges to air	Discharge rate (g/min)
Carbon monoxide		Nickel	
Oxides of nitrogen		Vanadium	
Sulphur oxides		Zinc	
Particulates (Total PM)		Vinyl chloride	
Volatile organic compounds		Hydrogen sulphide	
Inorganic fluoride		Benzene	
Pesticides		Carbon oxysulphide	
Aluminium		Carbon disulphide	
Arsenic		Acrylates	
Chromium		Beryllium	
Cobalt		Cadmium	
Copper		Mercury	
Lead		TDI (toluene-2, 4-di-iso-cyanate)	
Manganese		MDI (diphenyl-methane di-iso-cyanate)	
Molybdenum		Other waste	
Part 3 component subtotal		$	

Discharges onto land or into waters		Discharge rate
1. Liquid waste that can potentially deprive receiving waters of oxygen (for each kilogram discharged per day) —	(a) biochemical oxygen demand (in the absence of chemical oxygen demand limit)	
	(b) chemical oxygen demand (in the absence of total organic carbon limit)	
	(c) total organic carbon	
2. Bio-stimulants (for each kilogram discharged per day) —	(a) phosphorus	
	(b) total nitrogen	
3. Liquid waste that physically alters the characteristics of naturally occurring waters —	(a) total suspended solids (for each kilogram discharged per day)	
	(b) surfactants (for each kilogram discharged per day)	
	(c) colour alteration (for each platinum cobalt unit of colour above the ambient colour of the waters in each megalitre discharged per day)	
	(d) temperature alteration (for each 1°C above the ambient temperature of the waters in each megalitre discharged per day) — (i) in the sea south of the Tropic of Capricorn (ii) in other waters	

4. Waste that can potentially accumulate in the environment or living tissue (for each kilogram discharged per day) —	(a) aluminium	
	(b) arsenic	
	(c) cadmium	
	(d) chromium	
	(e) cobalt	
	(f) copper	
	(g) lead	
	(h) mercury	
	(i) molybdenum	
	(j) nickel	
	(k) vanadium	
	(l) zinc	
	(m)pesticides	
	(n) fish tainting wastes	
	(o) manganese	
5. *E. coli* bacteria as indicator species (in each megalitre discharged per day) —	(a) 1,000 to 5,000 organisms per 100 ml	
	(b) 5,000 to 20,000 organisms per 100 ml	
	(c) more than 20,000 organisms per 100 ml	
6. Other waste (per kilogram discharged per day) —	(a) oil and grease	
	(b) total dissolved solids	
	(c) fluoride	
	(d) iron	
	(e) total residual chlorine	
	(f) other	
Part 3 component subtotal		$
Summary – Proposed licence fee		
Part 1 Component		
Part 2 Component		
Part 3 Component		
Total proposed licence fees:		$

13.5 **Prescribed fee for registration**	
A fee of 24 units applies for an application for registration of premises, unless the occupier of the premises holds a licence in respect of the premises, in accordance with r.5B(2)(c) of the EP Regulations.	☐ (Tick to acknowledge)

13.6 **Amendment fee (works approval or licence)**	
The fee prescribed for an application for an amendment to a works approval or licence is calculated in accordance with r.5BB(1)(a) of the EP Regulations: • for a single category of prescribed premises to which the works approval or licence relates, by using the fee unit number corresponding to the prescribed premises category and relevant design capacity threshold in Schedule 4 Part 1 of the EP Regulations. • for multiple categories of prescribed premises to which the works approval or licence relates, by using the highest fee unit number corresponding to the prescribed premises categories and design capacity threshold in Schedule 4 Part 1 of the EP Regulations.	
Fee Units	Proposed fee
[redacted]	

13.7 **Prescribed fee for clearing permit**	
In accordance with the *Guideline: Industry Regulation Guide to Licensing* and *Procedure: Native vegetation clearing permits*, where approval to clear native vegetation is sought as part of an application for a works approval or licence, DWER may elect to either jointly or separately determine the clearing component of the application. Where DWER separately determines the clearing component of an application, the application will be deemed to be an application for a clearing permit under s.51E of the EP Act and processed accordingly. Note: If a clearing permit application has been separately submitted and accepted by DWER, a refund for the clearing permit application will not be provided where DWER determines to address clearing requirements as part of a related works approval application.	☐ (Tick to acknowledge)

13.8 **Information and data used to calculate proposed fees**	
The detailed calculations of fee components, including all information and data used for the calculations are to be provided as attachments to this application, labelled as **Attachment 10**, with an appropriate suffix (for example 10A, 10B etc.). Please specify the relevant attachment number in the space/s provided below.	
Proposed fee for works approval	Attachment No.
Details for cost of works	
Proposed fee for licence	Attachment No.
Part 1: Premises	
Part 2: Waste types	
Part 3: Discharges to air, onto land, into waters	

Part 14: Commercially sensitive or confidential information

NOTE:
Information submitted as part of this application will be made publicly available. If you wish to submit commercially sensitive or confidential information, please identify the information in Attachment 11, and include a written statement of reasons why you request each item of information be kept confidential.

Information submitted later in the application process may also be made publicly available at DWER's discretion. For any commercially sensitive or confidential information, please follow the same process as described above.

DWER will take reasonable steps to protect genuinely confidential or commercially sensitive information. However, please note that DWER cannot commit to redacting all personal information from all supporting documents. You are advised to ensure that all personal information, including signatures, are removed from supporting documents prior to submitting them to the department. Please note that all submitted information may be the subject of an application for release under the *Freedom of Information Act 1992*.

	Attached	**N/A**
All information which you would propose to be exempt from public disclosure has been separately placed in a redacted version of the application form and its supporting documentation. Note that this is in addition to the unredacted version(s) provided to DWER for its assessment. Grounds for claiming exemption in accordance with Schedule 1 to the *Freedom of Information Act 1992* must be specified in **Attachment 11** (located at the end of this form).	☐	☐

Part 15: Submission of application	
INSTRUCTIONS: **Check one of the boxes below to nominate how you will submit your application.** **Files larger than 50MB cannot be received via email by DWER. Files larger than 50MB can be sent via File Transfer. Alternatively, email DWER to make other arrangements.**	
A full, signed, electronic copy of the application form including all attachments has been submitted via email to info@dwer.wa.gov.au; **OR**	☒
A signed, electronic copy of the application form has been submitted via email to info@dwer.wa.gov.au and attachments have been submitted via File Transfer, or electronically by other means as arranged with DWER; **OR**	☐
A full, signed hard copy has been sent to: APPLICATION SUBMISSIONS Department of Water and Environmental Regulation Locked Bag 10 Joondalup DC WA 6919	☐

Part 16: Declaration and signature

General

I / We confirm and acknowledge that:

- the information contained in this application is true and correct;
- I / we have legal authority to sign on behalf of the applicant (where authorisation provided);
- I / we have not altered the requirements and instructions set out in this application form;
- I / we have provided a valid email address in Section 2.3 for receipt of correspondence electronically via email from DWER in relation to this application;
- that successful delivery to my / our server constitutes receipt of correspondence sent electronically via email from DWER in relation to this application; and
- I / we have provided a valid postal and/or business address in Section 2.4 for the service of all Part V documents.
- giving or causing to be given information that to my knowledge is false or misleading is an offence under s.112 of the EP Act and may incur a penalty of up to $100,000.

Publication

I / We confirm and acknowledge:

- this application (including all attachments apart from the sections identified in Attachment 11) is a public document and may be published;
- marine surveys provided in accordance with Part 5 will be published and used, for the purposes of the IMSA project, in accordance with your declaration made in the *Metadata and Licensing Statement*;
- all necessary consents for the publication of information have been obtained from third parties;
- information considered exempt from public disclosure has been noted by redaction of a separately provided copy of the completed application form and its supporting documentation (in accordance with Part 14), with reasons as to why the information should be exempt in accordance with the grounds specified in Schedule 1 to the *Freedom of Information Act 1992* (WA) being provided in Attachment 11;
- subsequent information provided in relation to this application will be a public document and may be published unless written notice has been given to DWER by the applicant, at the time the information is provided, claiming that the information is considered exempt from public disclosure; and
- the decision to not publish information will be at the discretion of the CEO of DWER and will be made consistently with the provisions of the *Freedom of Information Act 1992* (WA).

[redacted]

02/10/2025

Date

Date

NOTE: This form may be signed:

- **if the applicant is an individual, by the individual;**
- **if the applicant is a corporation, by:**
  - **the common seal being affixed in accordance with the *Corporations Act 2001* (Cth); or**
  - **two directors; or**
  - **a director and a company secretary; or**
  - **if a proprietary company has a sole director who is also the sole company secretary, by that director; and**
- **by a person with legal authority to sign on behalf of the applicant.**

ATTACHMENT 11 – Confidential or commercially sensitive information

Request for exemption from publication			
Information which you consider should not be published, on the grounds of a relevant exemption found in Schedule 1 to the *Freedom of Information Act 1992* (WA), must be specified in this Attachment. Add additional rows as required.			
NOT FOR PUBLICATION IF GROUNDS FOR EXEMPTION ARE DETERMINED TO BE ACCEPTABLE			
Section of this form:		Grounds for claiming exemption:	
Section of this form:		Grounds for claiming exemption:	
Section of this form:		Grounds for claiming exemption:	

_____

Full Name

_____ _____

Signature Date

Attachment 1A - Proof of occupier status

Government of Western Australia
Department of Mines, Industry Regulation and Safety

eMiTS MINERAL TITLES ONLINE

MINING TENEMENT SUMMARY REPORT

TEMPORARY RESERVE 70/4882

Status: Live

TENEMENT SUMMARY

Area: 10,890.00000 HA
Death Reason :
Mark Out : N/A
Death Date :
Received : 26/08/1968 09:30:00
Commence : 17/10/1969
Term Granted :
State Agreement Act : Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972

CURRENT HOLDER DETAILS

Name and Address
WRIGHT PROSPECTING PTY LTD
PO BOX 1220, SUBIACO, WA, 6904

HAMERSLEY RESOURCES LIMITED
C/- RIO TINTO IRON ORE TENURE MANAGEMENT & STRATEGY, GPO BOX A42, PERTH, WA, 6837

DESCRIPTION

Locality:
Datum: For description see page 14 of file 2586/68.
Boundary:

Area :	Type	Dealing No	Start Date	Area
	Surveyed		30/10/1992	10,890.00000 HA
	Granted		17/10/1969	11,395.94000 HA
	Applied For		26/08/1968	11,395.94000 HA

SHIRE DETAILS

Shire	Shire No	Start	End	Area
EAST PILBARA SHIRE	3220	17/10/1969		10,890.00000 HA

Attachment 1B - ASIC Company Extract - Rhodes Mgmt

ASIC
Australian Securities & Investments Commission

Current Company Extract

Name: RHODES RIDGE MANAGEMENT SERVICES PTY LTD
ACN: 662 895 927

Date/Time: 19 September 2025 AEST 11:56:23 AM

This extract contains information derived from the Australian Securities and Investments Commission's (ASIC) database under section 1274A of the Corporations Act 2001.

Please advise ASIC of any error or omission which you may identify.

EXTRACT

Organisation Details		Document Number
Current Organisation Details		
Name:	RHODES RIDGE MANAGEMENT SERVICES PTY LTD	4EAB82435
ACN:	662 895 927	
ABN:	33662895927	
Registered in:	Western Australia	
Registration date:	05/10/2022	
Next review date:	05/10/2025	
Name start date:	05/10/2022	
Status:	Registered	
Company type:	Australian Proprietary Company	
Class:	Limited By Shares	
Subclass:	Proprietary Company	

Address Details		Document Number
Current		
Registered address:	'Central Park' Level 18, 152-158 St Georges Terrace, PERTH WA 6000	4EAB82435
Start date:	05/10/2022	
Principal Place Of Business address:	'Central Park' Level 18, 152-158 St Georges Terrace, PERTH WA 6000	4EAB82435
Start date:	05/10/2022	

Contact Address	
Section 146A of the Corporations Act 2001 states 'A contact address is the address to which communications and notices are sent from ASIC to the company'.	
Current	
Address:	GPO BOX 384D, MELBOURNE VIC 3001
Start date:	31/01/2023

Officeholders and Other Roles		Document Number
Director		
Name:	[redacted]	
Address:		
Born:		
Appointment date:		
Name:		
Address:		
Born:		
Appointment date:		
Secretary		
Name:		
Address:		
Born:		

Appointment date:	[redacted]
Name:	
Address:	
Born:	
Appointment date:	
Ultimate Holding Company	
Name:	
ACN:	
ABN:	

Share Information

Share Structure

Class	Description	Number issued	Total amount paid	Total amount unpaid	Document number
ORD	ORDINARY	1	1.00	0.00	4EAB82435

Members

Note: For each class of shares issued by a proprietary company, ASIC records the details of the top twenty members of the class (based on shareholdings). The details of any other members holding the same number of shares as the twentieth ranked member will also be recorded by ASIC on the database. Where available, historical records show that a member has ceased to be ranked amongst the top twenty members. This may, but does not necessarily mean, that they have ceased to be a member of the company.

Name: HAMERSLEY HOLDINGS LIMITED
ACN: 008 446 222
Address: 'Central Park' Level 18, 152-158 St Georges Terrace, PERTH WA 6000

Class	Number held	Beneficially held	Paid	Document number
ORD	1	yes	FULLY	4EAB82435

Documents

Note: Where no Date Processed is shown, the document in question has not been processed. In these instances care should be taken in using information that may be updated by the document when it is processed. Where the Date Processed is shown but there is a zero under No Pages, the document has been processed but a copy is not yet available.

Date received	Form type	Date processed	Number of pages	Effective date	Document number
05/10/2022	201C Application For Registration As A Proprietary Company	05/10/2022	4	05/10/2022	4EAB82435
30/11/2022	484E Change To Company Details Appointment Or Cessation Of A Company	30/11/2022	2	30/11/2022	9EAA75139

	Officeholder				
13/01/2023	484E Change To Company Details Appointment Or Cessation Of A Company Officeholder	13/01/2023	2	13/01/2023	9EAA76920
07/08/2023	484E Change To Company Details Appointment Or Cessation Of A Company Officeholder	07/08/2023	2	07/08/2023	7ECG80845
30/08/2023	484E Change To Company Details Appointment Or Cessation Of A Company Officeholder	30/08/2023	2	30/08/2023	7ECH84861
15/01/2024	484A1 Change To Company Details Change Officeholder Name Or Address	15/01/2024	2	15/01/2024	7ECN43598
31/01/2024	492 Request For Correction	UNPROCESSED	2	31/01/2024	7ECO03276
26/08/2024	484A1 Change To Company Details Change Officeholder Name Or Address	26/08/2024	2	26/08/2024	7ECX41006
20/01/2025	484E Change To Company Details Appointment Or Cessation Of A Company Officeholder	20/01/2025	2	20/01/2025	7EDF11581
13/06/2025	484E Change To Company Details Appointment Or Cessation Of A Company Officeholder	13/06/2025	2	13/06/2025	7EDM04829

*****End of Extract of 3 Pages*****

Attachment 1C: Authorisation to Act as a Representative of the Occupier

RioTinto

Level 18, Central Park
152-158 St Georges Terrace
PERTH WA 6000

Tel: +61 (0) [redacted]

Private and confidential

The Manager, Resource Industries
Department of Water and Environmental Regulation
Locked Bag 10
Joondalup DC WA 6919

5 March 2024

Our reference: RTIO-HSE-0350820

To the Manager

Agents Authority: Applications for approvals administered by the Department of Water and Environmental Regulation

As a Director of Rhodes Ridge Management Services Pty Ltd, I hereby provide authorisation for the persons listed below to allow them to:

- Apply for Licences and Works Approvals (including the provision of associated documentation) administered by the Department of Water and Environmental Regulation (**DWER**) under the *Environmental Protection Act 1986* (WA) on behalf of any of the above listed companies; and
- Apply for any other environmental approvals from the DWER on behalf of any of the above listed companies.

Persons to which this authorisation applies:

- Declan Doherty (General Manager, State Agreements and Approvals)
- Nicola Fleming (Senior Manager, Approvals)
- Chris Morris (Manager, Government Approvals)
- Jeremy Quartermaine (Superintendent, Government Approvals)
- Carly Nixon (Senior Advisor, Government Approvals)
- Alistair Conn (Senior Advisor, Government Approvals)
- Stephen Danti (Senior Advisor, Government Approvals)
- Jennifer Major (Specialist Advisor, Government Approvals)

RioTinto

- Heidi Taylor (Specialist Advisor, Government Approvals
- Tahlia Walsh (Specialist, Government Approvals)
- Sarah Beukes (Advisor, Government Approvals)
- Carmen Le Breton (Advisor, Government Approvals)
- Brett Roelofs (Advisor, Government Approvals)
- Rebecca Spangler (Advisor, Government Approvals)

If you have any questions in relation to this authorisation, please contact [redacted] in the first instance.

Yours sincerely,

[redacted]

Managing Director, Operational & Technical Support

Attachment 2: Prescribed Premise Boundary Map

731,000mE 731,500mE 732,000mE 732,500mE

7,437,000mN

7,436,500mN

7,436,000mN

To Great Northern Hwy

WWTP 1

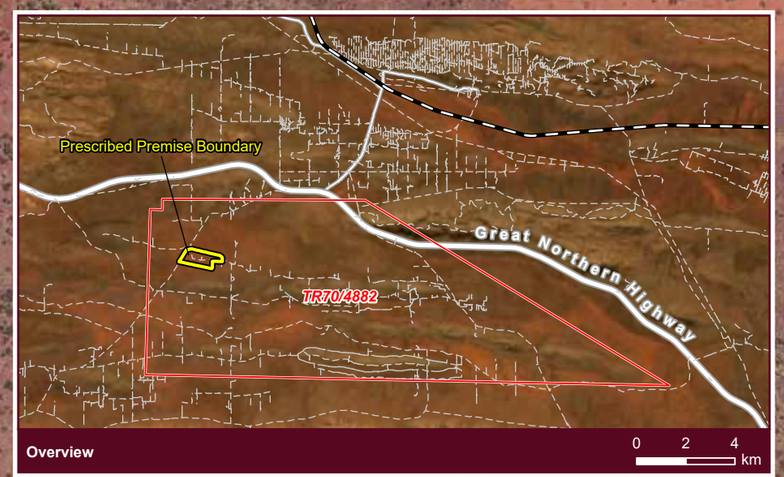
WWTP 1 Sprayfield

Proposed Camp

WWTP 2 Sprayfield

Giles Road

WWTP 2

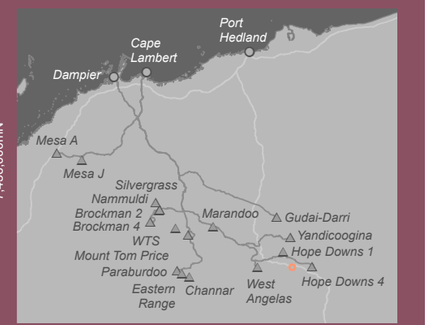


Legend

- Prescribed Premise Boundary
- Rio Tinto Mining Act Tenure
- Site Layout
- Rio Tinto Railway
- Highway
- Minor Road
- Track

Drawn: A. De Vries
Plan: RTIO-1043512v3
Date: October 2025

Checked by: L.Fuentes
Proj: GDA 1994 MGA Zone 50
GIS.Team@riotinto.com



 Imagery Source: Rio Tinto and Earthstar Geographics

RioTinto

Project Layout

0 50 100 150 200 250
metres
Scale: 1:6,000 @A3

N

Attachment 3A - WWTP 2 Commissioning Plan

3057ABP01

Draft Project Commissioning Plan

Contract Number: - TBD

Client Document Number: -

TBD

On Behalf Of

Rio Tinto

Document Control:

Rev No.	Date	Prepared by	Reviewed By	Issued For
A	09/09/2025	[redacted]		Issued for Info

Table of Contents

1.Project Overview

1.1.Details

Project Details	
Client	Rio Tinto
Project Name	RTIO Greater Rhodes Ridge
Site Address	65km Northwest of Newman
Project Manager	TBD
Site Manager	TBD

2.Standards and References

2.1.Statutory Requirements

- WA Occupational Safety and Health Act 1984
- WA Occupational Safety and Health Regulations 1996
- Mines Safety and Inspection Act 1994
- Mines Safety and Inspection Regulations 1995
- Rio Tintos Procedures and Documents where applicable
- DWER Works Approval

2.2.Quality Documents

ABCO Document Number	RIO Document Number	Description
TBC	TBC	Site Acceptance Testing Procedure-RO
TBC	TBC	Site Acceptance Testing Procedure-WWTP
TBC	TBC	Electrical Installation and Test Reports
TBC	TBC	Electrical Installation and Test Reports
TBC	TBC	Installation Operation and Maintenance Manual-RO
TBC	TBC	Installation Operation and Maintenance Manual-WWTP

2.3.Reference Documentation

ABCO Document Number	RIO Document Number	Description
TBC	TBC	Functional Design Specification - RO-BW133
TBC	TBC	Functional Design Specification - W-RBC142
TBC	TBC	Potable Water P&ID Sheet 1 of 4
TBC	TBC	Potable Water P&ID Sheet 2 of 4
TBC	TBC	Potable Water P&ID Sheet 3 of 4
TBC	TBC	Potable Water P&ID Sheet 4 of 4
TBC	TBC	Potable Water GA Sheet 1 of 4
TBC	TBC	Potable Water GA Sheet 2 of 4
TBC	TBC	Potable Water GA Sheet 3 of 4
TBC	TBC	Potable Water GA Sheet 4 of 4
TBC	TBC	WWTP P&ID Sheet 1 of 6
TBC	TBC	WWTP P&ID Sheet 2 of 6
TBC	TBC	WWTP P&ID Sheet 3 of 6
TBC	TBC	WWTP P&ID Sheet 4 of 6
TBC	TBC	WWTP P&ID Sheet 5 of 6
TBC	TBC	WWTP P&ID Sheet 6 of 6
TBC	TBC	WWTP GA Sheet 1 of 4
TBC	TBC	WWTP GA Sheet 2 of 4
TBC	TBC	WWTP GA Sheet 3 of 4
TBC	TBC	WWTP GA Sheet 4 of 4
TBC	TBC	Equipment List - RO-BW133
TBC	TBC	Equipment List - W-RBC142
TBC	TBC	Electrical Load List - RO-BW133
TBC	TBC	Electrical Load List - W-RBC142

2.4.Specifications

All works undertaken at the Rhodes Ridge project shall be completed in accordance with the relevant site Specifications. Where no relevant specification exists, works shall comply with the relevant Australian Standard or Guideline or Industry best practice.

Document Number	Document Title
SS-C111	Fabrication and Erection of Structural Steel
SS-E111	Electrical Equipment for Mine Site Buildings, Offices, Transportable Buildings, and Workshops
SS-M118	Installation & Commissioning of Mechanical Equipment
SS-M101	Mechanical Works
SS-M120	Piping Specifications
SS-E159	Electrical Cables, Wire and Terminations
SS-E115	Electrical Installations – Testing and Commissioning
SS-N104	WWTP Specification
DC-N001	Environment Design Criteria

Table 2-1: - Specifications

2.5.Definitions & Acronyms

Acronym	Definition
HV	High Voltage
LV	Low Voltage
IO	Input / Output
PLC	Programmable Logic Controller
P&IDs	Piping and Instrumentation Diagram
DCS	Distributed Control System
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
HSE	Health Safety Environment
WA	Western Australia
LOTO	Lock Out Tag Out
HAZID	Hazard Identification
P.O.	Purchase Order
PDC	Process Design Criteria
SAT	Site Acceptance Testing
ITP	Inspection and Test Plan
ITR	Installation and Test Report

Table 2-2: - Definitions

3.Commissioning Safety

During the commissioning of these packages the project will adopt the safety procedures from the existing Site Occupational Hazard Management Plan and supplement this with system specific risk assessments covered by JHA, L2RA and/or SWMS. Safety is taken very seriously as it is intended to provide a safe working environment both during construction and commissioning.

3.1.Risks

Some of the risks associated with the commissioning process are as follows:

Item	Task/ Equipment	Risk	Typical Control Measures
1	Work Area	Process leaks Adjacent operating plant Noise	Correct PPE Hearing protection Barriers, tape & signage
2	Power / control circuits testing	Live low voltage power Electric shock	Correct PPE Clearance certificates Correct tools and test equipment Commissioning Procedures/JHA Licensed, competent personnel
3	Low Voltage switchgear, starter	Low voltage shock Equipment failure	Correct PPE MV Isolation work methods Clearance certificates Correct LV test equipment Commissioning procedures/ JHA
4	Motor / Pumps	Rotating equipment Mechanical failure Incorrect rotation	Equipment guards Isolation work methods Barriers, tape & signage Commissioning procedures / JHA
5	Process fluid	High pressure water Pipeline failure / spillage Mechanical failure Electrical failure	Equipment guards Barriers, tape & signage Commissioning procedures / JHA Correct PPE
6	Chemicals	Exposure to chemicals	Correct PPE JHA

Table 3-1: - Risks

Reference is made to job specific JHAs created for each commissioning task. Also reference the project risk assessment for detailed risks involved.

3.2.Energising & Isolating

Site Isolation procedures shall be followed for all isolations required during commissioning.

4.Purpose and Scope

This document outlines the plan for the commissioning activities of the Water & Wastewater Treatment systems at Rhodes Ridge Site followed by ramp up to design capacity and execution of commissioning to allow final hand over and compliance with Part 5 Works approval.

Following commissioning and handover, ABCO Water will assist in the operation and maintenance of the Water Treatment systems during Time Limited operations and normal operation if required. Construction verification and pre-commissioning will be noted for references purposes and to support the commencement of the commissioning processes.

WWTP Activities		
Commissioning	**Time limited Operations (180 days)[1]**	**Operation**
Stage 1 – 6 (as described in the following pages	Validation and verification monitoring[2]	Operational Monitoring[3]

Table 4-1: - WWTP Activities

[1]Time Limited operations once commissioning is complete and handed over to the operator.

[2]Verfication and Validation must be completed within the 180 days allocated for time limited operations.

[3]Operation Monitoring can only commence once validation has been completed and satisfied.

4.1.Commissioning plan summary

The plan covers the following Water Treatment Packages.

1. RO-BW133 - Brackish Water Reverse Osmosis System
2. W-RBC142 - Wastewater Treatment Plant

4.1.1. RO-BW133 - Brackish Water Reverse Osmosis System

The Brackish Water Reverse Osmosis (BWRO) system is designed to produce potable-quality water from raw water sources by utilising a multi-barrier treatment approach. The system combines pre-treatment, chemical dosing, reverse osmosis separation, disinfection, and storage to deliver water that complies with Australian Drinking Water Guidelines (ADWG).

Raw Water Tank

Raw water is stored in a 205-kL panel-lined steel tank to allow for adequate redundancy in the case of a bore failure.

Low Pressure Supply

Feedwater is transferred from the tank to the treatment process by a low-pressure pump, providing a consistent supply to the pre-treatment filtration system.

Chlorine Dosing

Sodium hypochlorite is dosed upstream of the DMI filter to activate the DMI-65 filtration media, ensuring optimal performance in removing metals and contaminants.

DMI Filtration

The DMI-65 media filter removes iron, manganese, and other contaminants from the raw water stream. It also provides mechanical filtration of suspended solids greater than 10 microns. Operating in down-flow during filtration and up-flow during backwash, the system includes automated control valves and self-regulating flow controls. Solids removed during backwash are discharged to waste, while the media offers a long operational life of up to 5–8 years.

Dechlorination Dosing

Following media filtration, dechlorination dosing (e.g., sodium metabisulfite) is applied to eliminate residual chlorine. This step protects the downstream RO membranes from oxidative damage.

Cartridge Filtration

A 5-micron cartridge filter provides fine filtration prior to the RO system, protecting the membranes from fouling and safeguarding the high-pressure pump.

Antiscalant Dosing

Antiscalant is dosed prior to the cartridge filter to reduce scaling potential on the membrane surface. The system includes a bunded tank, low-level protection, and dosing pump controls to ensure reliable operation.

High Pressure Supply

A high-pressure pump delivers the required pressure to feedwater, overcoming osmotic pressure and driving the reverse osmosis process. The RO system is configured as a single-pass, two-stage array, with pressure vessels containing spiral-wound membranes for efficient desalination.

Clean-in-Place (CIP) System

A dedicated CIP system allows membranes to be chemically cleaned to restore performance when fouling or scaling occurs. A 1000L CIP tank is filled with chemicals, and the cleaning solution is recirculated through the membranes using manual valve configurations.

UV Sterilisation

Permeate from the RO passes through ultraviolet (UV) sterilisation units, providing disinfection by inactivating microorganisms through UV irradiation. This ensures the permeate meets microbiological safety requirements.

Potable Water Tank

The treated and UV-sterilised water is stored in two 365kL panel-lined steel potable water tanks

Chlorine Disinfection

Sodium hypochlorite is dosed into the permeate line feeding the potable water tank ensuring compliance with ADWG for microbiological safety.

Distribution Pumps

Potable water is delivered to end users via automatic distribution pumps. The pump set is demand-driven, starting and stopping as required to maintain downstream pressure and supply reliability.

4.1.2. W-RBC072 - Wastewater Treatment Plant

The Wastewater Treatment Plant (WWTP) is designed to collect, treat, and safely dispose of camp wastewater through a sequence of physical, biological, and chemical processes. The system incorporates pumping, screening, primary and secondary treatment, clarification, and final effluent disposal via irrigation. The arrangement ensures compliance with environmental and operational requirements while providing robust treatment performance.

Camp Wastewater Pump Station

Wastewater generated from the camp is first conveyed to the pump station through the sewage network. The pump station is equipped with dual macerator pumps to lift influent to the inlet screen. This arrangement ensures uninterrupted operation and prevents blockages, establishing the first stage of mechanical protection for downstream processes.

Influent Bar Screen

From the pump station, macerated sewage is directed to the influent bar screen located adjacent to the balance tank. This stainless-steel, mechanically raked screen removes suspended solids greater than 2.5 mm in size. The rake mechanism prevents foreign matter from jamming within the screen bars, while captured solids are discharged to a collection bin for removal. Screened wastewater then flows by gravity into the balance tank.

Balance Tank

The balance tank receives screened sewage and provides buffer capacity to manage diurnal flow variations, typically sized for 24 hours of influent storage. Internal recirculation maintains uniform conditions within the tank. Once a set level is reached, transfer pumps convey raw sewage to the sedimentation tank for further treatment.

Sedimentation Tank

The sedimentation tank acts as the primary settling and digestion stage. Here, influent from the balance tank mixes with return activated sludge (RAS) from the RBCs, break tank, and lamella clarifier. The tank promotes solids separation, with heavier matter settling to the base and scum rising to the surface. Biological activity within the anoxic zone initiates the breakdown of organic matter.

MLR Tank

Following sedimentation, flows are directed to the Mixed Liquor Recycle (MLR) tank, where scum, influent, and recycled liquor are combined under anoxic conditions. This environment supports denitrification, with bacteria converting nitrate to nitrogen gas in the absence of oxygen. This process reduces nitrogen concentrations, improving effluent quality and supporting downstream biological treatment.

Rotating Biological Contactors (RBCs)

The denitrified liquor flows sequentially through three rotating biological contactors. The discs, rotating at a controlled speed, provide a large surface area for microbial growth. As the liquor passes across each RBC, biological oxidation further reduces organic content and supports nitrification. Treated effluent then flows by gravity into the break tank.

Break Tank

The break tank provides temporary storage of nitrified effluent. An MLR pump located at the tank base recycles part of this effluent back to the MLR tank, with chemical dosing applied to optimise treatment. This recirculation enhances nutrient removal and balances process flows.

Clarification

From the break tank, flows enter the lamella clarifier where heavier solids are removed by settlement. The inclined plates provide an increased surface area to enhance separation efficiency. Settled solids are collected at the base and returned to the sedimentation tank as RAS, while clarified effluent is directed to the lift tank. This stage achieves significant reduction in suspended solids and produces a clear effluent stream.

Lift Tank

Clarified effluent is temporarily stored in the lift tank, from which lift pumps convey the treated water to the irrigation tanks. This arrangement provides operational control between clarification and final storage.

Irrigation Tanks

The irrigation tanks serve as final storage prior to effluent discharge. A chlorination system ensures the treated effluent is disinfected to required standards before disposal to the irrigation spray field.

Irrigation Discharge System

Treated water is distributed to the spray field via irrigation pumps. A mechanical totaliser records volumetric flow, providing assurance of accurate monitoring and compliance with disposal requirements.

Waste Sludge System

Waste Activated Sludge (WAS) generated from the sedimentation and MLR tanks is periodically directed to geobags for thickening and dewatering. The supernatant from these bags is returned to the pump station for re-treatment, ensuring minimal loss of process water and efficient solids handling.

5.Commissioning Sequence

5.1.Stage 1 – Construction Verification/ Mechanical Completion

This stage is completed prior to the commencement of commissioning.

5.1.1. Purpose

This is the verification testing and checking required to prove that the components and equipment within the system boundary have been constructed or assembled correctly and that it is mechanically and electrically complete. At this stage the equipment has not yet been energised by any energy source (electric, hydraulic, or pneumatic) and is isolated from all supply of power, feed and discharge lines or points.

Key points during this stage:

- Equipment has been built to design drawings, specifications (including vendor requirements) and complies with the applicable standards.
- Factory acceptance testing is complete
- Relevant documentation has been provided as part of the construction handover pack.
- Equipment is ready to have control supply applied for pre-commissioning checks.
- Punchlist Items completed and signed off
- ITP steps completed and signed

At this point construction is deemed completed and control is handed over to the Commissioning Manager.

All work from the stage 2 onwards will be undertaken in accordance with the commissioning isolation procedures.

5.2.Stage 2 – Pre-Commissioning

This Stage would follow on from Stage 1, Mechanical Completion, and would be preceded by a Notice of Energisation (NOE).

The NOE has a pre-defined checklist, which must be satisfied to enable energisation to proceed, and Stage 2 testing to commence.

After the NOE has been approved and released, commissioning flags, or flagging as per project requirements, shall be attached to all pieces of equipment covered by the relevant NOE will indicate commissioning activities have commenced, and all equipment should be considered LIVE.

Area's where commissioning activities take place would be flagged off by bunting tape, and signage placed indicating Commissioning is Progress.

Energisation is the process of applying a source of energy to equipment or a group of components. Energy sources include but are not limited to electrical power, control power, pressure in piping systems and accumulators, gravity systems (Including conveyor take-ups), and belt and rope tensions.

The function of this stage is to energise each item of equipment (individually) to test for component functionality to design.

Key outcomes of this stage:

- Equipment has been control supply checked (I/O checks completed to the PLC and SCADA).
- Sequences and interlocks have been tested with control power energised (i.e. primary supply power isolated).
- Equipment is clear of contaminants.
- Lubrication checked and carried out as required.

- Where required, equipment has been decoupled from the motor(s) and guards fitted ready for a direction check.
- All protection systems are in place. For example, guarding, emergency stops and local isolators.
- Equipment is ready to have energy sources (i.e. air, water, electricity) applied.
- ITP steps completed and signed.
- NOE Completed and signed.

5.3.Stage 3 – Direction Testing

The objective of this phase of commissioning will be to ensure the plant is ready for handover to the commissioning team and that all site requirements are fulfilled to start commissioning.

Key outcomes of this stage:

- Equipment has been direction tested with power energised.
- VSD's (where applicable) to perform mag ID run after bumping motor.
- All ancillary equipment is functional.
- Equipment is ready for no load commissioning.
- As built protection settings are recorded.
- Urgent and critical punch list items have been signed off.
- The system can be handed over to the Commissioning Manager. Construction will continue to undertake and complete any non-critical punch list work, non-conformances, and any warranty repair work.
- ITP steps completed and signed.
- Electrical Test sheets completed.

5.4.Stage 4 – Prerequisites for Commissioning

Prerequisite	Status
BWRO	
Raw Water Tanks shall be filled with water	
The filtrate volume shall be ready to be transferred recirculated to enable commissioning	
Potable water supply to safety shower/eyewash shall be available	
WWTP	
Pump Station, Balance tank, Sedimentation tank, MLR tank, RBC1,2,3, Break tank, Lamella Clarifier, Lift tank, Irrigations tanks shall be filled with water	
Biomass shall be available to be transferred into the Balance tank	
Potable water supply to safety shower/eyewash shall be available	
Submission of Environmental Compliance Report	

Table 5-1-Prerequisites for commissioning

5.5.Stage 5 – No Load Commissioning

The objective of this phase of commissioning will be to set up the plant ready for water testing before the process commissioning commences.

Key outcomes of this stage:

- Place in service, plant air and water services

- Trial start-up, shutdown, and emergency procedures
- All interlocks (safety and control) are functional
- All pre-start warning devices and safety devices are functional
- Individual equipment has been run under no load conditions, is fully checked with conditions recorded and is ready to accept water
- Instruments are set up and calibrated where required
- Chemicals have been loaded
- ITP steps completed and signed

5.6.Stage 6 – Load Commissioning

The objectives of this phase of commissioning will be to introduce feed water (raw water) into the plants and to establish a level of steady state plant operation. It is at the commencement of this stage that operations personnel will begin their full-time involvement in plant operations. The objectives of this phase are to:

- Introduce feed water into the plant.
- Check and adjust automatic control, controller set points, alarms, trips etc.
- Adjust process variables to fine tune the performance of the plant.
- Instigate any minor plant changes considered necessary.
- Maintain detailed records of all levels of plant performance.
- Commence ramp-up.
- Familiarisation and training of operating and maintenance team.
- ITP steps completed and signed.

5.7.Stage 7 – Practical Completion and Performance Testing

Performance validation against design criteria is the process of testing that the newly commissioned plant can sustain design performance as put forward in the process design criteria.

This process also provides the first opportunity to establish baseline performance criteria for the new plant, which is important for future expansion plans, improvement projects and operations / maintenance budgeting.

Key outcomes of this stage:

- The system has run up, been held at full continuous production at nameplate capacity (if possible) for an extended period (nominal total duration 1 day).
- The system has been demonstrated as being to operate in a safe, reliable, and efficient manner.
- All settings and operating data are recorded.
- Where required, sampling and laboratory testing has been performed to verify process parameters. Test parameters are detailed in each site acceptance document for each section.
- Operations technicians have familiarised themselves with the plant/process from working with the commissioning team and have completed training and are considered competent to run the operation with minimal assistance.
- The project works are completed except for minor defects as agreed with the commissioning manager.
- All items of plant have been installed, completed, commissioned and in a usable condition.
- All documents and other information required for the use, operation and maintenance of the WTP, WWTP and FWP equipment have been supplied to the client.
- All training requirements have been completed.
- ITP completed and signed.

- SAT Completed and signed.

5.7.1. Punch Listing

At the completion of this stage a Punchlist walk around shall be organised and shall include representation from nominated personnel from the relevant stakeholders, as required.

Any additional punch list items picked up during commissioning must be completed, and all critical and non-critical non-conformance items must be either completed or scheduled for completion within an agreed timeframe with the Commissioning Manager.

The signed Site Acceptance Test will act as verification of completion of the handover process to the client.

6.Personnel

The personnel listed in the table below will be responsible for the commissioning procedure. The various roles of each member are shown.

Name	Company	Role
Hamid Asaie	ABCO Water	Engineering Manager
Reza Tolou	ABCO Water	Commissioning Engineer
Jacob Shaw	ABCO Water	Operations Manager

7.Commissioning Planning

7.1.Scheduling

7.1.1. Commissioning Schedule

A commission schedule will be prepared to plan, in detail, individual commissioning activities.

The commissioning schedule shall:

1. Detail each individual commissioning activity.
2. Detail a milestone for each signoff certificate required from the commissioning register.
3. Include sufficient time for review and signoff of documentation.

The table below nominates the expected high-level commissioning schedule.

Phase	Expected Time Frame (days)
Stage 1	0.5 - 1 days
Stage 2	0.5 - 1 days
Stage 3	0.5 - 1 days
Stage 4	0.5 - 1 days
Stage 5	1 - 2 days
Stage 6	1 - 4 days
Stage 7	1 - 4 days

Table 7-1:- High Level Commissioning Schedule

8.Potable Water Treatment Plant Responsibility Matrix - Commissioning – Ongoing Operations

Item	Description	ABCO	Sodexo	RIO Tinto
Commissioning (Stages 1 – 7)				
1.	Provision of power to the plant/equipment			✓
2.	Provision of raw water to the plants			✓
3.	Site Acceptance Test – Sign off	✓		✓
4.	Site commissioning and hands on operator familiarisation	✓		
5.	Provision of suitable site personnel to assist with onsite commissioning and operator training		✓	✓
6.	Commissioning consumables	✓[1]		
Validation and Verification Monitoring				
7.	Provision of power to the plant/equipment			✓
8.	Provision of raw water to the plants			✓
9.	Plant validation (including sample collection and laboratory testing). Testing as per Sodexo's/ RIO's site requirements		✓	
10.	WTP consumables		✓[1]	
11.	Plant operation including monitoring of chlorine levels in the tanks		✓	
Operational Monitoring (Once Validation has been completed)				
12.	Provision of power to the plant/equipment			✓
13.	Provision of raw water to the plants			✓
14.	Sample collection and laboratory testing as per the legislative requirements		✓	
15.	Compliance with Australian Drinking Water Standards		✓	
16.	Maintenance and calibration of equipment		✓	
17.	Plant Operation		✓	
18.	WTP consumables		✓[1]	

Table 8-1: - Responsibilities

[1] ABCO Water will assist if required

9.WWTP Responsibility Matrix - Commissioning - Time Limited Operations – Ongoing Operations

Item	Description	ABCO	Sodexo	RIO Tinto
Commissioning (Stages 1 – 7)				
1.	Provision of power to the plant/equipment			✓
2.	Provision of feedwater/influent to the plants			✓
3.	Site Acceptance Test – Sign off	✓[2]		✓
4.	Site commissioning and hands on operator familiarisation	✓		
5.	Provision of suitable site personnel to assist with onsite commissioning and operator training		✓	✓
6.	Commissioning consumables	✓[1]		
7.	WWTP Compliance Audit		✓	✓
8.	Environmental Compliance Report	✓[1]		✓
Time Limited Operations - Validation and Verification Monitoring				
9.	Provision of power to the plant/equipment			✓
10.	Provision of feedwater/influent to the plants			✓
11.	Removal of Wastewater from temporary WWTP Tanks		✓	
12.	Plant validation (including sample collection and laboratory testing)		✓	
13.	WWTP consumables		✓[1]	
14.	Plant operation		✓	
15.	Disposal of dewatered sludge		✓	
16.	Time Limited Operations Report[1]		✓[3]	✓[3]
Operational Monitoring (Once Validation has been completed)				
17.	Provision of power to the plant/equipment			✓
18.	Provision of feedwater/influent to the plants			✓
19.	Sample collection and laboratory testing		✓	
20.	WWTP consumables		✓[1]	
21.	Plant operation including spray field maintenance		✓	
22.	Disposal of dewatered sludge		✓	

Table 9-1: - Responsibilities

[1] ABCO Water will assist if required

[2] ABCO Water will complete, RIO Tinto to sign off

10.Environmental Commissioning Report

The works approval holder must submit to the CEO an Environmental Commissioning Report within 30 calendar days of the completion date of environmental commissioning for each item of infrastructure specified in Table 2.

The works approval holder must ensure the Environmental Commissioning Report required by condition 9 of this works approval includes the following:

a) a summary of the environmental commissioning activities undertaken, including timeframes and amount of wastewater processed;
b) a summary of treated effluent monitoring results recorded in accordance with condition 7;
c) copies of laboratory reports for treated effluent monitoring results recorded in accordance with condition 7;
d) a summary of the environmental performance of each item of infrastructure or equipment as installed, which at minimum includes:
e) a comparison of the treated effluent monitoring results against discharge criteria specified in condition 1;
    a. assessment of the irrigation sprayfield performance against operational requirements in condition 5;
    b. a review of the works approval holder's performance and compliance against the conditions of this works approval; and
f) where they have not been met, measures proposed to meet the manufacturer's design specifications and the conditions of this works approval, together with timeframes for implementing the proposed measures.

11.Time limited operations phase

11.1.Commencement and duration

a) The works approval holder may only commence time limited operations for an item of infrastructure identified in condition 1 where the Environmental Commissioning Report for that item of infrastructure as required by condition 9 has been submitted by the works approval holder; and
b) The works approval holder may conduct time limited operations for an item of infrastructure specified in condition 13:
    a. for a period not exceeding 180 calendar days from the day the works approval holder meets the requirements of condition 11 for that item of infrastructure; or
    b. until such time as a registration or licence for that item of infrastructure is granted in accordance with Part V of the Environmental Protection Act 1986 and only where this occurs prior to the time period specified in sub provision

11.2.Compliance Reporting

a) The works approval holder must submit to the CEO a report on the time limited operations within 30 calendar days of the completion date of time limited operations or 30 calendar days before the expiration date of the works approval, whichever is the sooner.
b) The works approval holder must ensure the report required by condition 17 includes the following:
    a. a summary of the time limited operations, including date(s) for commencement of time limited operations, timeframes and amount of wastewater processed
    b. a summary of monitoring parameter results obtained during time limited operations under condition 15 of the works approval

c. copies of laboratory reports for treated effluent monitoring results recorded in accordance with condition 15 of the works approval

d. a summary of the environmental performance of each item of infrastructure or equipment as installed, which at minimum includes:

   i. a comparison of the treated effluent monitoring results against discharge limits specified in condition 1 of the works approval

   ii. assessment of the spray irrigation field performance against operational requirements in condition 13 of the works approval

   iii. a review of performance and compliance against the conditions of the works approval and the Environmental Commissioning Report; and

   iv. where the specifications and the conditions of this works approval have not been met, what measures will the works approval holder take to meet them, and what timeframes will be required to implement those measures.

11.3.Operational Monitoring

Operational monitoring corresponds to the routine monitoring of control parameters that confirm the treatment processes are under control and operating within the operating criteria. Operational monitoring involves the selection and monitoring of parameters that are constantly measured to show that the system is operating as intended.

11.3.1. Validation and verification monitoring– 6 samples

Parameter	Effluent compliance value	Influent monitoring frequency	Effluent monitoring frequency
E. coli[1]	<1000 MPN or cfu /100mL	N/A	Monthly
BOD	<20 mg/L	N/A	Monthly
TSS	<30 mg/L	N/A	Monthly
pH	6.5 – 8.5	N/A	Continuous online
Disinfection	Cl^9: 0.5 – 2.0mg/L	N/A	Continuous online
Total Nitrogen	<40 mg/L	N/A	Monthly
Total Phosphorus	<10 mg/L	N/A	Monthly
Cumulative Flow Volume	<142m^3/day	N/A	Continuous online

Figure 11-1: - Operational monitoring

Note: -

For the monitoring activity, the works approval holder must:

a) record the results;

b) handle and preserve all water samples collected during the monitoring of the WWTP in accordance with AS/NZS 5667.1:1998; and have analysis conducted by a laboratory with current National Association of Testing Authorities (NATA) accreditation for the parameters specified.

Attachment 8A: Works Approval Amendment Supporting Document – Rhodes Ridge WWTP & Sprayfield increase

Works Approval (W6932) Amendment Application

Supporting Document

Rhodes Ridge Temporary Exploration Camp

Wastewater Treatment Plant & Spray field-WWTP 2

October 2025
RTIO-1128018

Disclaimer and Limitation

This report has been prepared by Rio Tinto Iron Ore (Rio Tinto), on behalf of Rhodes Ridge Management Services, specifically for the Rhodes Ridge Project. Neither the report nor its contents may be referred to without the express approval of Rio Tinto (RTIO), unless the report has been released for referral and assessment of proposals.

Document Status					
Rev	Author/s	Reviewer/s	Review Issue Date	Approved for Issue	
				To Whom	Date
A	[redacted]		22/09/2025 26/09/2025	Department of Water and Environmental Regulation	TBC

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FIGURES

Abbreviations

ANZECC	Australian and New Zealand Environment and Conservation Council
BGL	Below ground level
BOM	Bureau of Meteorology
BOD	Basis of Design
CEMP	Construction Environmental Management Plan
CPS	Clearing Permit
DBCA	Department of Biodiversity, Conservation and Attractions
DEED	Department of Energy and Economic Diversification
DoH	Department of Health
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Area
GDE	Groundwater Dependent Ecosystems
GWL	Groundwater Licences
IILUA	Indigenous Land Use Agreement
KNAC	Karlka Nyiyaparli Aboriginal Corporation
MRL	Mixed Liquor Recycle
NVCP	Native Vegetation Clearing Permit
PEC	Priority Ecological Communities
PDWSA	Public Drinking Water Source Areas
PBI	Phosphorous Buffering Index
PRI	Phosphorous Retention Index
RBC	Rotating Biological Contactor
RFI	Request for Information
RiWI Act	*Rights in Water and Irrigation Act 1914*
RO	Reverse Osmosis
RO WTP	Reverse Osmosis Water Treatment Plant
RTIO	Rio Tinto Iron Ore
TDS	Total Dissolved Solids
TEC	Threatened Ecological Communities
TLO	Time Limited Operations
TN	Total Nitrogen
TP	Total Phosphorous
WA	Western Australia
WAA	Works Approval Amendment
WAS	Waste Activated Sludge
WWTP	Wastewater Treatment Plant

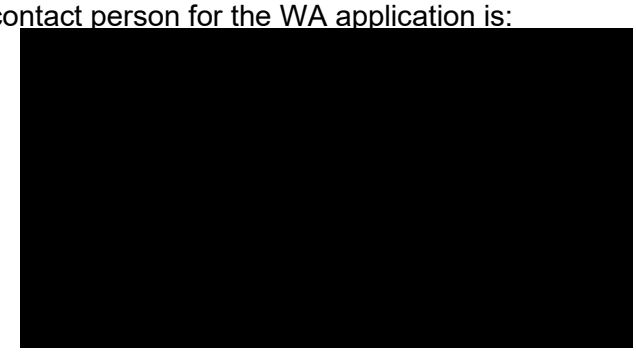
1 LICENSEE INFORMATION

1.1 Occupier Details

The occupier (the Licensee) of the land subject to this Works Approval Amendment application is:

Rhodes Ridge Management Services Pty Ltd
Level 18, Central Park
152-158 St Georges Terrace
Perth WA 6000
ACN: 662 895 927

The contact person for the WA application is:



2 INTRODUCTION

Due to an increase in planned exploration activity and personnel numbers, coupled with the reduced ability to use alternative accommodation facilities, there is a requirement to increase the capacity of the regional exploration camp at the Rhodes Ridge Iron Ore Project area. As a result of this expansion, amendments to approved Works Approval W6932/2024/1 held in the name of Rhodes Ridge Management Services Pty Ltd (the licensee) is required.

This document provides the supporting information to aid the assessment and determination of a Works Approval Amendment (WAA) application to W6932/2024/1. Details of the proposed amendments are outlined in below Sections 2.2 and 4.

2.1 Prescribed Activity Overview

W6932/2024/1 was approved by the Department of Water and Environmental Regulation (DWER) on the 26 September 2024 for the construction of a 75m^3 WWTP and 2.28ha irrigation sprayfield under Category 85 of the *Environmental Protection Regulations* to support a temporary 220 person regional exploration camp.

An administrative amendment was submitted on the 10 June 2025 to align the approved discharge criteria for Total Nitrogen (TN) from <30 mg/L to <40 mg/L to align with the designed WWTP output (as per the manufacturers Basis of Design Document) and increase the prescribed premises boundary. This amendment was approved on 12 August 2025.

There currently is no active licence granted under Part V (Division 3) of the *Environmental Protection Act 1986* (EP Act) for the Prescribed Premises. Infrastructure approved under the first iteration of W6932/2024/1 is currently under construction.

2.2 Proposed Works Approval Amendment

The scope of this WAA is to add an additional WWTP (WWTP 2) to complement existing WWTP1 which was approved under W6932/2024/1. This will result in an increase to the assessed production capacity from Category 85 to Category 54. The infrastructure required for WWTP 2 is listed in Table 4-4. The addition of the infrastructure will not affect the operation of the WWTP 1 infrastructure. WWTP 2 is its own operating system and will operate independently.

Additionally, there is a requirement to increase the approved output from WWTP 1 to accommodate the blending of RO reject water with the treated wastewater prior to discharge to the approved sprayfield. This adjustment is necessary to improve holistic water management on site and optimise operational performance.

An application for a Part V licence will be sought for the ongoing operation of both WWTP1 and WWTP2 following successful construction, commissioning, time limited operation (TLO) and the submission of required compliance documentation.

The amendment includes the following detail:

- Increase of approved WWTP 1 output from 75m^3/day to 94.25m^3/day to allow for the addition of RO reject water
- Increase to WWTP 1 sprayfield from 2.28ha to 2.86ha to support this increase

- Addition of WWTP 2 (design throughput of 199 m^3/day inclusive of RO reject water)
- Addition of a 6.05ha sprayfield irrigation area to service WWTP 2
- The resulting total throughput for the site will be 296.2574 m^3/day. Approval under category 54 is sought
- It is requested that condition 12 (a) and/or (b) of W6932 be amended to reflect the need for an extended time limited operation (TLO) timeframe for WWTP 1 infrastructure (to align with the licence application occurring post WWTP 2 TLO)
- Extension of expiry date by 12 months (new expiry 26/09/2028) to allow for WWTP 2 construction, commissioning and TLO

Table 2-1: Proposed Amendment

Parameter/Condition	W6932 (WWTP 1 – Approved)	WWTP 2 (the subject of this amendment)
Duration	27/09/2024 to 26/09/2027	27/09/2024 to 26/09/2028
Prescribed premises category description	85	54
Assessed production capacity (m^3/day)	75	199
Minimum sprayfield Size	2.28	6.05
Condition 12 (a) and (b)	Stage 1 TLO 180 days	WWTP 1 TLO 360 days (or until such time that WWTP 2 has completed TLO) WWTP 2 TLO 180 days

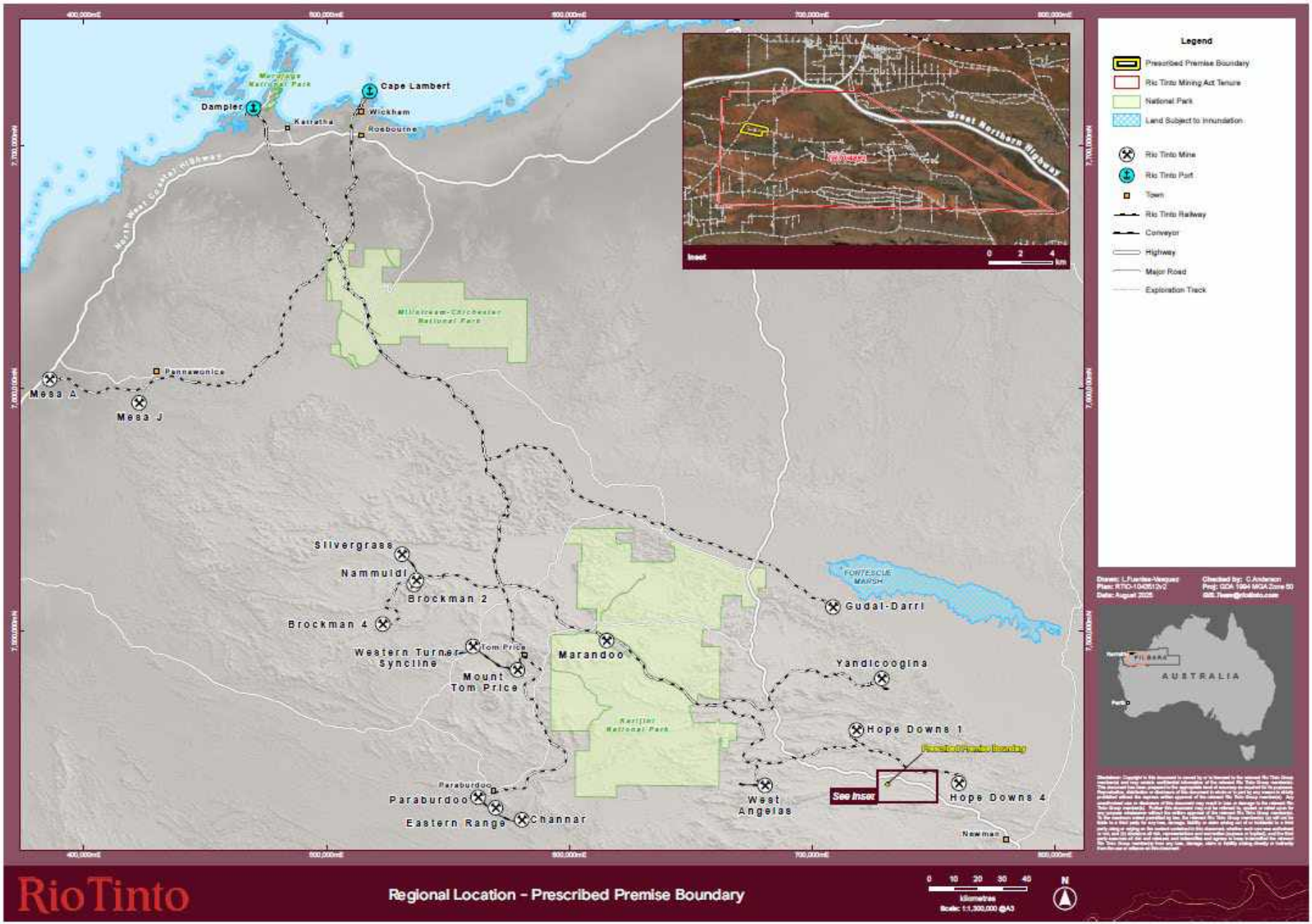


Figure 1: **Regional Location and Tenure**

3 PREMISES DETAILS

3.1 Premises Description

The Rhodes Ridge Iron Ore Project is located within the East Pilbara Region of Western Australia (WA), approximately 52 km north-west of the township of Newman. The Proposal is located within the Native Title Determination Area of the Nyiyaparli People.

The Project Area subject to this WAA is made up of the WWTP and the sprayfield. There is no change to the prescribed premises boundary proposed. The coordinates for the prescribed premises boundary are provided in Table 3-1 below.

Table 3-1: Coordinates of the Premise Boundary

Corner	MGA 94 Easting	MGA 94 Northing	GDA2020 Easting	GDA2020 Northing
1	731118	7437012	731119	7437013
2	732298	7436746	732299	7436747
3	732394	7436653	732395	7436654
4	732390	7436501	732391	7436502
5	731987	7436501	731988	7436502
6	731984	7436246	731985	7436247
7	731960	7436205	731961	7436206
8	730626	7436492	730627	7436493
9	730925	7436966	730926	7436967

3.2 Legal Land Description

The project area is located on TR 70/4882 which operates pursuant to the *Iron Ore (Rhodes Ridge) Agreement Authorisation Act1972 (WA)*. The tenement is jointly held by Hamersley Resources Limited and Wright Prospecting Pty Ltd. The joint venture is managed by Rhodes Ridge Management Services Pty Ltd (the licensee).

Figure 2: Current Prescribed Premises Boundary

4 CATEGORY 54: WWTP & IRRIGATION SPRAYFIELD

4.1 Overview

The Licensee is proposing to install and operate additional WWTP infrastructure based on Rotating Biological Contactor (RBC) technology and increase the size of the irrigation sprayfield to treat sewage produced from the proposed 600 bed multipurpose camp at Rhodes Ridge (increased from 220 person bed camp).

A reverse osmosis water treatment plant (RO WTP) is located approximately 500 m east of the WWTP 1 to enable water purification on site and is designed to meet the *National Water Quality Management Strategy (NWQMS) Australian Drinking Water Guidelines* (2011).

Reject water from the camp RO WTP plant will be plumbed into the WWTP1 and WWTP 2 irrigation tanks (post treatment cycle), where it will mix with the treated wastewater before discharge by irrigation to the sprayfield. Expected volumes are outlines in Table 4-1.

Table 4-1: Wastewater discharged to sprayfield

	WWTP Effluent (m3/day)	RO WTP Effluent (m3/day)	WWTP and RO WTP blend going to sprayfield (m3/day)
WWTP 1	75	19.25	94.25
WWTP 2	142	57	199
TOTAL	217	76.25	293.25

The expected total dissolved solids (TDS) of the water discharged from the irrigation tanks to the sprayfield is shown in the Tables below.

Table 4-2: WWTP 1 - Expected WWTP and RO WTP effluent salinity for sprayfield disposal

Parameter	WWTP Effluent (75 m3/day capacity)	RO WTP Effluent (19.25 m3/day capacity)	WWTP and RO WTP blend going to sprayfield (94.25 m3/day)
TDS (mg/L)	600	2474	983

Table 4-3: WWTP 2 - Expected WWTP and RO WTP effluent salinity for sprayfield disposal

Parameter	WWTP Effluent (142 m3/day capacity)	RO WTP Effluent (57 m3/day capacity)	WWTP and RO WTP blend going to sprayfield (199 m3/day)
TDS (mg/L)	600	2474	1137

This blended TDS is within the tolerance of native vegetation typically used in Pilbara sprayfields. Operational monitoring will confirm ongoing suitability.

The WWTP will be operational 24 hours per day, seven days a week. Plant process descriptions and technical detail for the WWTP is attached as the 'Basis of Design' (BOD) in Appendix 1a. Schematics for the infrastructure are attached in Appendix 1b. The WWTP footprint is approximately 756m^2 and the sprayfield will be 6.05ha (in addition to the WWTP 1 sprayfield of 2.28ha) to meet the principles of treating wastewater to a Soil Risk Category D as per the *Water Quality Protection Note 22: Irrigation with nutrient-rich wastewater* (DoW 2008).

4.2 Design and Construction

Construction of WWTP 2 and the associated sprayfield will take approximately 4-6 weeks and activities will include:

- Installation of additional “plug and play” pre-assembled modular sewage plant skids
- Increase the size of the sprayfield irrigation area and addition of further sprinklers, pipework, signage, bunding and perimeter fencing
- Dust suppression with water tankers as required

Tables 4-4 and 4-5 provide a list of the key additional infrastructure and capacities associated with the WWTP.

Table 4-4: Major Equipment List for Construction of Stage 2

Equipment	Size / Capacity
Sewage pump station	13m^3
Inlet bar screen	2.0 mm Bar Space
Balance tank x 2	50 kL
Sedimentation tank	50 kL
(Mixed Liquor Recycle) MLR tank	50 kL
Chemical storage tank and bund (AB-Coag-100)	100L
Chemical storage tank and bund (AB-Chlor-100)	100L
RBC tanks	6 x RBC (5.5m3 each = 33m3 total)
Break tank	9kL
Lamella clarifier 1	LS30 (30m^2 plate area)
Lamella clarifier 2	LS30 (30m2 plate area)
Lift tank	9kL
Treated water irrigation tank	50kL

Table 4-5: Wastewater Treatment Plant Specifications

Process	Treatment Type
Biological Treatment Process	Fixed Film Process
Pre-Treatment	Anaerobic settling and digestion
Post-Treatment	Tertiary filtration
Effluent Disposal	Spray irrigation
Type of Aeration	Passive/attached growth aeration via rotating biological contactors (RBCs); anoxic stage upstream (no aeration) for denitrification.
Sludge Disposal	Sludge Removal via geo bags
Design Max. Hydraulic Load	3.3 mm/day

4.3 Process and Operations

4.3.1 Inputs

Raw sewage is fed to the WWTP from a pump station sized to absorb the incoming flows. The pumpstation is fitted with grinder pumps operating on duty/standby with control panel, guide rails and an external valve pit.

Power required for the operation of the WWTP will be sourced from a set of generators located at the camp power station. It is estimated that an additional 46 kW of power will be required.

4.3.2 Balance Tanks

The raw sewage is then pumped from the pumpstation to the balance tank via a bar screen which screens any incoming solids. The balance tank provides suitable retention to cater for variations in the diurnal flows.

4.3.3 Sedimentation Tank

From the balance tank the screened influent is transferred to the sedimentation tank by the balance pump which then overflows to the mixed liquor recycle (MLR) tank by gravity. The sedimentation tank allows suspended solids to settle, reducing the load on downstream treatment processes. The settled solids are collected at the base of the tank and directed for further handling or sludge processing.

4.3.4 MLR Tank

MLR tank also known as the anoxic tank receives screened sewage from the primary tank and mixed liquor from the break tank. The tank allows nitrate-specific bacteria to use nitrate (NO^3) as an oxygen source and a nutrient in a process called de-nitrification. De-nitrification occurs when oxygen levels are depleted, and nitrate becomes the primary oxygen source for microorganisms.

4.3.5 Rotating Biological Contactor

The wastewater is then fed by gravity from the MLR Tank via flow divider to the Rotating Biological Contactors (RBC) units, which are known as one of the reliable fixed film technologies, where biological treatment is conducted. Coagulant is introduced at a fixed rate prior to the RBCs to aid reduction of Total Phosphorous (TP) and improve settling in the clarifier.

The RBCs are rotated slowly through a direct drive reduction gearbox and is arranged so that around 40% proportion of its surface area is submerged in the effluent at any time. As the RBC rotates, the surface of the media is subjected alternately to sewage and air, encouraging an aerobic, biologically active film of micro-organisms (biomass) to become established on each side of the media sheets.

The system includes plastic disks attached to a chrome plated steel mill rotating at low speeds such as 3-4 rpm with 40% of it being immersed in the wastewater at any time. This configuration promotes the growth of a biologically active film of microorganisms on the discs. As the discs rotate, the biofilm alternately contacts wastewater and air, enabling efficient degradation of organic matter. The microorganisms consume pollutants (measured as biological oxygen demand) as a food source, multiply, and maintain a biofilm thickness of approximately 1–2.5 mm, which supports stable treatment performance. Excess biomass sloughs off naturally, remains in suspension, and is carried forward to the break tank for further processing.

4.3.6 Break Tank

Mixed liquor from the RBC's is gravity-fed to the break tank. To improve nutrient reduction a portion of the mixed liquor from the break tank is returned to the MLR tank for further treatment whilst the remainder is fed forward to the lamella clarifier for solids removal.

4.3.7 Lamella Clarifier

Mixed liquor is gravity-fed from the break tank to the lamella clarifier. The lamella clarifiers remove heavier solids by means of settlement and separation from the liquid phase. The hopper bottom channels the sediment to the centre of the tank and is returned via the RAS pump to primary tank. Clear liquor from the top of the clarifier then overflows by gravity into the lift tank.

4.3.8 Lift Tank

Gravity conveys clarified water from the Lamella clarifiers to the lift tank, positioned just below the clarifier outlets. The clarified water to is then pumped to the irrigation tanks for the next stage of processing.

4.3.9 Irrigation Tanks

Within the irrigation tanks, the treated effluent and RO WTP effluent undergoes chlorination within a recirculation line before being discharged. After chlorination, the treated water is pumped to the irrigation field using the irrigation pumps. To monitor the volume of treated water distributed to the irrigation field, a flowmeter will be installed.

4.3.10 Sprayfield

Following disinfection and blending with RO reject in the irrigation tanks, the treated effluent is pumped to the sprayfield using an irrigation pump. The pump is fitted with level controls, flow monitoring, and alarms to ensure reliable and consistent operation.

The sprayfield is divided into multiple irrigation zones, each supplied by distribution piping and isolation valves. This arrangement allows for selective operation of zones, rotation to avoid overloading, and simplified maintenance. Above-ground sprinklers mounted on risers distribute the blended effluent uniformly across the sprayfield.

The sprayfield is enclosed with fencing and safety signage, with a minimum 5m setback beyond the sprinkler throw to manage drift. Vehicle access tracks are provided around the perimeter for ease of inspection and maintenance. This system ensures controlled land application of treated effluent and brine, delivering regulatory compliance and supporting sustainable vegetation growth.

4.3.11 Sludge Handling System (Geo Bags)

The sludge handling system using Geo Bags manages waste activated sludge (WAS) by automatically pumping it from the primary tank into large, permeable bags that separate water from solids. Two bags are used in rotation—while one is being filled, the other is left to drain and dry—allowing continuous operation. As the sludge sits in the bags, water drains out through the fabric, reducing the volume and leaving behind thickened solids. Once dried, the sludge is removed for disposal.

4.3.12 Outputs

The WWTP is designed to meet the effluent target discharge criteria as outlined in 4.7 below.

Table 4-6: Target Discharge Criteria for proposed WWTP

Parameters	Value
Biochemical oxygen demand	<20mg/L
Total Suspended Solids	<30mg/L
Total Nitrogen	<40mg/L
Total Phosphorus	<10mg/L
Residual free chlorine	0.2-2.0 mg/L
pH	6.5 - 8.5
Thermotolerant coliforms	<1000cfu/100mL
TDS	1137 mg/L

4.4 Environmental Commissioning

Once constructed, the additional WWTP infrastructure will be commissioned for a period of 12 weeks. At the end of the commissioning period, a commissioning compliance report will be submitted to the DWER to demonstrate the WWTP has stabilised towards the discharge quality target values (Table 4-7).

There will be two key stages of environmental commissioning – wet commissioning and biological commissioning. Monitoring of treated wastewater discharges will be undertaken fortnightly during the 12-week commissioning period.

See Table 4-8 below for the proposed environmental commissioning plan for the WWTP and sprayfield.

Table 4-7: Environmental Commissioning Plan for WWTP 2

Commissioning Stage	Activity Description	Input	Output	Monitoring & Controls
Stage 1				
Wet Commissioning	Energisation of the system. Leak testing, flow testing, testing of level and flow instrumentation and testing of the complete automated process. Undertake Site Acceptance Test (SAT) to verify all components meet performance and functional requirements. Duration of ~1 week.	~199m^3/day clean (potable) water.	Up to 199m^3 of clean water discharged to the sprayfield.	Fortnightly samples of effluent discharge quality. Monthly volumes (kL) Daily inspection by competent plant operator and recorded in log sheet
Stage 2				
Biological Commissioning	The WWTP process may be 'seeded' with healthy activated sludge from the Stage 1 WWTP. The process is optimised to produce the required treated effluent quality. Duration of 3 months (12 weeks).	~142m^3/day of Village sewage.	Initially partially treated effluent trending to compliance; then treated effluent to spray field meeting criteria in your monitoring table. Quality of treated effluent/wastewater will be trending towards discharge criteria outlined in Table 4-7.	Fortnightly samples of effluent discharge. Monthly volumes (kL). Daily inspection by competent plant operator and recorded in log sheet. Review of sampling analysis. Any significant exceedances of discharge quality criteria will be reported and corrective action plan implemented

Commissioning Stage	Activity Description	Input	Output	Monitoring & Controls
			Any waste sludge built up within the WWTP is removed by a licensed waste disposal contractor and disposed of offsite in an approved landfill in accordance with regulatory requirements.	immediately. This may include a representative of the plant manufacturer to attend site and make process adjustments.
Once commissioning is completed, monitoring and sampling of discharge quality during TLO will reduce to monthly and volumes will continue to be monitored continuously (Table 4-10).				

4.5 Time Limited Operations

Once commissioning has been completed, it is requested that WWTP 2 enters a time limited operations (TLO) period of 180 days.

It is requested that the TLO timeframes for this amended works approval be based on WWTP 2 completion. The Environmental Compliance Report, Environmental Commissioning Report and the TLO Report will be submitted in due course for WWTP 1, but it is requested that the start of the 180 day TLO period begin at the completion of Stage 2 so as to reduce the number of licence applications/amendments required. If required, it is requested that Stage 1 TLO be amended to 360 days. This strategy was discussed and agreed upon with DWER at a meeting on 10 September 2025. Alternatively, if the start date for construction and commissioning of WWTP 2 is extended, a licence application will be sought for WWTP 1 at the start of WWTP1 TLO and it will be requested that WWTP 2 construction, commissioning and TLO potentially be addressed under the licence.

TLO monitoring activities are proposed below in Table 4-9.

Table 4-8: Proposed monitoring regime for treated wastewater from WWTP during TLO

Sampling Location	Parameter	Frequency
Multipurpose Camp WWTP	5 Day Biochemical oxygen demand (mg/L)	Monthly during time limited operations phase
	Total Suspended Solids (mg/L)	
	Total Nitrogen (mg/L)	
	Total Phosphorus (mg/L)	
	Thermotolerant coliforms (cfu/100mL)	
	Residual chlorine	Daily or continuous
	pH (pH units)	
	TDS mg/L	
	Volumes (kL)	Continuous (averaging period daily)

4.6 Monitoring and Maintenance

During operations, treated wastewater samples will be collected quarterly from the sample point located at the discharge from the effluent pump to ensure the discharge quality criteria (Table 4-7) is being met. Discharge volumes are registered on the effluent flow meter and will be recorded weekly (reported as cumulative monthly volumes).

Table 4-9: Proposed monitoring regime for treated wastewater from WWTP

Sampling Location	Parameter	Frequency
Multipurpose Camp WWTP	5 Day Biochemical oxygen demand (mg/L)	Quarterly
	Total Suspended Solids (mg/L)	
	Total Nitrogen (mg/L)	
	Total Phosphorus (mg/L)	
	Thermotolerant coliforms (cfu/100mL)	
	Residual chlorine	Monthly
	pH (pH units)	
	TDS mg/L	
	Volumes (kL)	

Routine daily operational and maintenance inspections will be undertaken as per the "Daily Check Sheet" in Appendix 2a. This will involve ensuring operational aspects of the WTTP are functioning properly (e.g. screens, levels, mixing, aeration, flotation, switches etc.).

Routine weekly inspections will be undertaken as per the "Weekly Check Sheet" in Appendix 2b.

5 TIMESCALE FOR CONSTRUCTION, COMISSIONING AND TLO

Table 5-1 summarises the proposed and estimated timeframes for construction, commissioning and TLO for both Stage 1 and Stage 2 of the WWTP. Once the Environmental Commissioning report is submitted and TLO commences for Stage 2, the Licensee will prepare and submit a licence application for Category 54.

Table 5-1: Summary of estimated Construction, Commissioning and TLO Timeframes

Construction Start	Construction End	Submission of Env Compliance Report	Commissioning Start	Commissioning End	Submission of Env Commissioning Report	TLO Commence
Stage 1						
29/10/2025	25/11/2025	29/11/2025	30/11/2025	28/02/2026	29/01/2026	30/01/2026
Stage 2*						
01/06/2026	01/09/2026	03/09/2026	04/09/2026	04/12/2026	04/11/2026	05/11/2026

*subject to change

6 STAKEHOLDER AND COMMUNITY CONSULTATION

6.1 Regulator Consultation

RTIO meets with the DWER quarterly to provide an overview of upcoming proposals. This WA amendment application was discussed during the Q3 2025 meeting (September 10, 2025).

6.2 Community Consultation

The Licensee has a long-term commitment to working with Pilbara communities and recognises that local communities have a direct interest in their activities. Substantial

community consultation and public review of existing nearby and proposed future operations in the region has occurred as part of environmental approval processes. Community consultation will continue to be undertaken to keep relevant communities up to date throughout the operations and during closure of the Rhodes Ridge operation.

6.3 Traditional Owners

The proposed temporary camp located within the boundaries of the recognised Native Title Determination Areas of the Nyiyaparli People (WCD2018/008). Karlka Nyiyaparli Aboriginal Corporation (KNAC) is the Registered Native Title Body Corporate representing Nyiyaparli Common Law Holders.

The identification and management of cultural heritage within the traditional lands of the Nyiaparli People is in accordance with the principles and practices outlined within Rio Tinto's Communities and Social Performance Guidelines, the Rio Tinto Cultural Heritage Group Procedure, and the heritage protocols within the Participation Agreement and Indigenous Land Use Agreement (The RTIO and Nyiyaparli ILUA).

RTIO has a number of agreed forums to consult with the Nyiyaparli People and overview of each and their purpose is provided below table

Table 6-1: Summary of Engagement

Engagement with Nyiyaparli
Technical Group - this is a non-decision making forum consisting of RTIO and Karlka Nyiyaparli Aboriginal corporation staff. The purpose of this forum is to provide a technical review of engagement items prior to engagement with the Nyiyaprli People to ensure there aren't any gaps in information, sufficient detail ahs been provided and their is alignment on the ask of Nyiyaparli. This forum was established in 2023 to improve engagement quality. Local Implementation Committee - this is the formal engagement forum established under the Claim-Wide Participation Agreement that is decision-making and has a minimum of 6 elected representatives of the Nyiyaparli People involved and supported by key KNAC staff. The purpose of this forum to consult and make decisions on all of RTIOs activities including but not limited to all Environmental and Government approvals. Heritage Sub-Committee - this is a formal engagement forum established under the Claim-Wide Participation Agreement and is decision-making for all heritage matters including but not limited to heritage approvals. This forum consists of 12 senior Nyiyaparli People with cultural authority elected by the KNAC Board as their Local Cultural Heritage Services Committee. They are supported by a number if key kNAC staff. Life of Mine Planning forum - this is a forum established under the Life of Mine Regional Standard as part of the Regional Framework Deed. It is a consultative forum and consists of the 6 Local Implementation Committee member representatives and key KNAC staff. the purpose of the forum is to consult on all matters relating to RTIOs life of mine and includes engagement on the long term mine plan, new developments and closure. To progress the Rhodes Ridge temporary camp, engagement commenced in 2022 through the Life of Mine and Heritage Sub-Committee and culminated in a technical review by the Technical Group in February 2024 and decision on the heritage approach and support for the project design and scope made at the 21st February 2024 Local Implementation Committee meeting. Consultation and update on the project as it progresses will continue via the Heritage sub-Committee for heritage matters and the Life of Mine Planning forum for project updates throughout the approval and construction period.

7 OTHER APPROVALS, LICENCES AND PERMITS

7.1 State Agreement Act

The project operates under the existing *Iron Ore (Rhodes Ridge) Agreement Authorisation Act 1972* (WA), however as the works are associated with an exploration camp, further approvals are not required under the state agreement act.

7.2 Environmental Protection Act 1986 (Part IV)

The works proposed subject to this works approval application are not included in the scope of the Rhodes Ridge Iron Ore Project Part IV proposal currently under assessment by the Environmental Protection Authority (EPA).

The proposed works are not regarded as warranting referral to the EPA under Section 38 of the *Environmental Protection Act 1986* (EP Act) by virtue of its minimal impact on the environment.

7.3 Environmental Protection Act 1986 (Part V)

7.3.1 Part V, Division 2: Native Vegetation Clearing

All clearing completed for the Project Area is authorised under Native Vegetation Clearing Permit (NVCP) CPS 9751/1. Clearing will be controlled through the NVCP conditions and by the RTIO internal approval process. This ensures that the following is completed prior to commencing clearing activities: all heritage and biological reviews are undertaken; legal access to the land is in place; other necessary approvals are obtained; and the critical clearing boundary is inspected prior.

Any additional ground disturbance activities will be planned to ensure minimal disturbance is achieved through the use of appropriate ground engaging plant, use of designated tracks, roadways and use of pre-existing disturbed areas.

7.4 Rights in Water and Irrigation Act 1914

Current groundwater abstraction occurs under Groundwater Licences (GWL) 211767, GWL 211768 and GWL 211767, issued under the *Rights in Water and Irrigation Act 1914* issued on 15 April 2025. The combined abstraction under these instruments is 450,000 kL.

8 SITING AND LOCATION

There are no sensitive receptors that are located within or in the immediate vicinity of the Project Area.

Table 8-1 summarises the nearby receptors and proposed controls to prevent or mitigate any potential adverse impacts are detailed in Section 11. Receptors identified in Table 8-1 are shown in Figure 3 to Figure 8.

Table 8-1: Nearby environmentally sensitive receptors and aspect

Type/Classification	Description	Distance & Direction to premises boundary (if within 25km)	Proposed control to prevent or mitigate adverse impacts (if applicable)
Sensitive land uses			
Townsites	Hope Downs 4 Village	25km	Due to the separation distance and type of activities proposed, adverse impacts to townsites are not anticipated. No controls are proposed.
Occupied homesteads	None occur the local area.	N/A	Due to the separation distance and type of activities proposed, adverse impacts to occupied homesteads are not anticipated. No controls are proposed.
Bores	Two pastoral bores are known within the local area.	The two pastoral bores are situated 700m and 1 km from the premise boundary respectively.	Groundwater abstraction is managed in accordance with approved RIWI Act 5C licences. The WWTP and sprayfield will be managed as outline in Section 10.
Nearby Environmentally Sensitive Receptors and Aspects			
Environmentally Sensitive Area (ESA)	None occur the local area.	N/A	Due to the separation distance and type of activities proposed, adverse impacts to ESAs are not anticipated. All areas proposed to be cleared/disturbed have been subject to flora/fauna surveys to understand potential impacts. No further controls are proposed.
Threatened Ecological Communities (TEC)	Coolibah - Lignum Flats: sub type 1: Coolibah and mulga woodland over lignum and tussock grasses on clay plains (Coondewanna and Wanamunna flats and Mt Bruce Flats)	6km	Due to the separation distance and type of activities proposed, adverse impacts to TECs are not anticipated. All areas proposed to be cleared/disturbed have been subject to flora/fauna surveys to understand potential impacts. No further controls are proposed.
Priority Ecological Communities (PEC)	West Angelas Cracking Clays (Priority 1)	2km	Due to the separation distance and type of activities proposed, adverse impacts to PECs are not anticipated. All PECS are protected under CPS 9751 with appropriate buffers applied. All areas proposed to be cleared/disturbed have been subject to flora/fauna surveys to understand potential impacts. No further controls are proposed.
Threatened and/or priority fauna	No fauna species of conservation significance are known to occur within the prescribed premise boundary.	The closest species Ghost bat (Macroderma gigas - VU), is located more than 7 km from the presmise boundary.	Due to the separation distance and type of activities proposed, adverse impacts to local fauna species are not anticipated. All areas proposed to be cleared/disturbed have been subject to flora/fauna surveys to understand potential impacts. No further controls are proposed.
Threatened and/or priority flora	Aristida jerichoensis var. subspinulifera (P3) – population size 1	Located right on the edge of the prescribed premises boundary.	Proposed activities are to occur within the boundary of approved clearing permit CPS 9751/1. This permit has specific conditions that require the protection of priority flora species and there known local populations. No impact to this particular population is proposed.
Aboriginal and other heritage sites	The closest registered Aboriginal Cultural Heritage Site is Place 8146 (BAKERS WEST 1) located approximately 1km south of the prescribed premises boundary and Place 8147 (BAKERS WEST 2 (STOCKYARD) is located 1.4km south east of the prescribed premises boundary	1km	Due to the separation distance and type of activities proposed, adverse impacts to heritage values are not anticipated. All areas proposed to be cleared/disturbed have been subject to archaeological and ethnographic surveys. No further controls are proposed.
Public drinking water source areas	None are known to occur within the local area.	N/A	Due to the separation distance and type of activities proposed, adverse impacts to PDWSA are not anticipated. All areas proposed to be cleared/disturbed have been subject to desktop surveys. The WWTP and sprayfield will be managed as outline in Section 10.
Groundwater Dependent Ecosystems	None are known to occur within the local area.	N/A	Due to the separation distance and type of activities proposed, adverse impacts to GDEs are not anticipated. All areas proposed to be cleared/disturbed have been subject to desktop and field surveys. The WWTP and sprayfield will be managed as outline in Section 10.
Rivers, lakes, oceans, and other bodies of surface water, etc.	None are known to occur within the local area. The closest feature (located 1.3 km west) is a minor creek (non-perennial)	N/A	Due to the separation distance and type of activities proposed, adverse impacts to water related environments are not anticipated. All areas proposed to be cleared/disturbed have been subject to hydrological and hydrogeological assessment and/or investigation. The WWTP and sprayfield will be managed as outline in Section 10.

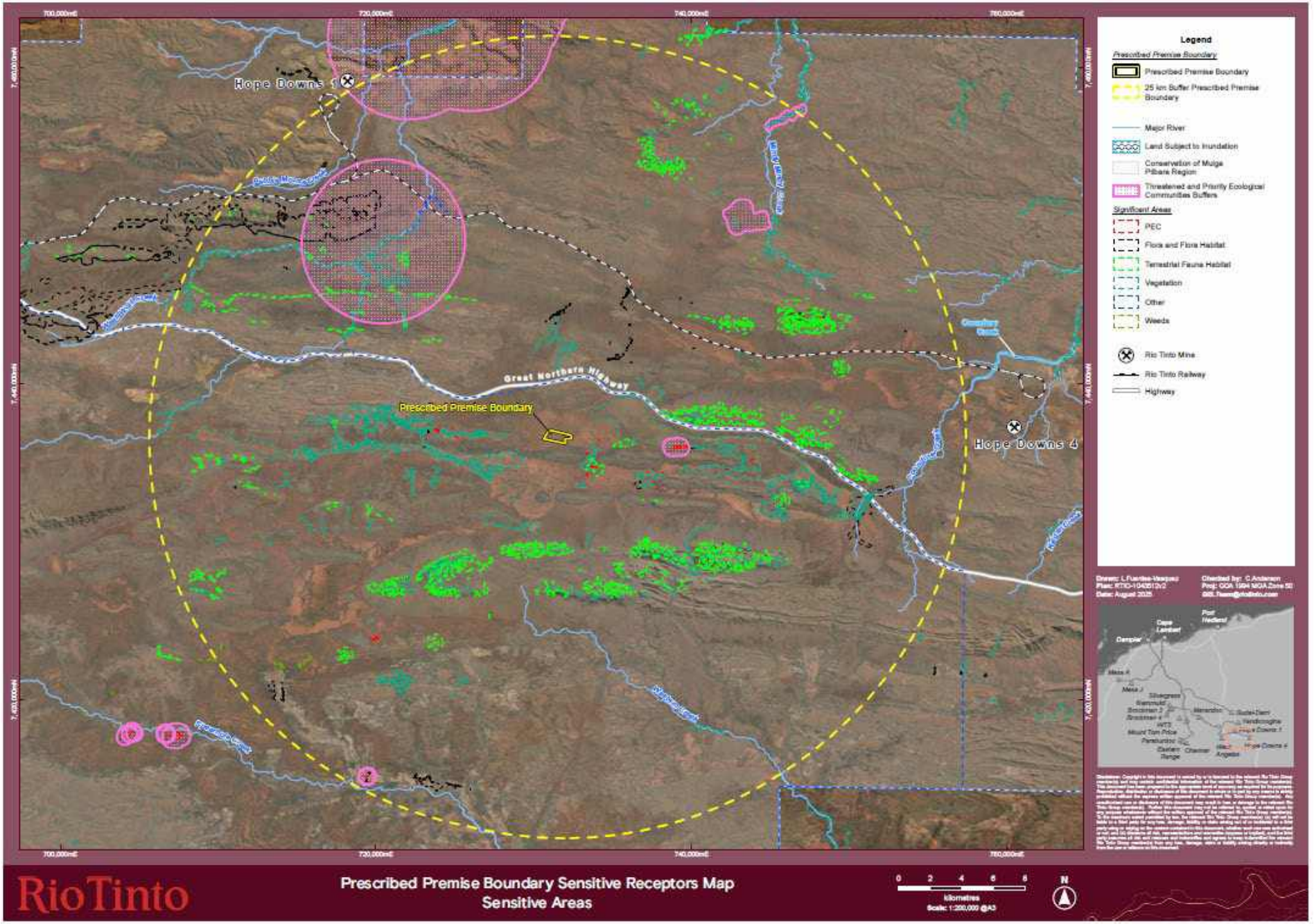


Figure 3: **Nearest Sensitive Receptors**

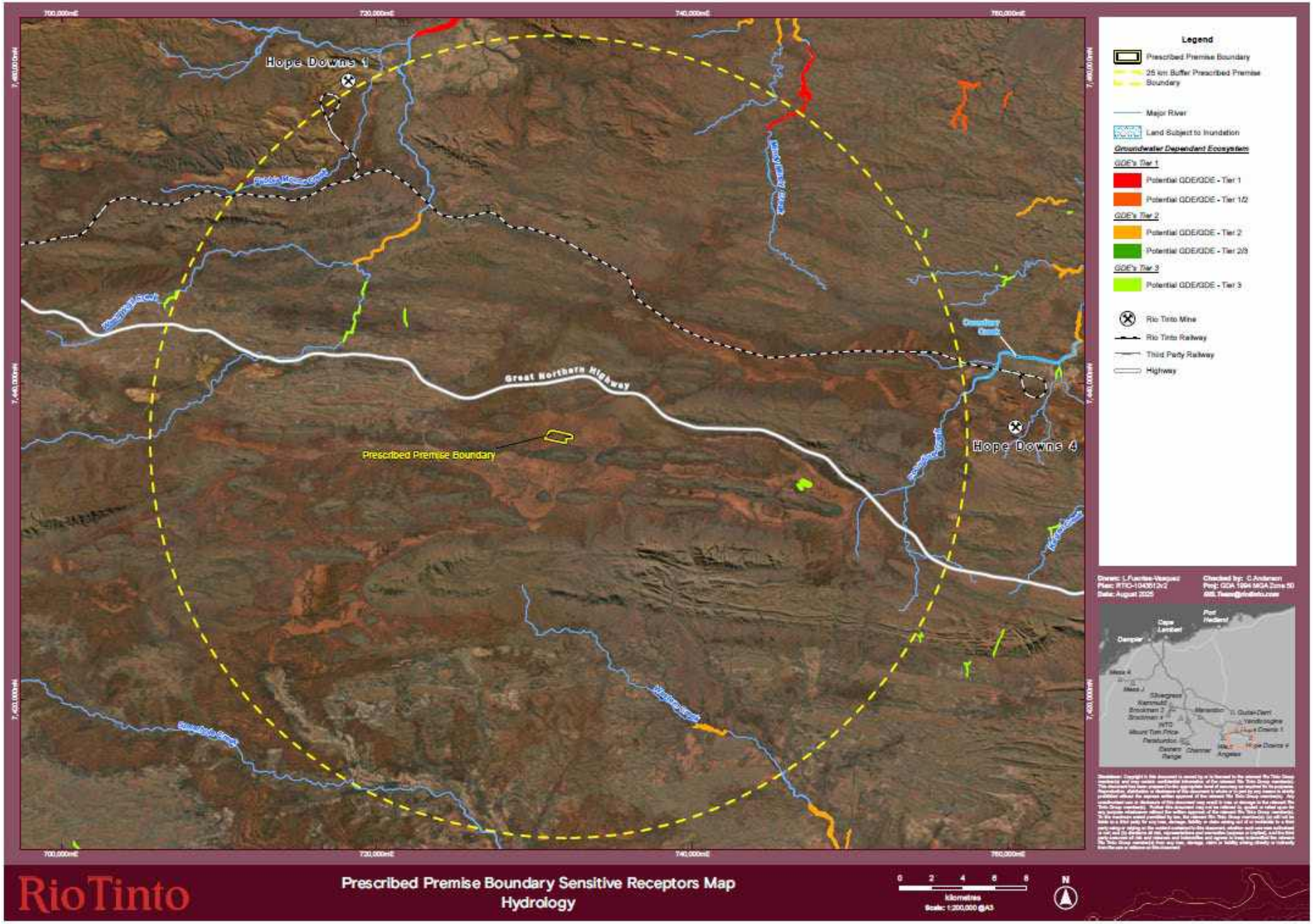


Figure 4: **Project Siting - Hydrological Receptors**

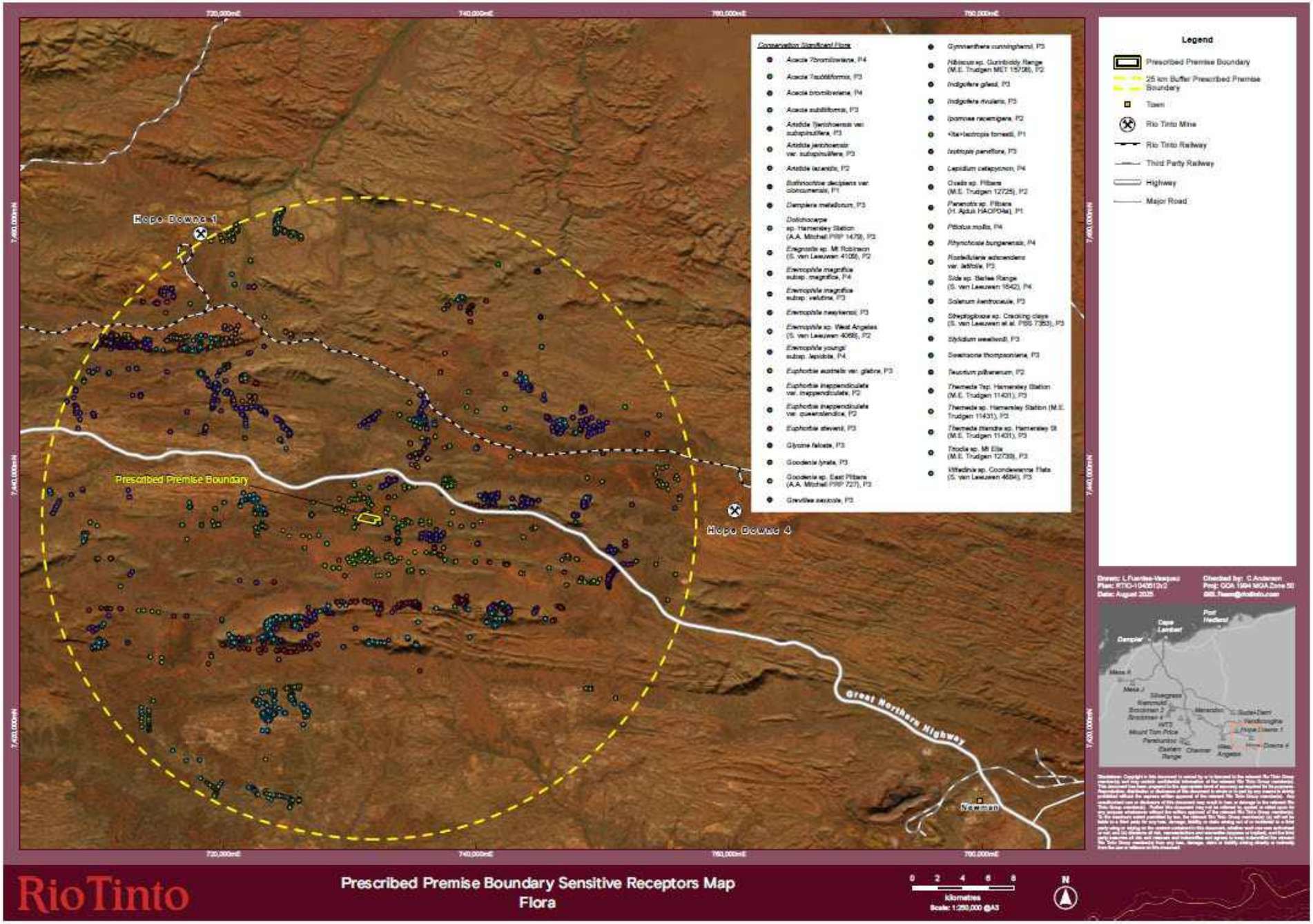


Figure 5: **Project Siting - Ecological Receptors – Surrounding Flora**

Figure 6: **Project Siting – Ecological Receptors – Surrounding Fauna**

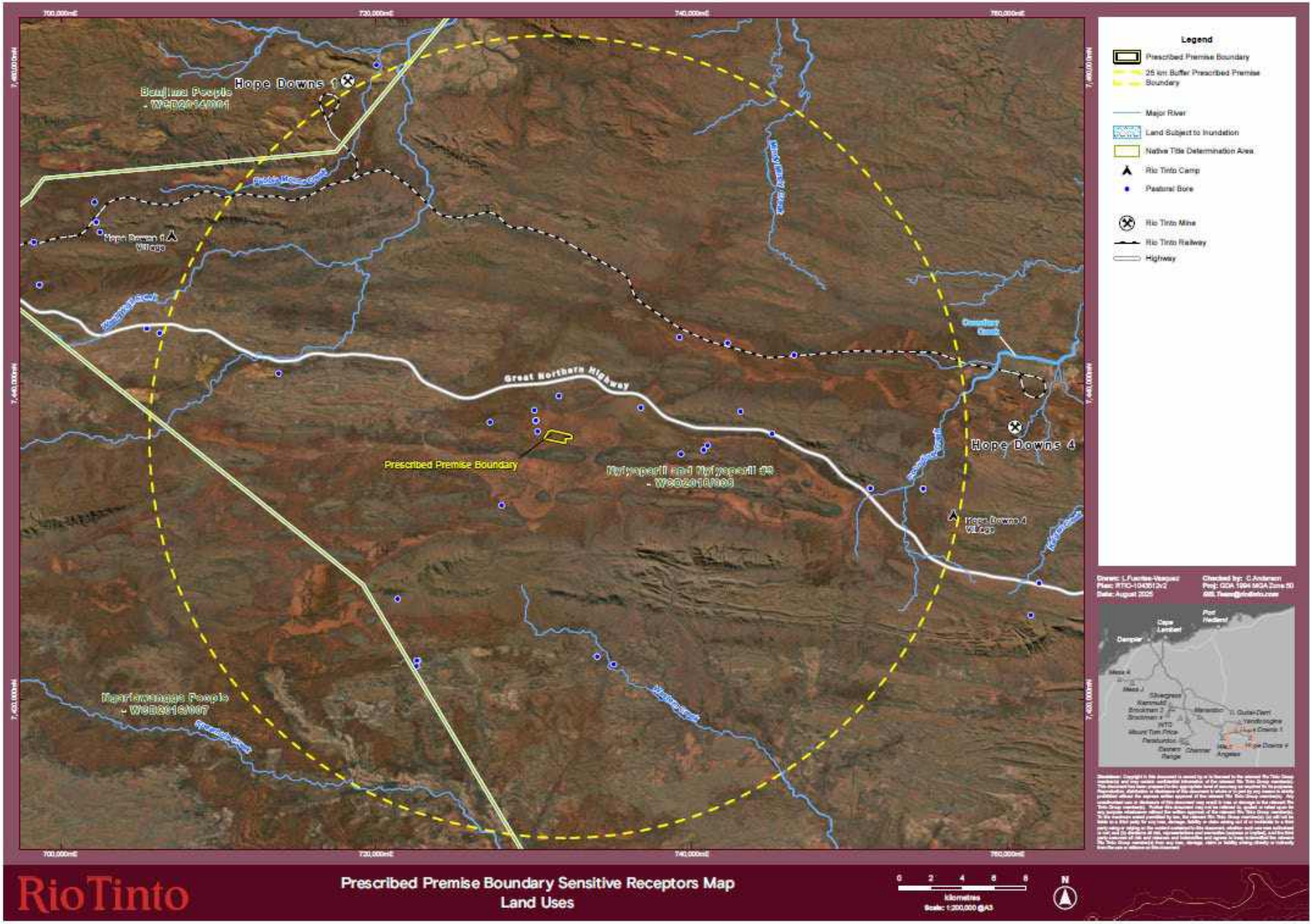


Figure 7: **Project Siting – Land uses**

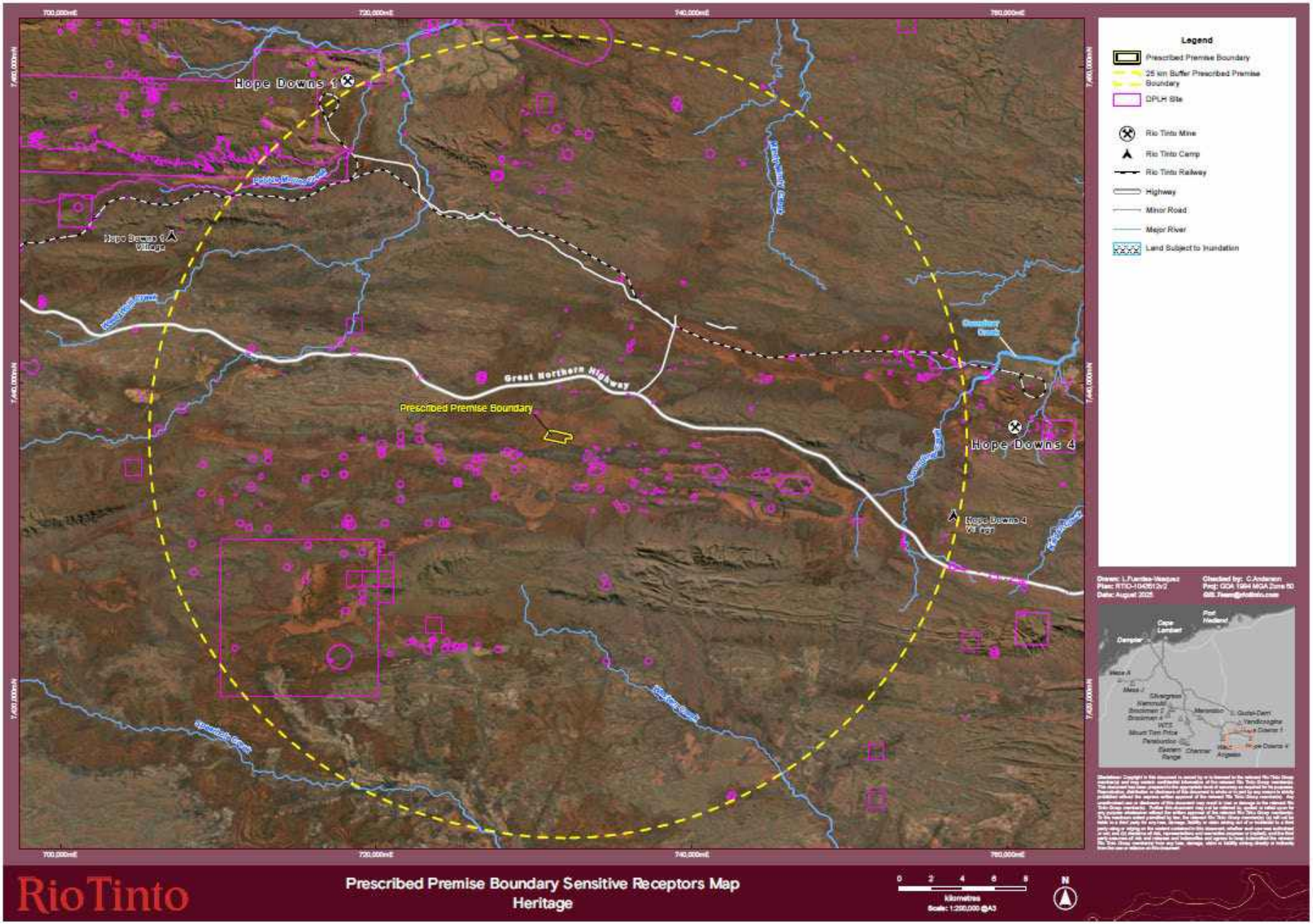


Figure 8: **Project Siting – Aboriginal and other heritage sites**

9 ENVIRONMENTAL SITING CONTEXT

9.1 Climate

The climate of the Pilbara region of Western Australia is classified as arid tropical with two distinct seasons: a hot, wet summer (October – April) and a mild, dry winter (May – September) (BoM 2023).

Based on long-term climatic data from the nearest Bureau of Meteorology (BoM) weather station at Newman Aero (Station 007176) (approximately 34 km south-east of the survey area), the mean annual rainfall since 1971 is 317 mm (BoM 2023). The mean maximum daily temperatures since 1996 range between 23.0°C and 39.3°C and exceed 30°C for much of the year (BoM 2023).

9.2 Topography

Regional topography is denominated by two main landscape features; the Hamersley Range to the north of the Prescribed Premises and the lower areas of flats and undulating plains. The top of the Hamersley Range plateau is a series of rounded hills and narrower ridges, reaching an elevation of 1,245 m above sea level at its highest point. The plateau forms the watershed between the Fortescue River to the north and the Ashburton River to the south. Numerous rivers and streams have dissected the plateau, forming gorges and broader scree and rubble-filled valleys (Copp 2005). The Newman Land System makes up the greatest proportion of the Hamersley Range (including the Project Area) and is characterised by rugged plateaus, ridges and mountains supporting spinifex grassland (van Vreeswyk et al. 2004).

9.3 Geology and Soils

The geology of the Pilbara region is dominated by the Hamersley Province which is a depositional basin of the Lower Proterozoic sediments. The sediments of the Hamersley Province lie in a sequence of supercrustal rocks comprising of the Fortescue, Hamersley and Turee Creek groups. The Proposal is situated within the Hamersley Plateau Province, which is primarily a complex of Lower Proterozoic rocks of the Hamersley and Fortescue groups. The rocks are mainly jaspilite and basalt with pockets of dolomite, shale, silt stone and acid volcanics.

The sparse vegetation cover and the erosive force of heavy summer cyclonic rains causes much of the soil on the hill slopes to be transported down to the valleys and plains. This is an intermittent and slow process which occurs over a long period of time. Thus, species and associations of vegetation on the hills and slopes tend to be correlated to geology rather than soil type. Along drainage lines, superficial deposits influence the distribution of vegetation, but the presence of surface and ground water is also a major determining factor.

The Department of Agriculture produced mapping of the state which broadly classifies Land Systems (Rangelands) (Van Vreeswyck et al. 2004). These units broadly describe regions by their physiographic classification. The Project Area occurs within the Newman land system. The following land system descriptions are adapted from Van Vreeswyck et al (2004):

- Newman Land System – rugged jaspilite plateaux, ridges and mountains with hard spinifex

9.3.1 Soils

Tille (2006) classified the soil landscapes of the Pilbara region categorising them into various provinces. The project area falls within the Hamersley Plateau Zone where the soils can be described as “Hills and dissected plateaux (with some stony plains and hardpan wash plains) on sedimentary and volcanic rocks of the Hamersley Basin with Stony soils, Red shallow loams and some Red/brown non-cracking clays and Red loamy earths”.

A site-and-soil evaluation was undertaken at the proposed sprayfield area in which five representative soil samples were taken to assess the suitability of the site for on-site disposal of effluent by percolation in accordance with the WA Department of Health’s Guidance on *Site-and-soil evaluation for on-site wastewater*. (Calibre 2023; Appendix 3).

The evaluation described the soils across the sprayfield as Qw: ALLUVIUM and COLLUVIUM: Red-brown sandy and clayey soil.

The generalised subsurface conditions encountered during the investigation are summarised as:

- ALLUVIUM: Sandy CLAY (CL): red-brown, clay is low plasticity, sand is fine to coarse grained, sub-rounded, between 0.5 and 1m thick, overlying,
- CLAY Hardpan, with localised Gravelly Clayey SAND pockets.

This ‘hardpan’ horizon was encountered between 0.4m below ground level (bgl) and 0.8m bgl.

Based on the soil types and infiltration rates it was determined that the soils present across the sprayfield area are suitable for disposal of secondary treated effluent (Calibre, 2024).

The risk of irrigation has been assessed in general accordance with *Water Quality Protection Notice 22 (WQPN22).* In terms of the risk from irrigation, the sprayfield is not within proximity to any surface water bodies or wetlands, including creek lines. Additionally, there is a sufficient separation distance between the sprayfield and any underlying groundwater, with this distance being in excess of the required 2m separation distance. The sprayfield is also outside of any identified PDWSA. In accordance with Table 1 of WQPN22, the sprayfield would have a Low eutrophication risk, with a Risk Category of D. (Calibre, 2023).

9.4 Hydrology

They are no creeks or surface water bodies within proximity to the proposed construction camp, including the proposed sprayfield location. However, surface water may pond in low lying areas across the site due to the relatively low permeability of the soils encountered.

9.5 Hydrogeology

During investigative works, groundwater was not encountered in any of the test pits. Available groundwater data indicates that the groundwater level at the site is approximately 30 m below

ground level (approximately RL 655 m AHD). The data also indicates that the groundwater flows in an easterly direction, i.e. west to east.

Bore log information (Bore Reference: WB21BKN0010) suggested groundwater sits within a 'clay/detrital' weathered horizon. Hydraulic conductivity for such aquifers can range between 5x10-6 m/s and 5x10-9m/s1.

No PDWSAs are located within the Project Area or vicinity.

9.6 Flora and Fauna

The Project Area occurs within the Hamersley Subregion (PIL3) of the Pilbara Bioregion. This subregion is described as mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by gorges (basalt, shale and dolerite). Mulga low woodland over bunch grasses on fine textured soils in valley floors, and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges (Kendrick, 2001).

Several biological surveys have been undertaken across the Rhodes Ridge Iron Ore Project development envelope in 2022 and 2023 by Astron Environmental Services and GHD. In addition to these, multiple surveys have been undertaken across the Proposal to support Native Vegetation Clearing Permit (NVCP) applications, which have informed the detailed surveys.

Key points for the Project Area:

- It is not within an Environmentally Sensitive Area (ESA)
- None of the Vegetation represents a PEC or TEC or is considered a Groundwater Dependant Ecosystem (GDE).
- None of the weeds are declared pests.
- No threatened flora occur within or near to the Project Area or are expected to occur.

Additional details are provided in the Section 9.6.1 and 9.6.2 below.

9.6.1 Vegetation and Flora

The Project Area is located within the Fortescue Botanical District (Eremaean Botanical Province) of Western Australia (Beard 1975a, 1975b). Broad scale vegetation mapping for the Pilbara region has been completed by Beard (1975) with only one Beard mapping unit occurring in the project area, Hamersley 175. This unit is described as Short bunch grassland - savanna/ grass plain (Pilbara).

Vegetation and flora surveys undertaken within the Rhodes Ridge Iron Ore Project area have mapped and described the vegetation, providing a detailed understanding including conservation significance of the vegetation communities and condition present. Astron (2023a) provides a consolidated coverage and combined assessment of all previous detailed flora and vegetation surveys and is considered the most relevant report for the Project Area.

The vegetation units described by Astron (2023a) that occur in the project area are described below in Table 9-1.

Table 9-1: Vegetation Types within the Project Area

Vegetation Code	Vegetation Description
Stony Plains	
P5	(*Eucalyptus victrix* scattered low trees to low open woodland over) *Acacia aptaneura* tall open shrubland to tall shrubland over (*Rhagodia eremaea* and/or Ptilotus obovatus var. *obovatus* scattered low shrubs to shrubland over) *Aristida latifolia* and *Chrysopogon fallax* scattered tussock grasses to open tussock grassland over *Iseilema vaginiflorum*, *Urochloa occidentalis* var. *occidentalis* and *Enneapogon polyphyllus* very open annual grassland to annual grassland over **Bidens bipinnata* scattered herbs on crabhole clay plains.

Within or surrounding the Project Area there were no TECs listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) or State *Biodiversity Conservation Act 2016* (BC Act), or PECs listed by the Department of Biodiversity, Conservation and Attractions (DBCA).

No flora species of conservation significance, listed under the EPBC Act or the BC Act have previously been recorded within the Project Are.

One population of Aristida jerichoensis var. subspinulifera (P3) occurs on the boundary of the prescribed premise. No impact to this population is proposed. Proposed activities are to occur within the boundary of approved clearing permit CPS 9751/1. This permit has specific conditions that require the protection of priority flora species and there known local populations.

P3 priority flora species, Rhagodia sp. Hamersly (M.Tudgen 17794), was listed as occurring in the first iteration of W6932 but this was delisted in 2025.

9.6.2 Fauna

The area has been surveyed, resulting in a detailed understanding including conservation significant species present and habitat values. Astron (Astron 2023b) presents an integrated report that consolidates the results of numerous surveys and is considered the most relevant report for the Project Area. No fauna species of conservation significance, listed under the EPBC Act or the BC Act, or listed as Priority by DBCA were recorded within the Project Area. The closest species Ghost bat (Macroderma gigas - VU), is located more than 7 km from the presmise boundary.

10 RISK IDENTIFICATION AND ASSESSMENT

A risk assessment has been prepared to identify the potential emissions from the proposed activities and the potential sources, pathways and receptors of those emissions, and proposed controls to manage potential emissions to determine a risk rating. The risk assessment has been based on the DWER *Guideline: Risk Assessments* (DWER 2017) and the RTIO risk assessment process, based on the following risk rating matrix (Table 10-1).

Table 10-1: Risk Rating Matrix

	Consequence				
Likelihood	**Slight**	**Minor**	**Moderate**	**Major**	**Severe**
Almost Certain	**Medium**	**High**	**High**	**Extreme**	**Extreme**
Likely	**Medium**	**Medium**	**High**	**High**	**Extreme**
Possible	**Low**	**Medium**	**Medium**	**High**	**Extreme**
Unlikely	**Low**	**Medium**	**Medium**	**Medium**	**High**
Rare	**Low**	**Low**	**Medium**	**Medium**	**High**

Risk = consequence x likelihood

The following criteria (DWER 2017) are used to determine the consequence and likelihood of a risk event occurring (Table 10-2 and 10-3).

Table 10-2: Consequence Matrix

Consequence	Consequence description	
	Environment	**Health**
Severe	On-site impacts: catastrophic Off-site impacts (local scale): high level Off-site impacts (wider scale): mid level Mid to long term or permanent impact to an area of high conservation value or special significance	Loss of life Adverse health effects: high level or ongoing medical treatment Local scale impacts: permanent loss of amenity
Major	On-site impacts: high level Off-site impacts (local scale): mid level Off-site impacts (wider scale): low level Short term impact to an area of high conservation value or special significance	Adverse health effects: mid level or frequent medical treatment Local scale impacts: high level impact to amenity
Moderate	On-site impacts: mid level Off-site impacts local scale: low level Off-site impacts wider scale: minimal	Adverse health effects: low level or occasional medical treatment Local scale impacts: mid level impact to amenity
Minor	On-site impacts: low level Off-site impacts (local scale): minimal Off-site impacts (wider scale): not detectable	Local scale impacts: low level impact to amenity
Slight	On-site impacts: minimal	Local scale impacts: minimal impacts to amenity

Table 10-3: Likelihood Matrix

Likelihood	Likelihood description
Almost certain	The risk event is expected to occur in most circumstances.
Likely	The risk event will probably occur in most circumstances.
Possible	The risk event could occur at some time.
Unlikely	The risk event will probably not occur in most circumstances.
Rare	The risk event may only occur in exceptional circumstances.

The potential emissions, sources, pathways and receptors that have been identified for the construction, commissioning and operation of the proposal are outlined in Table 10-4. Table 10.4 also identifies the potential impacts, proposed controls and associated risk ratings. Further consideration (via additional management measures) will be given any activity which has been identified as having a 'Medium' risk rating or higher (Section 11.1). Further consideration includes:

- A description of the potential emissions, sources, pathways and receptors.
- Any controls that have been identified for the risk event.
- An assessment of the consequence and likelihood.
- Risk rating.

Table 10-4: Risk Assessment – Category 54 WWTP and Irrigation Sprayfield

Source		Potential Emissions	Potential Pathway	Potential Receptors	Potential Impacts	Proposed Controls	Consequence	Likelihood	Risk Rating	Further consideration required?
Category 54: WWTP & Irrigation sprayfield	Construction of WWTP	Dust: Release of particulate matter from construction activities and vehicular movements.	Air: Transport through air then transport through the respiratory system	Residential: Hope Downs 4 camp is located 25km east. Newman is located more than 50 km from the project area.	Human health Impacts – respiratory illness. Given the large distance to the nearest receptor and short-term duration of construction activities, impacts to public health or amenity from nuisance dust are expected to be limited.	Dust will be managed via the requirements of the Works Approval, Native Vegetation Clearing Permit (CPS 9751/1) and standard operating procedures, including: - Clearing will be managed to ensure that areas are only cleared as required and rehabilitation of cleared areas is implemented as construction is completed; and - Dust suppression will be implemented (including use of water trucks, control of vehicle movements / restricted speeds). - Works that have the potential to generate high dust levels may be restricted during times of high winds. Construction Environmental Management Plan (CEMP) will be implemented and adhered to. Standard management procedures are expected to effectively mitigate the risk of dust emissions during construction.	Minor	Rare	**Low**	Risk pathway is low, further consideration or assessment is not required.
			Air: Transport through air then deposition	Terrestrial ecosystems: Riparian vegetation (associated with minor ephemeral creek 1.3km west of the Project Area	Smothering and the potential suppression of photosynthetic and respiratory functions of vegetation.					
				Terrestrial ecosystems: Native fauna	Dust may impact habitats which represent shelter, foraging and dispersal habitats for native fauna. Given the large distance to the nearest receptor and short-term duration of construction activities, dust is expected to have a negligible impact on native fauna.					
		Noise and vibration: associated with construction activities and vehicular movements.	Air or other physical medium: Vibration of particles.	Residential: Hope Downs 4 camp is located 25km east. Newman is located more than 50 km from the project area.	Human health impacts – amenity or nuisance. Given the large distance to the nearest receptor and short-term duration of construction activities, impacts to public health or amenity from nuisance noise are expected to be limited.	*Environmental Protection (Noise) Regulations 1997* and standard operating procedures are expected to effectively mitigate the risk of noise during construction. CEMP will be implemented and adhered to. Construction activities limited to daylight hours only. Specific controls are not proposed.	Minor	Rare	**Low**	Risk pathway is low, further consideration or assessment is not required.
				Terrestrial ecosystems: Nocturnal native fauna	No potential impacts as no construction activities proposed at night	Construction activities will be limited to daylight hours only. Specific controls are not proposed				
		Light	Air: light spill generated during construction activities.	Residential: Hope Downs 4 camp is located 25km east. Newman is located more than 50 km from the project area.	No potential impacts to health and amenity given the large distance to the nearest receptor and no night works proposed.	Construction activities will be limited to daylight hours only. Specific controls are not proposed. CEMP will be implemented and adhered to.	Minor	Rare	**Low**	Risk pathway is low, further consideration or assessment is not required.
				Terrestrial ecosystems: Nocturnal native fauna	None, given no night works will be conducted during construction.	Construction activities will be limited to daylight hours only. Specific controls are not proposed	Minor	Rare	**Low**	Risk pathway is low, further consideration or assessment is not required.
		Wastes	General wastes generated during construction activities	Residential: Hope Downs 4 camp is located 25km east. Newman is located more than 50 km from the project area.	Health and amenity: Given the large distance to the nearest receptor and short-term duration of construction activities, impacts to public health or amenity from general wastes are expected to be limited.	General wastes will be managed via the requirements of the Works Approval and standard operating procedures including: - Sufficient recycling and general waste collection areas will be established and labelled with the relevant waste type to facilitate the management of waste; - Recyclable materials will be separated from other waste and recycled wherever possible; and - Non-recyclable materials will be disposed of at an approved landfill facility. Standard waste management procedures are expected to effectively mitigate the risk of general wastes during construction.	Minor	Rare	**Low**	Risk pathway is low, further consideration or assessment is not required.
				Terrestrial ecosystems: Native fauna.	Local increase in feral fauna (scavengers attracted to putrescible wastes) could result in predation and replacement of native fauna.		Minor	Rare	**Low**	Risk pathway is low, further consideration or assessment is not required.

Source		Potential Emissions	Potential Pathway	Potential Receptors	Potential Impacts	Proposed Controls	Consequence	Likelihood	Risk Rating	Further consideration required?
Category 54: WWTP & Irrigation sprayfield	Commissioning /Operation of WWTP	Odour	Air	Residential: Hope Downs 4 camp is located 25km east. Newman is located more than 50 km from the project area.	Health and amenity: Negligible odour impacts, given the distance to the receptors, odour emissions are not expected to affect health or amenity.	The WWTP will be appropriately designed and operated to mitigate the risk of odour emissions. Inspection and maintenance will be undertaken. Standard maintenance procedures are expected to effectively mitigate the risk of odour emissions	Minor	Rare	**Low**	Risk pathway is low, further consideration or assessment is not required.
		Raw sewerage	Sewage spill during operation of the WWTP causing soil contamination / seepage to groundwater / eutrophication of surface water	Terrestrial ecosystems Groundwater (30mbgl throughout the year) Surface Water: A minor ephemeral creek line 1.3 km west of the WWTP	Minimal impacts expected to potential receptors given the distance to each receptor.	The WWTP will be appropriately designed and operated to mitigate the risk of sewage spills Surface water management structures (including perimeter bund and sumps) will ensure any spills are contained. Spill response will be provided. Inspection and maintenance will be undertaken. Standard management procedures are expected to effectively mitigate the risk of sewage emissions.	Moderate	Rare	**Medium**	Discussed further in Section 11.1
			Sewage spill during operation of the WWTP causing risk to human health	Residential: Hope Downs 4 camp is located 25km east. Newman is located more than 50 km from the project area.	Health: None, given the distance to the nearest receptors spills are not expected to affect health.	Same controls proposed as row directly above.	Minor	Rare	**Low**	Risk pathway is low, further consideration or assessment is not required.
		Treated effluent	Discharge of inadequately treated effluent to land (sprayfield) / seepage to groundwater / eutrophication of surface water	Terrestrial ecosystems Groundwater (30 mbgl throughout the year) Surface Water: A minor ephemeral creek line 1.3 km west of the WWTP	Elevated nutrient levels in soil / groundwater. Impacts to native vegetation / ingress or spread of weeds. The above impacts will be minimal given the distance to receptors, the ephemeral nature of the creeks, high evaporation rates and appropriate sizing of the sprayfield.	The WWTP will be appropriately designed and operated to mitigate the risk of sewage spills. The treated effluent will be disposed of to an appropriately sized sprayfield, as per WQPN 22 guidance (DoW 2018). Surface water management structures (including windrow to separate the pipeline from the LV access track). Spill response will be provided. Inspection and maintenance will be undertaken. Monitoring of discharge effluent quality will be undertaken in principle accordance of Category D level of treatment (WQPN 22) and will not exceed target values specified in *Australian Guidelines for Sewerage Systems – Effluent Management* (ANZECC 1997). Standard management procedures are expected to effectively mitigate the risk of elevated nutrient levels in soil / seepage to groundwater as a result of discharge of inadequately treated effluent.	Moderate	Rare	**Medium**	Detailed assessment provided in Section 11.1
		Treated effluent	Discharge of inadequately treated effluent causing risk to human health	Residential: Hope Downs 4 camp is located 25km east. Newman is located more than 50 km from the project area.	Health: None, given the distance to the nearest receptors spills are not expected to affect health.	Same controls proposed as row directly above.	Minor	Rare	**Low**	Risk pathway is low, further consideration or assessment is not required..

11 EMISSIONS, MANAGEMENT AND CONTROLS

The Licensee operates under an integrated Health, Safety, Environment and Communities and Social (HSEC) Management System which includes processes, procedures and plans that ensure environmental controls are developed for key environmental risks, legal compliance is maintained, and continuous improvement is achieved through a formal review process.

Subject to approval, the construction, commissioning and operation of the proposed facility will be in accordance with the requirements of the HSEC Management System and the issued Works Approval (and any amendments, as required).

As mentioned in Section 10 (Table 10.4), risks that have been identified as having a 'Medium' risk rating or higher have been discussed further in the below sections.

11.1 Discharges to Land – Raw Sewage

11.1.1 Description of Risk Event

The operation of the proposed WWTP could potentially result in spills or leaks of untreated raw sewage to soil or groundwater. Sewage is not likely to contaminate surface water with the controls (bunding and sump) in place. The vertical distance to groundwater (30 mbgl) lessens the risk of untreated sewage reaching and contaminating groundwater.

11.1.2 Proposed Environmental Controls

Siting and operational controls are the key controls to minimise any potential risk and impacts of spills or leaks of raw sewage. The proposed WWTP is located in an area away from any sensitive land uses and terrestrial ecosystems (such as major creek lines, sensitive flora and/or vegetation and important native fauna habitat areas). The depth to groundwater in the WWTP area is at least 30 mbgl and therefore any spills are unlikely to reach the groundwater. The nearest sensitive land use (Hope Downs 4 Mining Camp ~25km E) is unlikely to be impacted in any way by the operation of the WWTP.

11.1.2.1 Alarms

Operational controls proposed to minimise the risk of spills include alarms. The WWTP control system is configured with alarms and interlocks to minimise the risk of spills, overflows, or equipment failure.

Two primary alarm types are provided:

1. High Level Alarm – Float switches are installed in key process tanks to initiate alarms if liquid levels rise above normal operating range. A high-level alarm typically indicates a downstream restriction, such as an effluent pump failure.
2. Motor Overload Alarm – Overload protection is provided for all critical drive motors and pumps. An alarm is raised if any of the following trip on overload:
    - Balance Tank Transfer Pumps
    - Influent Feed Pumps

- Rotating Biological Contactor (RBC) Drive Motors
- Effluent / Lift Pumps (1 and 2)

Additional online monitoring alarms are included for process compliance, such as:

- pH deviation alarms (online sensor)
- Chlorine residual alarms (low/high, online sensor)
- Daily flow totaliser exceedance alarms

11.1.2.2 Overflow Mitigation

The control philosophy includes interlocks between influent feed pumps and high-level tank alarms to prevent uncontrolled overflows.

Key provisions are:

- If the final effluent (lift) tank reaches Hi-Hi level, influent feed pumps are automatically inhibited until capacity is restored.
- If the balance tank reaches Hi-Hi level, influent feed pumps will operate to reduce tank volume, provided the final effluent tank is not already at Hi-Hi. In this case, pumps run only while the balance tank Hi-Hi float is active.
- This strategy ensures that wastewater can be managed safely under upset conditions without causing uncontrolled discharge.

All alarms and interlocks are logged, trended, and reviewed by operators. Persistent or repeated Hi-Hi events trigger investigation, corrective action, and reporting**.**

Appropriate operation of the WWTP, including regular monitoring and maintenance is also key to preventing spills and leaks. The WWTP will be operated in accordance with the manufacturer's manual. Daily operational inspections will be undertaken in accordance with Appendix 2a. These general inspections of the WWTP will help to identify any malfunctions such as leaks, high tanks levels, overflows, electrical malfunctions etc. Weekly inspections will also be undertaken for monitoring and measuring of sewage and effluent treatment functionality, this will be done in accordance with the weekly check sheet provided in Appendix 2b.

A perimeter bund and sumps will be placed at the WWTP to capture and contain any potential spills or contaminated storm water runoff.

Appropriate design, particularly distance to ground water levels, management, inspection and maintenance controls are expected to effectively mitigate the risk of potentially contaminated discharges from the WWTP.

11.1.3 Residual Risk to the Environment

After conducting a detailed risk assessment, the Licensee considers that the residual risk to the environment from potentially raw sewage discharges to land (soil contamination, seepage to groundwater or migration to surface waters) from the proposed WWTP is 'low' - given the distance from sources to potentially sensitive receptors and the proposed environmental controls to be implemented.

Given the depth to groundwater and distance to the nearest surface water, raw sewage is not expected to seep to groundwater or migrate to surface water. Alarm systems, inspections,

overflow mitigation, perimeter bund and sumps will minimise risks of spills and/or leaks. The risk to groundwater quality, surface water quality and any associated terrestrial ecosystems is therefore considered low.

11.2 Discharges to Land – Treated Effluent

11.2.1 Description of the Risk Event

Treated effluent from the WWTP will be discharged to a sprayfield area via a sprinkler system with the potential risk of elevated nutrient levels (eutrophication) in surface water and soils. The vertical distance to groundwater (at least 30 mbgl) minimises the risk of treated effluent reaching and contaminating groundwater.

11.2.2 Proposed Environmental Controls

Location siting, sizing of the sprayfield and ensuring appropriate effluent discharge quality are the key controls for minimising potential risks of elevated nutrient levels in soil from the discharge of treated effluent to land.

Calibre undertook a geotechnical and environmental study in 2024 (Appendix 3) to assess the general subsurface conditions across the site. Laboratory testing showed the soils to be moderately acidic, non-sodic and non-dispersive. Phosphorous Buffering Index (PBI) and Phosphorous Retention Index (PRI) results suggest that there is a potential for applied Phosphorus to move through the soil profile, however, the underlying clayey soils would limit the vertical movement of any potential leachate/irrigation water and movement during surface water flow events could occur.

The risk of irrigation has been assessed in general accordance with *Water Quality Protection Notice 22* (WQPN22). In terms of the risk from irrigation, the sprayfield is not within proximity to any surface water bodies or wetlands, including creek lines. Additionally, there is a sufficient separation distance between the sprayfield and any underlying groundwater, with this distance being in excess of the required 2m separation distance. The sprayfield is also outside of any identified PDWSA.

In accordance with Table 1 of WQPN22, the sprayfield would have a *Low eutrophication* risk, with a Risk Category of D. Category D soils provide good infiltration capacity and are suitable for controlled irrigation of treated effluent. These soils allow for percolation without excessive runoff while supporting nutrient removal through filtration and microbial activity within the soil profile.

Vegetation selected for the sprayfield is tolerant of elevated nutrient and salinity conditions and will actively utilise nitrogen and phosphorus contained in the applied effluent. The vegetation contributes to nutrient uptake, evapotranspiration, and improved stability of the irrigation area. Establishing deep-rooted grasses or native shrubs will further assist in maintaining hydraulic balance and preventing nutrient leaching.

The proposed WWTP will be appropriately designed and operated to treat sewerage and will ensure that the nutrient loads in treated effluent do not exceed targets specified in the National Water Quality Management Strategy (NWQMS) which outlines the *Australian Guidelines for Sewerage Systems – Effluent Management* (ANZECC 1997). See Table 11-1 for the NWQMS

discharge criteria. These criteria are considered appropriate for the eutrophication risk and the low risk to public health, amenity or the environment.

Treated effluent from the WWTP 2 will be discharged to a designated sprayfield irrigation area of 6.05ha. WWTP 1 will be discharged to a sprayfield of 2.86ha. These sprayfields are appropriately sized to ensure nutrient (nitrogen and phosphorus) application rates are appropriate for nutrient application criteria for risk Category D soils.

The sprinkler system at the sprayfield will be manually zoned to allow drying of certain areas as required from time to time. The sprinklers will be evenly spaced and allow for 360° rotation to ensure adequate distribution and maximum spread over the area to avoid soil saturation and pooling. A perimeter bund will be placed around the sprayfield to capture any potential runoff; and a perimeter fence will be installed to restrict access to the irrigation area. Seasonal variation in rainfall and evapotranspiration has been considered. During wet season conditions, irrigation scheduling and zone rotation will be adjusted to prevent waterlogging and ensure hydraulic loading does not exceed soil infiltration capacity.

Daily operational checks will be undertaken in accordance with the checklist provided in Appendix 2a, and weekly inspections as per Appendix 2b. This will include weekly inspections of the pipeline to the sprayfield area, checks for any pooling or malfunctioning sprinklers.

Table 11-1: Treated Effluent Discharge Quality Criteria and Target Values

Outputs	NWQMS Discharge Criteria	WWTP Target Value
5 day biological oxygen demand	20 – 30 mg/L	< 20 mg/L
Total suspended solids	25 – 40 mg/L	< 30mg/L
Total Nitrogen	20 – 50 mg/L	< 40mg/L
Total phosphorus	6 – 12 mg/L	< 10mg/L
pH	-	6.5 - 8.5
Residual free chlorine	-	0.2-2.0 mg/L
E. coli	< 10,000 cfu/100mL	< 1,000 cfu/100 mL

As per Section 4.5, monitoring of treated effluent quality will be undertaken monthly during TLO. Discharges volumes will be recorded weekly during operations.

11.2.3 Residual Risk to the Environment

After conducting a detailed risk assessment, the Licensee considers that the residual risk to the environment from treated effluent discharges to land (soil contamination, seepage to groundwater or migration to surface waters) from the proposed sprayfield is 'low' given the distance from sources to potentially sensitive receptors and the proposed environmental controls to be implemented.

Given the depth to groundwater and distance to the nearest surface water, treated effluent is not expected to seep to groundwater or migrate to surface water. In the unlikely event of potential excess irrigation runoff - the perimeter bund will assist in capturing and containing

this. The risk to groundwater quality, surface water quality and any associated terrestrial ecosystems is therefore considered low.

12 SUMMARY OF CONTROLS

Table 12-1: Summary of Controls

Key Emissions	Potential impacts	Proposed Controls	Section
Discharges to land – Raw Sewage/Treated Effluent	Nutrient enrichment of soil, waterways / groundwater from excess nutrient loading in treated effluent irrigation	**WWTP Facility** • Surface water management structures (e.g. perimeter bund, and sumps) will ensure any spills or potentially contaminated stormwater runoff are contained. • Daily operational checks will be undertaken in accordance with the checklist provided in Appendix 2a, and weekly inspections as per Appendix 2b. Maintenance in accordance with manufacturer requirements will be undertaken. • Overflow alarm systems installed and overflow mitigation tank design, to minimise risks of spills and/or leaks • Spill kit response will be provided at the facility. **Sprayfield Area** • The treated effluent will be disposed of to an appropriately sized sprayfield, in alignment with WQPN 22 guidance (DoW 2018). • A windrow will be placed along the access track to the sprayfield to separate LV's from the effluent pipeline; and a perimeter fence will be installed to restrict access to the irrigation area. • Nutrient loads in treated effluent do not exceed targets specified in the National Water Quality Management Strategy (NWQMS) which outlines the *Australian Guidelines for Sewerage Systems – Effluent Management* (ANZECC 1997). • Daily operational checks will be undertaken in accordance with the checklist provided in Appendix 2a, and weekly inspections as per Appendix 2b. This will include weekly inspections of the pipeline to the sprayfield area, checks for any pooling or malfunctioning sprinklers.	11

13 REHABILITATION AND CLOSURE

Closure plans document the most up to date closure knowledge base for the operation, outline the objectives that need to be met upon closure, set out the strategies to achieve the closure objectives and the criteria that will be used to assess the success of closure.

The Project Area will be decommissioned and rehabilitated in accordance with RTIO's closure objectives and completion criteria for the "infrastructure" closure domain; where closure measures will include:

- Where infrastructure requires removal, remove all structures and footings that are above surface or within 1 m of the final land surface
- Actively seek reuse and recycling opportunities for decommissioned infrastructure
- Dispose of inert materials are not retained, reused or recycled in an inert landfill area (may be a used pit area) and then cap landfill with at least 2 m of inert material
- Rehabilitate final surface in accordance with standard procedures, which includes:
    - deep rip the surface where required to address compaction;
    - add a layer of topsoil and subsoil where available; and
    - revegetate with an appropriate mix of species of local provenance

14 PROJECT COSTS

The following information has been provided to support the Total Works Approval Amendment Fee calculation of [redacted]

[redacted]

Table 14-2: Premise Components

Category	Capacity Range
54 – Sewage Facility	More than 200 but not more than 2000 cubic metres or more per day

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Appendix 1a

Basis of Design

Basis of Design

Project Details			
Client	RIO Tinto	**Client Contact**	[redacted]
Project Number	3057P01	**Contract/ PO Number**	
Project Description	Rhodes Ridge WWTP	**Site Location**	
Project Type	W-RBC142	**ABCO Project Manager**	
ABCO Document Number	3047AP01-E27-100	**Client Document Number**	

Version	Date	Prepared	Approved	Description
A	28/08/2025	[redacted]		Issued for Information
B	30/08/2025			Issued for Information

Contents

1.Introduction

This Basis of Design (BOD) document outlines the design philosophy, criteria, and key parameters for the proposed wastewater treatment plant (WWTP) and associated sprayfield irrigation system for the Rhodes Ridge FEED Project. The document defines influent and effluent quality requirements, unit process descriptions, and the adopted sizing methodology for the sprayfield, including consideration of both nutrient and hydraulic loading in accordance with Department of Health (WA) and Department of Water and Environmental Regulation (DWER) guidelines. It also details operational safeguards, environmental protection measures, and compliance monitoring arrangements to ensure that the facility achieves sustainable, reliable, and regulatory-compliant performance.

2.Wastewater Influent Specifications

Details		Units	Parameter
Influent Quality	Water source	-	Domestic strength sewage
	Number of Person	P	380
	Wastewater Rate	L/P/D	310
	Daily Flow	m^3/ day	118
	DMI Backwash	m^3/ day	24
	Total Daily Flow	m^3/ day	142
	Hourly Flow	m^3/ hr	6.0
	Peak flow[1]	m^3/ hr	59
	Temperature[3]	°C	15~32
	BOD_5	mg/l	<300
	TSS	mg/l	<300
	pH	pH units	6.5~8.5
	TN	mg/l	< 80
	TP	mg/l	<15
	FOG[3]	mg/l	<20

3.Wastewater Effluent Specifications

Details		Units	Parameter		
Quality	Exposure risk level	-	WWTP	RO Reject	Combined Effluent
	Daily Flow	m^3/ day	142	57	199
	Hourly Flow	m^3/ hr	6.0	2.4	8.4
	BOD	mg/l	<20	0	<20
	TSS	mg/l	<30	0	<30
	pH	pH units	6.5~8.5	8-9	6.5-8.5
	TN	mg/l	< 40	0	<40
	TP	mg/l	<10	0	<10
	E Coli	cfu/100mL	<1,000	0	<1000
	Free chlorine	mg/l	0.2~2.0	0	0.2-2.0
Spray Field	Flow	m^3/day		57	199
	Max. nutrient loading	Kg TN/ha/year Kg TP/ha/year			480 120
	Area[3]	m^2			120
	Hydraulic loading	mm/day			3.3
	Sprinklers	-			58 x 15m radius full spray 14 x 15m radius half spray nozzles, impact type, on 0.9 m risers

4.Sprayfield Design Flowrate

Parameter	Value
WWTP Effluent	142 m^3/day (includes backwash from RO Filter)
RO Brine	57 m^3/day
Blended Total	199m^3/day

5.System overview

The wastewater treatment process is based on Rotating Biological Contactor (RBC) technology, which provides a reliable fixed-film method for biological treatment. Raw sewage is first screened and settled to remove coarse solids and grit, then equalised in a balance tank to smooth out diurnal flow variations. From there, the flow passes through an anoxic zone (MLR tank) to promote denitrification before entering the RBC units.

Within the RBCs, wastewater is biologically treated as rotating discs support the growth of a biofilm that alternately contacts air and wastewater, enabling effective oxidation of organic matter and nutrients. Downstream, a lamella clarifier separates suspended solids, with settled biomass returned for further treatment and the clarified effluent conveyed forward.

The treated effluent is disinfected before being discharged to the irrigation system and spray field, where soil and vegetation provide final polishing and beneficial reuse. Sludge generated during the process is thickened and dewatered using geo bags for simplified handling and disposal.

Continuous monitoring, automated controls, and adherence to regulatory requirements ensure the plant operates efficiently, meets performance targets, and protects the receiving environment.

5.1.System design parameters

5.1.1. Primary subsystems

In the subsequent sections, you will find a concise explanation of the main subsystems and assemblies that make up this system. Additionally, it outlines the sequential order in which feedwater passes through the subsystems during the processing phase. The details concerning the individual components utilised within these subsystems have been generated and provided by third-party vendors responsible for manufacturing the said components.

5.2.Process Description

5.2.1. Inlet works facility (pumpstation)

Raw sewage is fed to the WWTP from a pump station sized to absorb the incoming flows. The pumpstation is fitted with grinder pumps operating on duty/standby with control panel, guide rails and an external valve pit.

5.2.2. Balance tank

The raw sewage is then pumped from the pumpstation to the balance tank via a bar screen which screens any incoming solids. The balance tank provides suitable retention to cater for variations in the diurnal flows.

5.2.3. Sedimentation Tank

From the balance tank, the screened influent is transferred to the Sedimentation Tank by the balance pump, after which the clarified overflow passes by gravity to the MLR tank. The Sedimentation Tank allows suspended solids to settle, reducing the load on downstream treatment processes. The settled solids are collected at the base of the tank and directed for further handling or sludge processing..

5.2.4. MLR Tank

MLR tank also known as the anoxic tank receives screened sewage from the sedimentation tank and mixed liquor from the break tank. The tank allows nitrate-specific bacteria to use nitrate (NO3) as an oxygen source and a nutrient in a

process called de-nitrification. De-nitrification occurs when oxygen levels are depleted, and nitrate becomes the primary oxygen source for microorganisms.

5.2.5. Rotating Biological Contactor

The wastewater is then fed by gravity from the MLR Tank via flow divider to the Rotating Biological Contactors (RBC) units, which are known as one of the reliable fixed film technologies, where biological treatment is conducted. Coagulant is introduced at a fixed rate prior to the RBCs to aid reduction of Total Phosphorous and improve settling in the clarifier. The RBCs are rotated slowly through a direct drive reduction gearbox and is arranged so that around 40% proportion of its surface area is submerged in the effluent at any time. As the RBC rotates, the surface of the media is subjected alternately to sewage and air, encouraging an aerobic, biologically active film of micro-organisms (biomass) to become established on each side of the media sheets. The system includes a series of PVC discs mounted on a steel shaft, rotating slowly at approximately 3–4 rpm, with about 40% of the disc surface area submerged in the wastewater at any given time. This configuration promotes the growth of a biologically active film of microorganisms on the discs. As the discs rotate, the biofilm alternately contacts wastewater and air, enabling efficient degradation of organic matter. The microorganisms consume pollutants (measured as BOD) as a food source, multiply, and maintain a biofilm thickness of approximately 1–2.5 mm, which supports stable treatment performance. Excess biomass sloughs off naturally, remains in suspension, and is carried forward to the break tank for further processing.

5.2.6. Break Tank

Mixed Liquor from the RBC's then is fed into the break tank by means of gravity. To improve nutrient reduction a portion of the mixed liquor from the break tank is returned to the MLR Tank for further treatment whilst the remainder is fed forward to the lamella clarifier for solids removal.

5.2.7. Lamella Clarifier

Mixed Liquor enters the lamella clarifiers by means of gravity from the break tank. The lamella clarifiers remove heavier solids by means of settlement and separation from the liquid phase. It is designed to have a large surface area with adequate retention time. The hopper bottom channels the sediment to the centre of the tank and is returned via the RAS pump to Sedimentation Tank. Clear liquor from the top of the Clarifier then overflows by gravity into the lift tank.

5.2.8. Lift Tank

Gravity conveys clarified water from the Lamella clarifiers to the lift tank, positioned just below the clarifier outlets. Within this tank, you will find both duty and standby pumps responsible for transferring the clarified water to the irrigation tank for the next stage of processing.

5.2.9. Irrigation Tanks

Within the irrigation tanks, the treated effluent undergoes chlorination directly within a recirculation line before being discharged. After chlorination, this treated water is pumped to the irrigation field using the irrigation pumps. To monitor the volume of treated water distributed to the irrigation field, a flowmeter has been installed.

5.2.10. Sludge Handling System (Geo Bags)

The sludge handling system using Geo Bags manages waste activated sludge (WAS) by automatically pumping it from the Sedimentation tank into large, permeable bags that separate water from solids. Two bags are used in rotation—while one is being filled, the other is left to drain and dry—allowing continuous operation. As the sludge sits in the bags, water drains out through the fabric, reducing the volume and leaving behind thickened solids. Once dried, the sludge is

removed for disposal, making the process simple, cost-effective, and low-maintenance compared to mechanical dewatering methods. The supernatant from the Geo Bags will be returned to the balance tank by gravity.

5.2.11. Sprayfield

Following disinfection and blending with RO reject in the irrigation tanks, the treated effluent is pumped to the sprayfield using an irrigation pump. The pump is fitted with level controls, flow monitoring, and alarms to ensure reliable and consistent operation.

The sprayfield is divided into multiple irrigation zones, each supplied by distribution piping and isolation valves. This arrangement allows for selective operation of zones, rotation to avoid overloading, and simplified maintenance. Above-ground sprinklers mounted on risers distribute the blended effluent uniformly across the sprayfield.

The sprayfield is enclosed with fencing and safety signage, with a minimum 5 m setback beyond the sprinkler throw to manage drift. Vehicle access tracks are provided around the perimeter for ease of inspection and maintenance. This system ensures controlled land application of treated effluent and brine, delivering regulatory compliance and supporting sustainable vegetation growth.

6.Sprayfield Sizing and RO Brine Blending

6.1.Design Basis

The wastewater treatment plant (WWTP) is designed to manage both treated effluent and reverse osmosis (RO) reject brine. The disposal method is via irrigation over a dedicated sprayfield. The sprayfield has been sized in accordance with Department of Health (WA) Guidelines for the Non-potable Uses of Recycled Water (2011) and the Department of Water Water Quality Protection Note 22: Irrigation with Nutrient-rich Wastewater (2008). These guidelines specify that irrigation areas must be designed to avoid ponding, runoff, or nutrient leaching, with hydraulic application rates typically around 3 mm/day for continuous application. For coarse-grained Pilbara soils (Category D), a design rate of 3.3 mm/day has been adopted, consistent with accepted practice for camp-based WWTPs.

6.2.Design Inputs

- WWTP effluent volume: 142 m^3/day
- Effluent quality (design targets): TN ≤ 40 mg/L, TP ≤ 10 mg/L
- RO reject (brine): 57 m^3/day (assumed negligible nutrient content for TN and TP)
- Total combined discharge to sprayfield: 199 m^3/day
- Hydraulic loading target: 3.3 mm/day (per WA DoH/DoW guidance)

6.3.Nutrient Loading Assessment

Nutrient loadings are based on effluent quality and WWTP discharge volume. RO reject is conservatively assumed to contribute no measurable TN or TP.

6.3.1. Daily nutrient loadings:

TN = 142,000 L/day × 40 mg/L = 5.68 kg/day

TP = 142,000 L/day × 10 mg/L = 1.42 kg/day

6.3.2. Annual nutrient loadings:

TN = 5.68 × 365 = 2,073 kg/yr

TP = 1.42 × 365 = 518 kg/yr

6.3.3. Allowable application rates (Category D soils, WA DoH 2011):

TN = 480 kg/ha·yr

TP = 120 kg/ha·yr

6.3.4. Minimum land application areas required:

TN = 2,073 ÷ 480 = 4.32 ha

TP = 518 ÷ 120 = 4.32 ha

Nutrient-based minimum sprayfield size: 4.32 ha

6.4.Hydraulic Loading Assessment

Hydraulic loading is calculated against the 3.3 mm/day design limit.

- Combined discharge = 199 m³/day
- Required area = 199 ÷ 0.0033 = 6.03 ha

Rounded for operational design, the adopted hydraulic-based area is 6.05 ha.

Hydraulic-based minimum sprayfield size: 6.05 ha

6.5.Adopted Sprayfield Area

The hydraulic criterion governs the sprayfield size. To ensure resilience, seasonal flexibility, and rotation capability, the final sprayfield size is adopted as:

- Final design sprayfield size: 6.05 ha

This exceeds the nutrient-based requirement and aligns with guideline-recommended hydraulic limits.

6.6.RO Brine Blending Consideration

The RO reject stream is blended with disinfected effluent before irrigation. While nutrients are negligible in the reject, the brine elevates total dissolved solids (TDS).

6.6.1. TDS Blending Calculation (Design)

Inputs

- Reject volume = 57 m³/d (57,000 L/d)
- Reject TDS = 2,474 mg/L
- Effluent volume = 142 m³/d (142,000 L/d)
- Effluent TDS = 600 mg/L

Mass balance

- Reject mass = 57,000 L × 2,474 mg/L = 141,018,000 mg
- Effluent mass = 142,000 L × 600 mg/L = 85,200,000 mg
- Total volume = 199,000 L
- Total TDS mass = 226,218,000 mg

Result

Blended TDS = 226,218,000 ÷ 199,000 = ≈ 1,137 mg/L

This blended TDS is within the tolerance of native vegetation typically used in Pilbara sprayfields. Operational monitoring will confirm ongoing suitability.

6.7.Sprayfield Layout, Soil and Vegetation Considerations

The sprayfield is situated on coarse-grained Category D soils, which provide good infiltration capacity and are suitable for controlled irrigation of treated effluent. These soils allow for percolation without excessive runoff while supporting nutrient removal through filtration and microbial activity within the soil profile.

Vegetation selected for the sprayfield is tolerant of elevated nutrient and salinity conditions and will actively utilise nitrogen and phosphorus contained in the applied effluent. The vegetation contributes to nutrient uptake, evapotranspiration, and improved stability of the irrigation area. Establishing deep-rooted grasses or native shrubs will further assist in maintaining hydraulic balance and preventing nutrient leaching.

Seasonal variation in rainfall and evapotranspiration has been considered. During wet season conditions, irrigation scheduling and zone rotation will be adjusted to prevent waterlogging and ensure hydraulic loading does not exceed soil infiltration capacity.

6.7.1. Operational Buffers and Contingency

The adopted sprayfield size of 6.05 ha exceeds the minimum nutrient-based requirement of 4.32 ha. This additional capacity provides:

- Flexibility for rotation of irrigation zones.
- Contingency during periods of reduced infiltration (e.g. following rainfall).
- Operational resilience to prevent ponding, drift, or overloading.

This design approach ensures the sprayfield remains compliant and functional under both normal and peak conditions.

6.7.2. Environmental Safeguards

The sprayfield provides final polishing of the effluent through natural soil processes and vegetation uptake. As effluent percolates through the soil, residual contaminants are reduced through physical filtration, chemical binding, and microbial degradation. This multi-barrier approach provides added environmental protection.

A minimum 5 m setback beyond sprinkler throw is maintained around the perimeter to manage drift. The area is fully fenced with warning signage to prevent unauthorised access. Vehicle access tracks are provided around the perimeter to enable inspection and maintenance.

6.8.Compliance and Monitoring

Compliance will be achieved through ongoing monitoring of the effluent quality, sprayfield operation, and receiving environment in accordance with Department of Water and Environmental Regulation (DWER) licence conditions. Key measures include:

- Effluent monitoring: Routine sampling of TN, TP, BOD, TSS, pH, E. coli, and TDS prior to irrigation.
- Operational monitoring: Flow metering, pump performance checks, and zone rotation scheduling to confirm even application.
- Soil and vegetation checks: Periodic assessment of soil salinity and vegetation health to confirm sustainability of irrigation practices.

6.9.Seasonal Operation Strategy

The sprayfield will be managed to account for climatic and seasonal variations. During the wet season, when rainfall is high and infiltration capacity is reduced, irrigation scheduling will be adjusted and zones rotated more frequently to prevent waterlogging. Where necessary, irrigation flows may be temporarily reduced, with storage capacity in the irrigation tanks used to balance inflows. During the dry season, irrigation schedules will be optimised to ensure vegetation receives sufficient water and nutrients, supporting sustainable uptake and maintaining vegetation cover year-round.

6.10.Groundwater and Surface Water Protection

The sprayfield design incorporates safeguards to protect groundwater and nearby surface water receptors. Application rates are limited to ensure infiltration occurs within the root zone, preventing nutrient and salinity leaching. The Category D soils provide high permeability and are suitable for controlled effluent application without ponding. Buffer distances are maintained to sensitive receptors such as drainage lines or surface water bodies, in line with Department of Health and DWER guidance. If required, monitoring bores will be installed to track groundwater quality in the vicinity of the sprayfield.

6.11.Public Health and Buffer Distances

The sprayfield is designed with public health protection measures in accordance with WA Department of Health guidelines. A minimum 5 m buffer is maintained beyond the sprinkler throw radius to manage drift, and fencing with signage ensures unauthorised personnel do not access the sprayfield. Additional setback distances to camp facilities, roads, and watercourses will be observed as required by regulatory guidance, ensuring compliance with exposure risk levels and minimising potential for human contact.

6.12.Operational Contingency and Storage

The irrigation tanks provide short-term storage capacity to accommodate fluctuations in flow and temporary non-irrigation periods, such as during heavy rainfall or pump maintenance. This contingency allows irrigation to be paused without breaching hydraulic limits on the sprayfield. Combined with the 6.05 ha adopted sprayfield area, this approach ensures operational resilience under both normal and peak conditions.

6.13.Instrumentation, Control, and Monitoring Systems

The sprayfield and associated irrigation system are supported by instrumentation and control measures to ensure reliable and safe operation. Key systems include:

- Flowmeters and pressure gauges to confirm irrigation rates and detect blockages or failures.
- Free chlorine residual monitoring within the irrigation tanks to ensure disinfection compliance.
- Alarm systems for pump performance and tank levels.
- Telemetry integration to enable remote monitoring, control, and data recording.

These systems ensure continuous compliance with performance requirements and provide early warning of operational issues.

6.14.Compliance Summary

- Nutrient-based minimum area: 4.32 ha

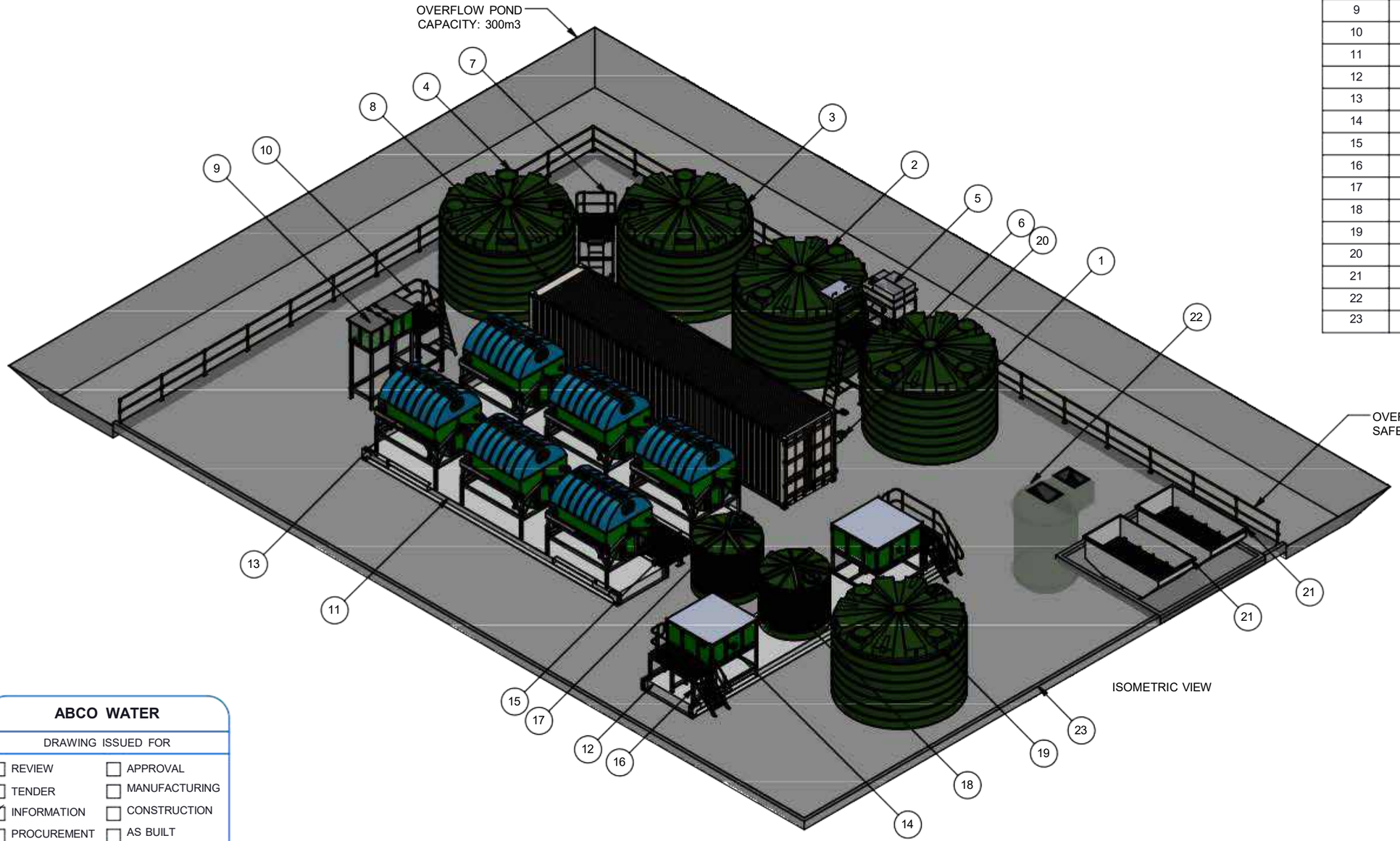
- Hydraulic-based minimum area: 6.05 ha
- Adopted sprayfield size: 6.05 ha

This design ensures compliance with WA Department of Health (2011) recycled water guidelines, Department of Water WQPN 22 (2008), and satisfies the regulatory requirements of the Department of Water and Environmental Regulation (DWER).

Appendix 1b

WWTP Design and Process Flow

ITEM NO.	DESCRIPTION	QTY.
1	WWTP BALANCE TANK-1 (50KL POLY)	1
2	WWTP BALANCE TANK-2 (50KL POLY)	1
3	WWTP SEDIMENTATION TANK (50KL POLY)	1
4	WWTP MLR TANK (50KL POLY)	1
5	TANK ACCESS PLATFORM WITH SCREENBOX	1
6	WHEELIE BIN / LONGOPAC	1
7	TANK ACCESS PLATFORM	1
8	40FT HC SEA CONTAINER	1
9	WWTP RBC FLOW DIVIDER	1
10	WWTP FLOW DIVIDER ACCESS PLATFORM	1
11	40FT FLATRACK CONTAINER (RBC)	2
12	40FT FLATRACK CONTAINER (CLARIFIER)	1
13	ROTATING BIOLOGICAL CONTACTOR (RBC)	6
14	LAMELLA CLARIFIER	2
15	RBC FLATRACK ACCESS PLATFORM	1
16	LAMELLA CLARIFIER ACCESS PLATFORM	2
17	WWTP BREAK TANK (9KL POLY)	1
18	WWTP LIFT TANK (9KL POLY)	1
19	WWTP IRRIGATION TANK (50KL POLY)	1
20	SAFETY SHOWER & EYE WASH STATION	1
21	GEOBAG SKIP BIN 6M3	2
22	WWTP PUMP STATION	1
23	WWTP CONCRETE PAD	1



ISOMETRIC VIEW

ABCO WATER

DRAWING ISSUED FOR

- ☐ REVIEW
- ☐ APPROVAL
- ☐ TENDER
- ☐ MANUFACTURING
- ☑ INFORMATION
- ☐ CONSTRUCTION
- ☐ PROCUREMENT
- ☐ AS BUILT

SIGNATURE | DATE

	BY	DATE
DESIGNED	RT	27-08-25
DRAWN	SP	27-08-25
CHECKED	RT	27-08-25
APPROVED	BD	27-08-25

THIRD ANGLE PROJECTION

REFERENCES

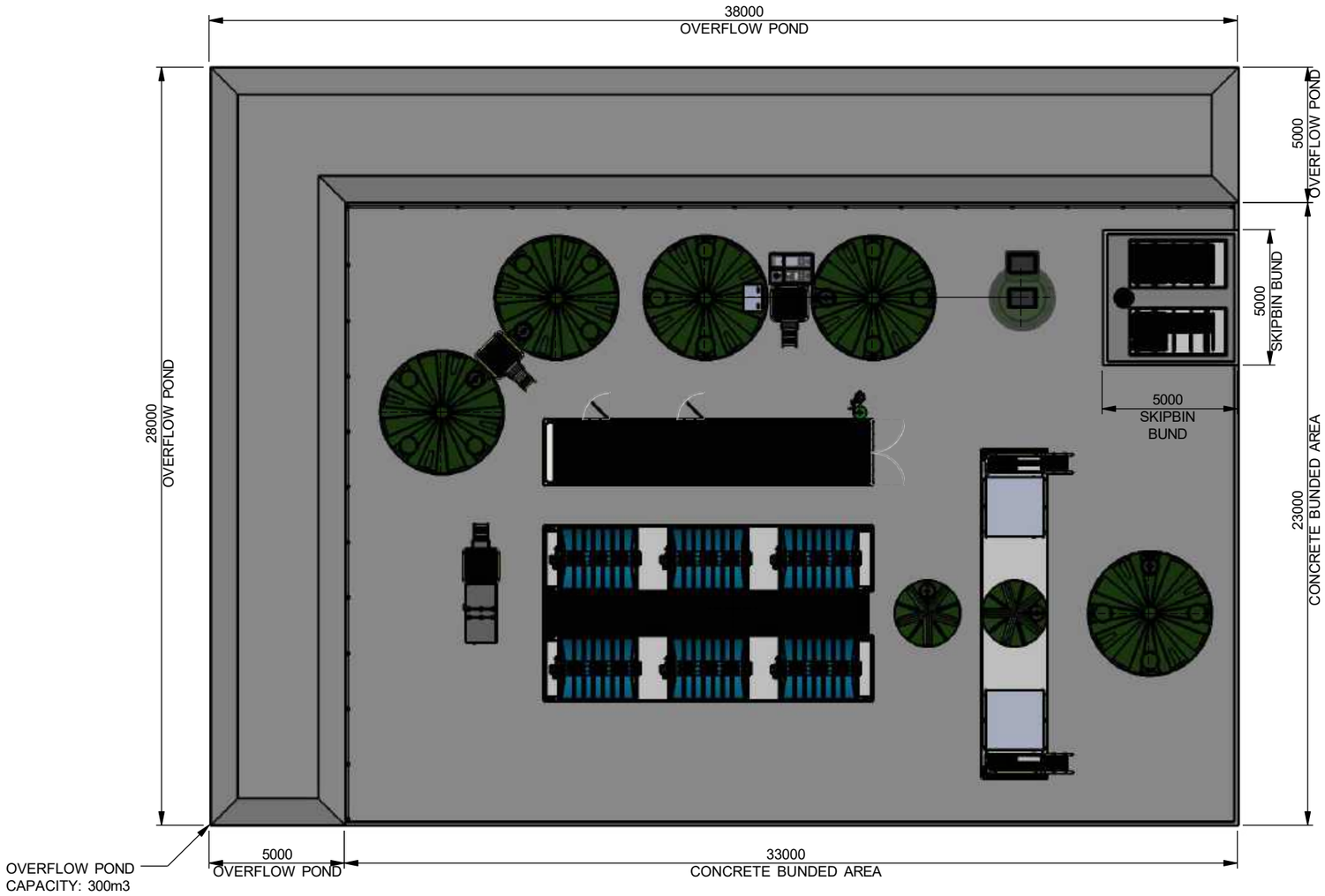
REV	BY	DATE	DESCRIPTION	CHK	APP
B	SP	02-09-25	ISSUED FOR INFORMATION	RT	BD
A	SP	27-08-25	ISSUED FOR INFORMATION	RT	BD

17 BRANT ROAD KEMBLA WESTERN AUSTRALIA 6111
www.abco.net.au (08) 9399 1662

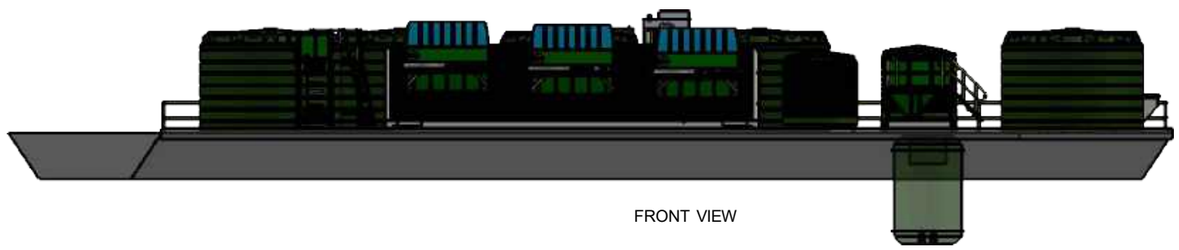
TITLE:
RIO TINTO
RHODES RIDGE EXPANSION WWTP FEED
W-RBC155 WASTE WATER TREATMENT PLANT
GENERAL ARRANGEMENT DRAWING-01

JOB/PROJECT NO: 3057P01 | **DWG NO:** 3057P01-E26AA-100

SCALE: 1:100 | **SHT SIZE** A3 | **SHEET:** 1 OF 2 | **REV** B



TOP VIEW



FRONT VIEW

ABCO WATER

DRAWING ISSUED FOR

- ☐ REVIEW
- ☐ APPROVAL
- ☐ TENDER
- ☐ MANUFACTURING
- ☑ INFORMATION
- ☐ CONSTRUCTION
- ☐ PROCUREMENT
- ☐ AS BUILT

SIGNATURE: BD

DATE:

	BY	DATE
DESIGNED	RT	27-08-25
DRAWN	SP	27-08-25
CHECKED	RT	27-08-25
APPROVED	BD	27-08-25

THIRD ANGLE PROJECTION

REFERENCES

REV	BY	DATE	DESCRIPTION	CHK	APP
B	SP	02-09-25	ISSUED FOR INFORMATION	RT	BD
A	SP	27-08-25	ISSUED FOR INFORMATION	RT	BD

abco water
MAKING WATER RIGHT
17 BRANT ROAD KENSCOTT WESTERN AUSTRALIA 6111
www.abco.net.au (08) 9399 1662

TITLE:
RIO TINTO
RHODES RIDGE EXPANSION WWTP FEED
W-RBC155 WASTE WATER TREATMENT PLANT
GENERAL ARRANGEMENT DRAWING-02

JOB/PROJECT NO: 3057P01 | **DWG NO:** 3057P01-E26AA-200

SCALE: 1:50 | **SHT SIZE** A3 | **SHEET:** 2 OF 2 | **REV** B

LINE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15 (a/b)	16 (a/b)	17	18	19 (a/b)	20 (a/b)	21	22	23	24	25	26	27	28	29	30	Remarks
FLOW (m^3/hr)	35	24	59	59	59	N/A	18	59	6	18	18	6	12	18	9	9		15	3	3	18	18	18	18	0.4	6	5 L/hr	20	2.4	24	* Daily flow based on 380 person, 310 L/P/D plus DMI Backwash
FLOW (m^3/day)	118	24	142	142	142	N/A	-	142	142			142	284	426	213	213		-	71	71	-	-	-	-		-		-	57	199	* Hourly Peak Flow Rate: (6 times of average flow for 1 hr)
PH	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		-	0.00	0.00	0	0	-	-		0		0	6.5-8.5	6.5-8.5	* : WAS Should be (5mins on & 180 mins off)
৳ (ppm)	<300	-	<300	<300	<300	-	-	<300	<300	<300	0.00	<300	<300	<300	<300	<20		-	<20	<20	<300	<300	-	-		<20		<20	0	<20	* :The Best value for WAS Should be Found during normal operation.
TSS (ppm)	<300	<300	<300	<300	<300	-	-	<300	<300	<5000	<5000	<300	<300	<1000	<1000	<1000		-	<1000	<30	<5000	<5000	-	-		<30		<30	0	<30	* : RAS Should be (3 mins on & 60 mins off) at Commissioning
TN (ppm)	<80	-	<80	<80	<80	-	-	<80	<80	<80	<80	<80	<80	<80	<80	<80		-	<80	<40	<80	<80	-	-		<40		<40	0	<40	* :RAS can be readjusted regarding to operation requirement
TP (ppm)	<15	-	<15	<15	<15	-	-	<15	<15	<15	<15	<15	<15	<15	<15	<15		-	<15	<10	<15	<15	-	-		<10		<10	0	<10	* : RAS working intervally depends on process condition
FOG (ppm)	<20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-		-		-		-	
CHLORINE (ppm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-		-		0.5-2	0	0.5-2	
E-COLI (cfu/100ml)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-		-		-	-	<1000	

MAINTENANCE

AB-COAG-100

12.5% Sodium

CAMP WASTEWATER

DMI BACKWASH

ABCO WATER SYSTEMS

DRAWING ISSUED FOR

[x] REVIEW	[ ] APPROVAL
[ ] TENDER	[ ] MANUFACTURING
[ ] INFORMATION	[ ] CONSTRUCTION
[ ] PROCUREMENT	[ ] AS BUILT

SIGNATURE: BD | DATE:

BAR SCREEN SCR-101

WHEELIE BIN BIN101

BALANCE TANK-1 50kL POLY TK101

BALANCE FLOW

BALANCE TANK-3 50kL POLY TK102

PUMP PU103A

PUMP PU103B

MIXING PUMP PU102

GRAVITY OVERFLOW

SEDIMENTATION TANK 50kL POLY TK103

MLR TANK 50kL POLY TK104

SKIP BIN-2 GEO SLUDGE BAG

SKIP BIN-1 GEO SLUDGE BAG

SLOPE TO DRAIN PIT

WAS PUMP PU106

PUMP PU101A

PUMP PU101B

PUMP STATION PUS101

MLR PUMP PU104

COAGULANT DOSING PUMP PU105

COAGULANT DOSING TANK TK105

LAMELLA CLARIFIER TK108

LAMELLA CLARIFIER TK109

RBC105

RBC103

RBC101

RBC106

RBC104

RBC102

RBC FLOW DIVIDER TK106

RO REJECT

TO SPRAYFIELD

STRAINER STR101A

STRAINER STR101B

TRANSFER PUMP PU112A

TRANSFER PUMP PU112B

OVERFLOW

TREATED WATER TANK 50kL POLY TK111

RECIRC PUMP PU111

PUMP PU110A

PUMP PU110B

LIFT TANK 9kL POLY TK110

CHLORINE DOSING PUMP PU112

CHLORINE DOSING TANK TK112

PUMP PU108

BREAK TANK 9kL POLY TK107

RAS PUMP PU109

	BY	DATE
DESIGNED	RT	25-08-25
DRAWN	SH	25-08-25
CHECKED	RT	25-08-25
APPROVED	BD	25-08-25

THIRD ANGLE PROJECTION

REFERENCES

REV	BY	DATE	DESCRIPTION	CHK	APP
B	SH	30-08-25	MINOR TYPO FIXED	RT	BD
A	SH	25-08-25	ISSUED FOR REVIEW	RT	BD

abco water MAKING WATER RIGHT
17 BRANT ROAD, KELMSCOTT
WESTERN AUSTRALIA 6111
www.abco.net.au (08) 9399 1662

TITLE:
RIO TINTO
RHODES RIDGE EXPANSION WWTP FEED
W-RBC142 WASTEWATER TREATMENT PLANT
PROCESS FLOW DIAGRAM (PFD)

JOB/PROJECT NO: 3057P01 | **DWG NO:** 3057P01-AJ-000

SCALE: NTS | **SHT SIZE** A3 | **SHEET:** 1 OF 1 | **REV** B

Appendix 2a

Daily Inspection Check Sheet

Client	RioTinto
Asset ID	3001CP01
Asset Description	MLE095-Rio Tinto-Ti Tree
Email Logs weekly to	service@abcowater.com.au

Daily Log Sheet

	Item Description	Tag #	Unit	Set Point	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	Date		dd/mm/yy	-							
2	Operators Name	N/A	Name	-							
3	Is the safety shower operating?	N/A	Y/N	Y							
4	Odour Levels (Strong/ medium/ Weak)	N/A	~	W							
5	Are any leaks present?	N/A	Y/ N	N							
6	Is the Bar Screen operational?	SCR101	Y/N	Y							
7	Is the inlet screen Shute clear of any blockages	SCR101	Y/ N	Y							
8	Is Container clean?	N/A	Y/ N	Y							
9	Is Area clean?	N/A	Y/ N	Y							
10	Are any alarms present ?	N/A	Y/ N	N							
11	Has the inlet bin been emptied ?	N/A	Y/ N	Y							
12	Are there chemicals in storage ?	N/A	Y/ N	Y							
8	Is the Feed Pump A Operational?	PU101A	Y/ N	Y							
9	Is the Feed Pump B Operational?	PU101B	Y/ N	Y							
10	Is ANOXIC Tank Mixer operating?	MX101	Y/ N	Y							
11	Is AEROBIC Tank Mixer operating?	MX102	Y/ N	Y							
12	Is MLR Pump operating?	PU102	Y/ N	Y							
15	Is MIXER Pump operating?	PU105	Y/ N	Y							
16	Is Blower operating?	BL101	Y/ N	Y							
17	Is Media Filter Pump 1 Operating?	PU201A	Y/ N	Y							
18	Is Media Filter Pump 2 Operating?	PU201B	Y/ N	Y							
19	Is RAS/WAS Pump Operating?	PU202	Y/ N	Y							
20	Is Media Filter Head Valve Operating?	MF201	Y/ N	Y							
21	Is Sump Pump Operating?	PU203	Y/ N	Y							
22	Is GEO Sludge Bag in a good Operational Mode	GB201A	Y/ N	Y							
23	Is GEO Sludge Bag in a good Operational Mode	GB201B	Y/ N	Y							
24	Is Irrigation Pump 1 Operating?	PU301A	Y/ N	Y							
25	Is Irrigation Pump 2 Operating?	PU301B	Y/ N	Y							
26	Is Recirc Pump Operating?	PU302	Y/ N	Y							
13	Is AB-CORRECT-100 Dosing pump operating?	PU103	Y/ N	Y							
14	Is AB-COAG-100 Dosing pump operating?	PU104	Y/ N	Y							
27	Is Chlorine Dosing Pump Operating?	PU303	Y/ N	Y							
28	Is Electrochlorination System Operating?	AIT304	Y/ N	Y							
29	Is Water Chiller Operating?	TK302	Y/ N	Y							
30	Is Regenerative Softener Operating?	RS301	Y/ N	Y							
	Comments										

Client	RioTinto
Asset ID	3001CP01
Asset Description	MLE095-Rio Tinto-Ti Tree
Email Logs weekly to	service@abcowater.com.au

Daily Log Sheet

	Item Description	Tag #	Unit	Set Point	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Process Checks											
31	Raw Feed water Flow rate?	FIT101	m^3/hr	4.0							
32	Feed Water pH (Handheld Tools)	VW-047	pH	6-8.5							
33	Aeration Tank pH	AIT101	pH	6-8.5							
34	Colour of Mixed Liqour inside Aeration Tank	TK103	Colour	Light Brown							
35	Mixed Liquor Flow Rate	FIT102	m^3/hr	8							
36	Sludge Settle Volume (SSV)	TK103	mg/L	250-350							
37	Mixed Liquor Suspended Solids (MLSS)	TK103	mg/L	2500-3500							
38	Aeration Tank DO Level	AIT102	mg/L	0.3-2							
39	Is water clear over the Lamella Wier?	TK201	Y/ N	Y							
40	Has the clarifier been drained and cleaned (Once a Week - Ideally Sunday)	VW-014/VW-015/VW016	Y/ N	Y							
41	Quality of effluent going over clarifier weir	TK201	Clear / Cloudy / Dirty	Clear							
42	Break Tank Level	TK202	%	>30							
43	Media filter inlet pressure	PI201	Kpa	4-500							
44	Irrigation Tank level	TK301	%	>30							
45	Sprayfield Totalised Flow	FIT301	m^3	-							
46	AB-COAG-100 Tank Level?	TK105	%	>30							
47	AB-COAG-100 Dosing Rate?	PU104	%	2-12%							
48	AB-CORRECT-100 Tank Level?	TK104	%	>30							
49	AB-CORRECT-100 Dosing Rate?	PU103	%	1-10%							
50	Chlorine Tank level	TK304	%	>30							
51	Salt Saturated Tank level	TK303	%	>30							
52	Electrochlorination Air Flow	FI	Y/N	Y							
53	Is there any build up on the electro chlorinator fins	AIT304	Y/ N	N							
54	Treated water ORP level	AIT302	mV	350							
55	Treated Effluent Handheld ORP reading	VW-052	mV	350							
56	Treated Effluent Handheld Chlorine reading	VW-052	ppm	0.5-2							
57	Treated Effluent Handheld ph reading	VW-052	pH	6.5 - 8.5							
58	Treated Effluent Water Quality	VW-052	Clear / Cloudy / Dirty	Clear							
	Comments										

Appendix 2b

Weekly Inspection Check Sheet

CHECKLIST TEMPLATE ID	NAME	LINE NUMBER	IFMSBM_ MINUTES	INSTRUCTIONS	MANDATORY
241-CON-0091	0091 D - WWTP - Rotating Biological Contac	10	60	Engage Contractor to perform Quarterly Waste Water Service.	Yes
241-CON-0091	0091 D - WWTP - Rotating Biological Contac	20	60	RBC - Check to see if the level of the PlanetDISK unit is even at all 4 corners using a spirit level.	Yes
241-CON-0091	0091 D - WWTP - Rotating Biological Contac	30	60	RBC - Check the oil level in the reduction gearbox. Top up if necessary.	Yes
241-CON-0091	0091 D - WWTP - Rotating Biological Contac	40	60	Plant - General inspection and service of the plant. Prepare a quarterly report to satisfy the license conditions noting equipment condition, effluent quality, faults, recommended maintenance to be performed, abnormal noise/vibration of pumps etc, and sub	Yes
241-PLB-0001	0001 D - WWTP - Rotating Biological Contact	10	2	Check all warning lights (fault lights) and rectify findings.	Yes
241-PLB-0001	0001 D - WWTP - Rotating Biological Contact	20	10	Check general operation of the plant.	Yes
241-PLB-0001	0001 D - WWTP - Rotating Biological Contact	30	2	Record daily flow meter readings.	Yes
241-PLB-0001	0001 D - WWTP - Rotating Biological Contact	40	5	Check cleanliness of plant area.	Yes
241-PLB-0001	0001 D - WWTP - Rotating Biological Contact	50	3	Repair, replace and report damaged equipment.	Yes
241-PLB-0001	0001 D - WWTP - Rotating Biological Contact	60	5	Check level of PAC solution and fill tank when necessary	Yes
241-PLB-0001	0001 D - WWTP - Rotating Biological Contact	70	3	Check level of chlorine liquid and fill tank when necessary	Yes
241-PLB-0001	0001 D - WWTP - Rotating Biological Contact	80	10	Complete daily RBC WWTP log sheet.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	10	2	Check all warning lights (fault lights) and rectify findings.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	20	10	Check general operation of the plant.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	30	2	Record daily flow meter readings.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	40	5	Check cleanliness of plant area.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	50	3	Repair, replace and report damaged equipment.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	60	5	Check level of PAC solution and fill tank when necessary	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	70	3	Check level of chlorine liquid and fill tank when necessary	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	80	10	Complete daily RBC WWTP log sheet.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	90	3	Visually check for crust build up and record status.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	100	5	Clean all level and alarm floates both in the WWTP and pump stations.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	110	5	Check operation of all pumps and disc rotation.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	120	5	Check operation status of all valves and their condition.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	130	3	Check correct operation of the alarm system.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	140	3	Check correct function of seals on inspection chambers.	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	150	5	Clarifier - Skim floating sludge off the surface of the final clarifier and dispose it	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	160	5	Check and clean grease trap ?	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	170	3	RBC - Check the rotor operation turning it by hand from both cages	Yes
241-PLB-0007	0007 D - WWTP - Rotating Biological Contact	180	3	RBC - Check rotors for normal operation (sight and sound) of the system	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	10	2	Check all warning lights (fault lights) and rectify findings.	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	20	10	Check general operation of the plant.	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	30	2	Record daily flow meter readings.	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	40	5	Check cleanliness of plant area.	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	50	3	Repair, replace and report damaged equipment.	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	60	5	Check level of PAC solution and fill tank when necessary	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	70	3	Check level of chlorine liquid and fill tank when necessary	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	80	10	Complete daily RBC WWTP log sheet.	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	90	3	Visually check for crust build up and record status.	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	100	5	Clean all level and alarm floates both in the WWTP and pump stations.	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	110	5	Check operation of all pumps and disc rotation.	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	120	5	Check operation status of all valves and their condition.	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	130	3	Check correct operation of the alarm system.	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	140	3	Check correct function of seals on inspection chambers.	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	150	5	Clarifier - Skim floating sludge off the surface of the final clarifier and dispose it	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	160	5	Check and clean grease trap ?	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	170	3	RBC - Check the rotor operation turning it by hand from both cages	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	180	3	RBC - Check rotors for normal operation (sight and sound) of the system	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	190	3	RBC - Check the flow to the PlanetDISK Units. Set it using a flow meter if required	Yes
241-PLB-0014	0014 D - WWTP - Rotating Biological Contac	200	3	RBC - Check the nuts on the rods are tight to avoid losing a rod	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	10	2	Check all warning lights (fault lights) and rectify findings.	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	20	10	Check general operation of the plant.	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	30	2	Record daily flow meter readings.	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	40	5	Check cleanliness of plant area.	Yes
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241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	60	5	Check level of PAC solution and fill tank when necessary	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	70	3	Check level of chlorine liquid and fill tank when necessary	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	80	10	Complete daily RBC WWTP log sheet.	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	90	3	Visually check for crust build up and record status.	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	100	5	Clean all level and alarm floates both in the WWTP and pump stations.	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	110	5	Check operation of all pumps and disc rotation.	Yes
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241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	170	3	RBC - Check the rotor operation turning it by hand from both cages	Yes
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241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	190	3	RBC - Check the flow to the PlanetDISK Units. Set it using a flow meter if required	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	200	3	RBC - Check the nuts on the rods are tight to avoid losing a rod	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	210	3	Pump Stations - Check general operation of the plant	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	220	5	Pump Stations - Hose down inside of tanks if necessary	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	230	3	Balance Tank - Check Level Float switches	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	240	10	Odour Control - Check for any additional or unusual odours	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	250	3	RBC - Check operation of motor and drive shaft	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	260	5	RBC - Ensure all rotating discs are turning and they are not touching any end walls	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	270	5	RBC - Check for excessive build up on the discs	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	280	5	RBC - Check all brackets and pipe work	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	290	3	RBC - Check for odour and record	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	300	3	RBC - Check all covers are secure	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	310	5	RBC - Clean and reseal all inspection openings	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	320	5	Irrigation Tank - Check all floats and pump operations	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	330	3	Bearings - Grease every month with Termalene Extreme Pressure Grease	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	340	3	Grease Cartridges - Check every month and replace when necessary	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	350	3	RBC - Check the reduction gear for vibration or any abnormal sound. Check for oil leaks from the seals	Yes
241-PLB-0030	0030 D - WWTP - Rotating Biological Contac	360	3	RBC - Check the appearance of the biofilm on the disks. The film should be grey to light brown on the first disk,	Yes
241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	10	2	Check all warning lights (fault lights) and rectify findings.	Yes
241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	20	10	Check general operation of the plant.	Yes
241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	30	2	Record daily flow meter readings.	Yes
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241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	50	3	Repair, replace and report damaged equipment.	Yes
241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	60	5	Check level of PAC solution and fill tank when necessary	Yes
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241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	80	10	Complete daily RBC WWTP log sheet.	Yes
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241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	220	5	Pump Stations - Hose down inside of tanks if necessary	Yes
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241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	300	3	RBC - Check all covers are secure	Yes
241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	310	5	RBC - Clean and reseal all inspection openings	Yes
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241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	330	3	Bearings - Grease every month with Termalene Extreme Pressure Grease	Yes
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241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	350	3	RBC - Check the reduction gear for vibration or any abnormal sound. Check for oil leaks from the seals	Yes
241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	360	3	RBC - Check the appearance of the biofilm on the disks. The film should be grey to light brown on the first disk,	Yes
241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	370	3	Drain Grit Grease Trap - using 3 - 5 ton capacity Sewage Truck	Yes
241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	380	3	Remove sludge from sedimentation tanks - using 8 - 10 ton capacity sewage truck	Yes
241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	390	3	Remove sludge from equatisation tank - using 8 - 10 ton capacity sewage truck	Yes
241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	400	3	RBC - Clean the outer body of the PlanetDISK with soap and water.	Yes
241-PLB-0182	0182 D - WWTP - Rotating Biological Conta	410	5	Complete the attached condition assessment survey e-form.	No

Appendix 3

Site and Soil Evaluation Report (Calibre)

RioTinto

CONTRACTOR DOCUMENT COVER SHEET

DOCUMENT DETAILS

Document Title:	Rhodes Ridge Construction Camp – Geotechnical and Environmental Report
Sustaining Capital Document No:	N/A
Asset Document Number:	N/A
Project / Job Number:	P-0325003
Document Sub Type:	Report
Project Title	Rhodes Ridge Roads and Drainage
Tag Reference(s):	N/A
Drawing or Model Reference(s):	N/A

CONTRACTOR DETAILS

Contractor's Name:	Calibre		
Contractor Document No:	COPP210911-REP-G-001	**Contractor Revision:**	B

Total Number of Pages (including coversheet):	90
Volume (If required)	N/A

REVISION HISTORY

Rev	Issue Status	Revision Date	Prepared By:	Reviewed By:	Approved By:
A	Issued for Internal Review	07/03/2024	[redacted]		
B	Issued for Client Review	11/03/2024			

Document Review Status ***RT OFFICE USE ONLY***

☐	**A**	Accepted	☐	**C**	Rejected – Revise and Resubmit
☐	**B**	Accepted – Subject to Comments	☐	**D**	Reviewed for Information only (Receipt acknowledged).

Reviewed by	Name	
	Signature	
	Review Date	

Review or acceptance of documentation does not relieve the originator of contractual or statutory requirements and does not verify that these requirements are met or waived.

Rhodes Ridge Construction Camp – Geotechnical and Environmental Report

COPP210911-REP-G-001

Revision B

12 March 2024

Project Name:	Rhodes Ridge Construction Camp				
Project Number:	COPP210911 / P-0325003				
Client:	Rio Tinto Iron Ore				
Document No:	COPP210911-REP-G-001	**Rev:**	B	**Rev Date:**	11/03/2024

ISSUE	DATE	ISSUE DETAILS	AUTHOR	CHECKED	APPROVED	AUTHORISED
A	07/03/2024	Issued for Internal Review	[redacted]			
B	12/03/2024	Issued for Client Review				

Contents

Tables

Appendices

Figures

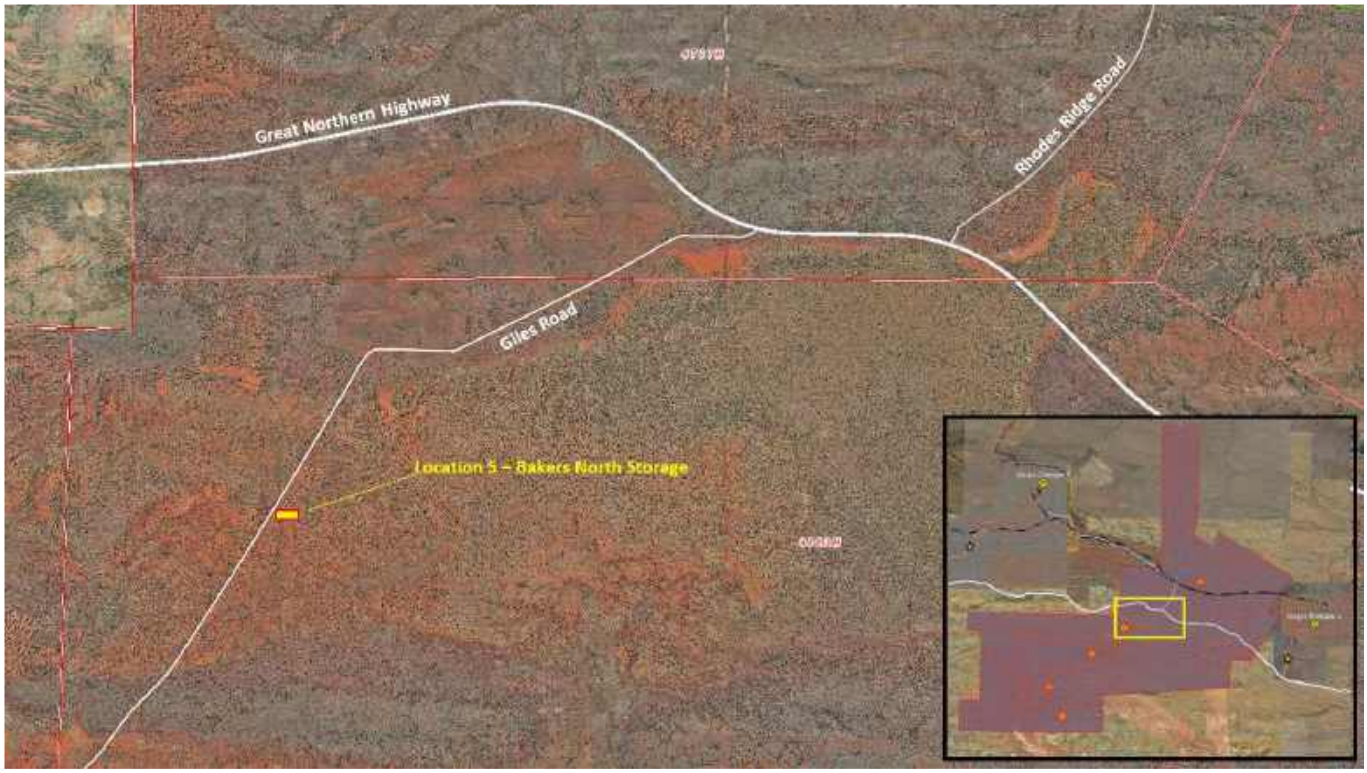
1. Introduction

This report presents the results of the geotechnical and environmental study undertaken by Calibre at the proposed site for the Rhodes Ridge Construction Camp ("the Camp").

The Camp is proposed to be located adjacent to the existing Bakers North Storage Facility (Location 5) on Giles Road, south of Great Northern Highway, as shown in Plate 1. The Camp comprises accommodation blocks, communal areas including messing and administration buildings, parking areas, and a sprayfield for effluent disposal.

The design of the camp is ongoing and may change following the completion of this report. This report is based on the proposed design and location of the camp at the time of writing.

Plate 1: Proposed Rhodes Ridge Camp Location



2. Projects Objectives

The objective of the geotechnical and environmental study as to assess the general subsurface conditions across the site, including the following:

- Topsoil depth;
- Soil type and structure for each material encountered;
- Depth to drainage impeding layers;
- Depth and flow direction of groundwater (based on Rio Tinto supplied information);
- Soil infiltration rates and water holding capacity;
- Saturated hydraulic conductivity (based on published information);
- pH, electrical conductivity, cation exchange capacity and exchangeable sodium percentage of soils; and
- Phosphorus retention and buffering index of soils.

3. Supplied Information

The following information has been supplied by Rio Tinto and is referenced in this report:

- Camp layout (Ref. P0325003-23209-C-001/F), email received 28 January 2024; and
- Groundwater data (groundwater levels and flow direction shown on figures, and groundwater bore log), email received 2 February 2024.

4. References

The following standards and specifications have been referenced in this report.

Table 1: Standards and Specifications

Document Number	Document Title
AS1726-2017	Standards Australia, (2017) Australian Standard AS1726-2017 “Geotechnical site investigations”
SS-C101	Rio Tinto, Standard Specification – Earthworks and Drainage, RTIO-AM-0017818, Rev 6, 16 December 2021
SS-C103	Rio Tinto, Standard Specification – Roads and Pavements, RTIO-AM-0017819, Rev 4, 23 June 2021

5. Fieldwork

5.1 General

The fieldwork for the geotechnical and environmental study was undertaken by Calibre on 1 February 2024 and comprised:

- site walkover and inspection of in-situ materials;
- excavation of five (5) test pits near the proposed camp location;
- Dynamic cone penetrometer (DCP) testing adjacent to each test pit; and
- Collection of representative samples for laboratory testing.

Permitting and approvals for the works was obtained by Rio Tinto prior to the works commencing. The locations of the test pits are presented in Figure 1. The proposed camp is planned directly south and adjacent to an existing laydown area on Giles Road.

Test pit locations within the proposed camp footprint were nominated by Calibre prior to mobilising to site based on the proposed camp layout.

However due to access permits / limitations, the test pit locations were relocated as directed by Rio Tinto to the adjacent laydown area. It is noted that the test pits and sampling were not undertaken on the proposed camp site or footprint of the sprayfield. This approach was discussed with various stakeholders and was confirmed by Rio Tinto after a site walkover of the proposed camp footprint, which indicated that the surficial ground conditions appeared to be similar to the revised test pit locations.

5.2 Test Locations

The test pit coordinates were recorded with a handheld GPS (typically accurate to ±5m) and are presented in Table 2.

Samples were also collected from nearby existing borrow pits, as requested by Rio Tinto during the fieldwork.

The approximate test locations are presented on Figure 1, and the approximate sampled locations from the borrow areas are shown on Figure 2.

Table 2: Test Locations

Test Location	Easting (MGA94 Zone 50)	Northing (MGA94 Zone 50)	Termination Depth (m bgl)	Reason for Termination
RR-TPE01	731,138	7,437,035	0.6	Hard digging
RR-TPE02	731,128	7,437,034	0.8	Hard digging
RR-TPE03	731,130	7,437,043	0.4	Hard digging
RR-TPG01	731,180	7,437,042	0.8	Hard digging
RR-TPG02	731,198	7,437,036	0.5	Hard digging
RR-BA1-01	N/A	N/A	Surface Sample	N/A
RR-BA2-01	N/A	N/A	Surface Sample	N/A
RR-BA2-02	N/A	N/A	Surface Sample	N/A

5.2.1 Test Pits

Five (5) test pits were excavated utilising a Bobcat E55, 5 tonne tracked mini-excavator, supplied and operated by Mobecrete (engaged by Rio Tinto).

The recovered spoil from the test pits was logged in general accordance with AS 1726 ‘Geotechnical Site Investigations’, and the ‘Australian Soil and Land Survey Handbook’. Representative samples were collected from the test pits for laboratory testing.

The test pit logs and photographs are presented in Appendix A.

DCP testing was conducted adjacent to each test pit location in accordance with AS1289.6.3.2. The testing was conducted to a maximum of depth of 0.8m or shallower refusal. The DCP results are presented in Appendix B.

5.2.2 Borrow Samples

Three (3) samples were collected from nearby existing borrow areas, located approximately 5 km east, south-east of the proposed construction camp site. The samples were collected via hand sampling of the available material, including one (1) sample from the stockpile present on the southern end of BA1, and two (2) samples from the surficial disturbed material at BA2.

6. Laboratory Testing

Geotechnical and geochemical laboratory testing on samples recovered from the test pits was undertaken at the following NATA accredited laboratories:

- Western Geotechnical & Laboratory Services; and
- Envirolab Services (WA) Pty Ltd trading as MPL Laboratories.

Table 3 summarises the geotechnical laboratory testing undertaken. A summary of the laboratory results and test certificates are presented in Appendix C.

Table 3: Summary of Geotechnical Laboratory Testing

Laboratory Test	Test Method	Number of Tests
Particle Size Distribution (PSD)	AS1289.3.6.1	7
Atterberg Limits with Linear Shrinkage	AS1289.3.1.1, 3.2.1, 3.3.1 and 3.4.1	7
Modified Maximum Dry Density and Optimum Moisture Content	AS1289.5.1.2	5
California Bearing Ratio	AS1289.6.1.1	5
Permeability	AS1289.6.7.1	4
Emerson Class Number	AS1289.3.8.1	1

Table 4 summarises the geochemical laboratory testing undertaken. A summary of the laboratory results and test certificates are presented in Appendix D.

Samples were collected from the test pits at different depths to identify possible changes in the geochemical profile of the soils.

Table 4: Summary of Geochemical Laboratory Testing

Laboratory Test	Test Method	Number of Tests
Aggressivity Suite (pH, Sulphate, Chloride and Electrical Conductivity)	MPL in house	6
Cation Exchange Capacity (CEC) and Exchangeable Sodium Potential (ESP)	MPL in house	6
Phosphorous Retention Index (PRI)	MPL in house	6
Phosphorous Buffering Index (PBI)	MPL in house	6

7. Site Conditions

7.1 Location

The proposed construction camp is located about 100m south of an existing laydown alongside Giles Road, approximately 80km west of Newman.

The proposed camp location is relatively flat with small trees and bushes in the area.

The existing laydown area (to the north of the proposed camp location) is slightly elevated (~0.5m above adjacent ground) with an open drain surrounding the laydown (~1m below adjacent ground).

7.2 Regional Geology

The underlying geology at the site is presented in the Newman Sheet (SF50-16) of the Geological Survey of Western Australia 1:250,000 scale Geological Series map. The site geology is presented on Figure 3 and is described as:

- Qw: ALLUVIUM and COLLUVIUM: Red-brown sandy and clayey soil.

7.3 Subsurface Conditions

The subsurface conditions were identified according to:

- *AS1726-2017 Geotechnical Site Investigations*; and
- *Australian Soil and Land Survey Handbook*.

AS1726-2017 Geotechnical Site Investigations

The generalised subsurface conditions encountered during the investigation are summarised as:

- ALLUVIUM: Sandy CLAY (CL): red-brown, clay is low plasticity, sand is fine to coarse grained, sub-rounded, between 0.5 and 1m thick, overlying,
- CLAY Hardpan, with localised Gravelly Clayey SAND pockets.

This 'hardpan' horizon was encountered between 0.4m below ground level (bgl) and 0.8m bgl.

Australian Soil and Land Survey Handbook

In accordance with the Australian Soil Classification system, the soil profile is considered a Kandosol classification. This B Horizon soil is characterised by a lack of strong texture with limited contrast between the A (topsoil) and B horizon. Clay content is also known to increase with depth, with kandosols generally being acidic in nature.

7.4 Groundwater

Groundwater was not encountered in any of the test pits.

Groundwater data supplied by Rio Tinto (refer to Section 3) indicates that the groundwater level at the site is approximately 30 m below ground level (approximately RL 655 m AHD). The supplied data also indicates that the groundwater flows in an easterly direction, i.e. west to east.

Borelog information supplied by Rio Tinto (Bore Reference: WB21BKN0010) suggested groundwater sits within a 'clay/detrital' weathered horizon. Hydraulic conductivity for such aquifers can range between $5x10^{-6}$ m/s and $5x10^{-9}$m/s[1].

7.5 Surface Water

They are no creeks or surface water bodies within proximity to the proposed construction camp, including the proposed sprayfield location. However, surface water may pond in low lying areas across the site due to the relatively low permeability of the soils encountered.

[1] https://structx.com/Soil_Properties_007.html

7.6 Public Drinking Water Source Area

The proposed construction camp, including the sprayfield, is not located within a Public Drinking Water Source Area (PDWSA).

8. Geochemical Laboratory Test Results

The following provides a summary of the soil assessment based on the geochemical laboratory test results. Tabulated results and laboratory test certificates are presented in Appendix D.

8.1 Soil pH

The pH values were recorded to be moderately acidic, with values noted to vary between 5.2 pH units and 5.6 pH units. There was no discernible difference between the shallow and deeper samples.

8.2 Cation Exchange Capacity

Cation Exchange Capacity (CEC) is a measure of a soils capacity to retain and exchange cations. This affects the buffering capacity of soil, nutrient availability, and soil stability.

Testing showed CEC to range between 2.8meq/100g and 5.3meq/100g, which is a low CEC value for a clay soil. Again, there were no discernible difference between the shallow and deeper samples.

8.2.1 Calcium/Magnesium Ratio

If the calcium to magnesium ratio is less than 2:1, then this may indicate reduced soil stability. Results showed a Ca/Mg ratio between 1.7:1 and 2.2:1.

8.3 Salinity and Exchangeable Sodium Percentage

Salinity across the analysed samples, measured as Electrical Conductivity, ranged from 11µS/cm to 34µS/cm suggesting the soils are non-saline to slightly saline.

Exchangeable Sodium Percentage (ESP) across the soil samples ranged from 2.7% to 3.1%, suggesting the soils are non-sodic.

These results suggest the soils are ‘non-dispersive’.

8.4 Phosphorus Buffering Index and Phosphorus Retention Index

Phosphorus Buffering Index (PBI) is an indication of a soils capacity to absorb and bind phosphorus (P). If a soil has a high PBI, then it will rapidly bind applied P, making it unavailable for plants to uptake or to be leached through the soil profile. PBI ranged between 65 and 130 indicating a very low to low PBI class.

Phosphorus Retention Index (PRI) is a direct measure of a soil ability to fix P. PRI results ranged from 50 to 350 suggesting the soils have a moderate ability to fix P.

8.5 Soil Permeability

Permeability testing on recovered undisturbed samples recorded permeabilities ranging between $5.17x10^{-07}$m/s and $9.25x10^{-07}$m/s. This range of permeability is generally within the expected values for a clay soil and would not be deemed as free draining.

8.6 Water Holding Capacity

The water holding capacity, which is the ability of a soil to hold water, was calculated at 94.5mm. This was based on a root zone being within the top 63cm (average depth to restrictive layer) and based on available water of 1.5mm/cm depth for a clay soil.

9. Discussion

9.1 Geotechnical Considerations

9.1.1 Geotechnical Risks

The following geotechnical risks have been identified during the investigation:

- Drainage within and around the site must be adequately managed to prevent softening of the clayey soils;
- Earthworks considerations including moisture conditioning and compaction of the clayey soils;
- Design of foundations to consider the clayey soils and potential shrink-swell movements; and
- Presence of hard/cemented layers at shallow depth which may result in shallow refusal excavation depths with small earthmoving equipment.

9.1.2 Earthworks

The earthworks at the site should be undertaken in accordance with the following Rio Tinto specifications:

- SS-C101: Civil Earthworks and Drainage; and
- SS-C103: Roads and Pavements.

9.1.3 Borrow Material

The samples collected from the borrow areas were assessed in accordance with SS-C101, against the criteria for Type A – Select Fill, Type B – Common Fill and Unsealed Basecourse. The tabulated assessment is presented in Appendix E, with a summary of the outcomes presented in Table 5.

This borrow material assessment is only preliminary due to the limited number of samples collected across the borrow areas. Additional testing of potential borrow materials should be undertaken in accordance with SS-C101 to confirm suitability of the material prior to use.

Table 5: Borrow Material Assessment

Test Location	Type A – Select Fill	Type B – Common Fill	Unsealed Basecourse
RR-BA1-01	Compliant	Compliant	Marginal[1]
RR-BA2-01	Compliant	Compliant	Non-Compliant
RR-BA2-02	Compliant[2]	Compliant	Non-Compliant

Notes:

[1]Material considered “Marginal” as a result of the shrinkage product being lower than the specification requirements. This may increase the required maintenance if used on site.

[2]Material considered “Compliant” however one sieve size is within 1% of the grading specification requirements.

9.1.4 Permeability

Laboratory soil permeability tests recorded permeabilities ranging between 1.11x 10^{-08}m/s and 2.64x 10^{-09}m/s for the remoulded samples and between 5.17x10^{-07}m/s and 9.25x10^{-07}m/s for the undisturbed samples.

The low permeability of the soil may lead to water ponding around the site following major rainfall events.

9.2 Geochemical and Irrigation Considerations

Laboratory testing has shown the soils to be moderately acidic, non-sodic and non-dispersive. PBI and PRI results suggest that there is a potential for applied P to move through the soil profile, however, the underlying clayey soils would limit the vertical movement of any potential leachate/irrigation water; and movement during surface water flow events could occur.

The risk of irrigation has been assessed in general accordance with Water Quality Protection Notice 22[2] (WQPN22). In terms of the risk from irrigation, the sprayfield is not within proximity to any surface water bodies or wetlands, including creek lines. Additionally, there is a sufficient separation distance between the sprayfield and any underlying groundwater, with this distance being in excess of the required 2m separation distance. The sprayfield is also outside of any identified PDWSA. In accordance with Table 1 of WQPN22, the sprayfield would have a *Low eutrophication risk*, with a Risk Category of *D*.

[2] Irrigation with nutrient-rich wastewater, Water Quality Protection Notice 22, Department of Water, 2022

10. Limitations

The information provided in this report is based on the data available at the time of assessment.

The inherent uncertainty in the geotechnical findings presented herein must be recognised. Variations to the ground conditions are likely and allowance must be made in the design and construction work for potential vertical and lateral variability in the extent of in-situ material conditions.

As directed by Rio Tinto, the soil profile for the sprayfield was assessed from samples collected from ~50m to ~70m from the footprint of the sprayfield. Soil conditions have been extrapolated and variations may exist.

Groundwater information has been provided by Rio Tinto. No hydrogeological investigation has been completed.

It must be noted that the material conditions encountered in the geotechnical investigations represent the material conditions at the locations where the tests were undertaken and, as such, are an extremely small proportion of the proposed footprint.

It is also important to note that some information detailed in this report has been collated from other sources. Calibre cannot be responsible for the veracity of this information.

The material conditions within the project area may vary between any given assessed location. Material conditions may also change or be modified as a result of anthropogenic events (e.g. construction, site contamination) and natural events (e.g. flooding, earthquakes, landslides, significant weather events).

This report specifically excludes contaminated site assessment, acid sulfate soils, asbestiform minerals risk assessment, and detailed hydrological assessments.

Figures

Proposed Site

Test Pit Location

Map data: Google Maxar Technologies

CLIENT	RIO TINTO IRON ORE
PROJECT	RHODES RIDGE CONSTRUCTION CAMP
TITLE	TEST PIT LOCATIONS
JOB No	COPP210911

SCALE	Not to Scale		
DRAWN	WP	DATE	6/03/2024
CHECKED	BL	DATE	6/03/2024

Figure 1

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Proposed Site

Map data:
Google
Maxar
Technologies

CLIENT	RIO TINTO IRON ORE	SCALE	Not to Scale	
PROJECT	RHODES RIDGE CONSTRUCTION CAMP	DRAWN	WP	DATE 11/03/2024
		CHECKED	BL	DATE 11/03/2024
TITLE	BORROW AREA LOCATIONS			
JOB No	COPP210911			

Figure 2

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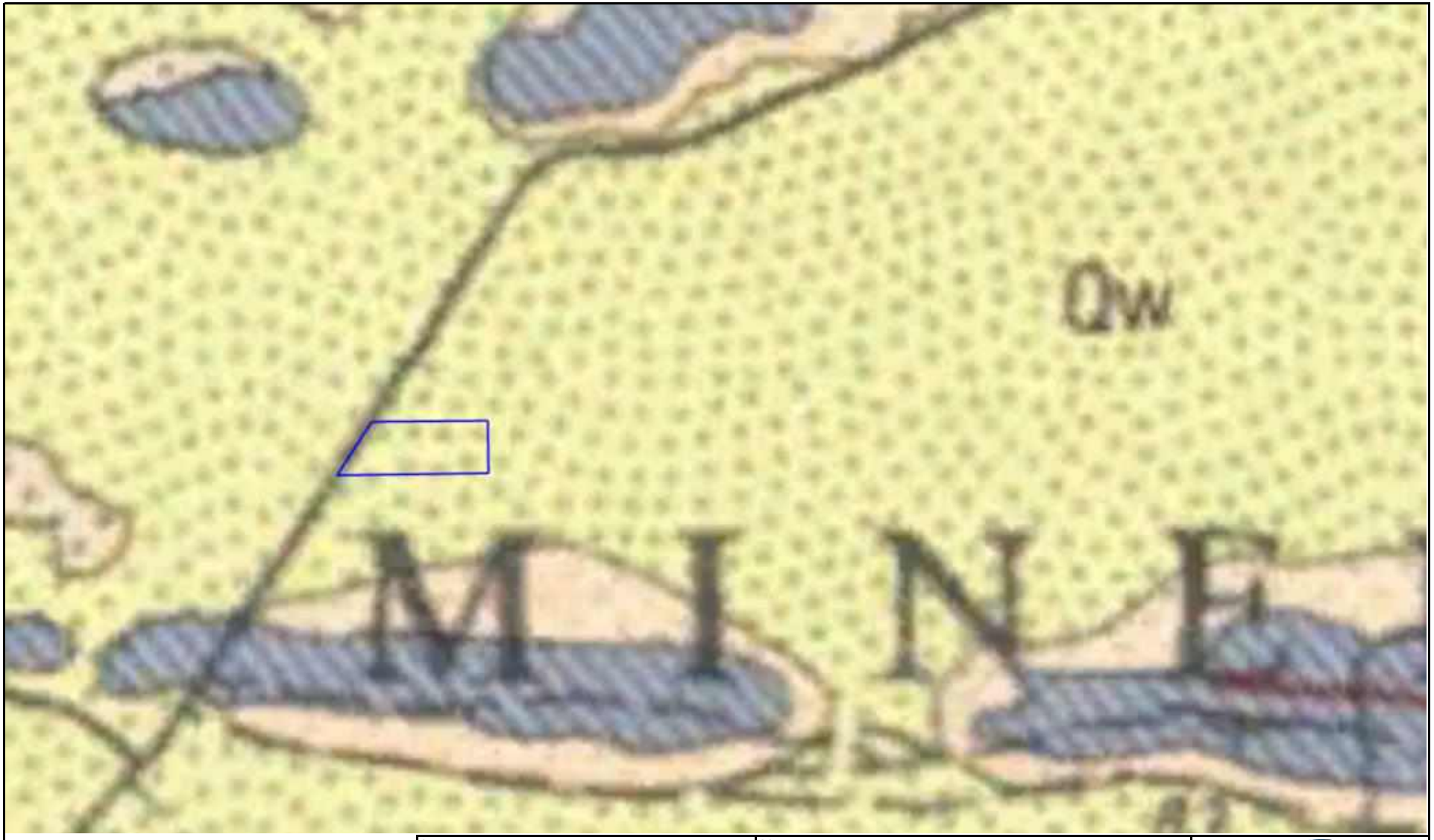

Proposed Site

Map data: GSWA

CLIENT	RIO TINTO IRON ORE	SCALE	Not to Scale	
PROJECT	RHODES RIDGE CONSTRUCTION CAMP	DRAWN	WP	DATE 6/03/2024
		CHECKED	BL	DATE 6/03/2024
TITLE	GEOLOGY OVERVIEW			
JOB No	COPP210911			

Figure 3

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Appendix A Test Pit Logs and Photographs

ENGINEERING LOG — TEST PIT No. RR-TPE01

Client: RTIO
Project: Construction Camp
Project No: COPP210911
Location: Rhodes Ridge

Easting: 731138.0 m **Northing:** 7437035.0 m
Reduced Level: m AHD
Surface:

Horizontal Datum: MGA94
Vertical Datum: AHD
Plant: Bobcat, 5T Excavator
Operator: Mobecrete

Sheet 1 of 1
Start Date: 1/02/2024
End Date: 1/02/2024
Logged: WP
Checked: BL

TEST DATA						MATERIAL DESCRIPTION		SOIL CONDTN.		OTHER
method	support	ground water	reduced level (m)	depth (m)	field tests and samples	graphic log	NAME (AS 1726 SOIL CLASSIFICATION): Colour, plasticity/ particle characteristics, structure, geological origin, other minor components	consistency/ density	moisture condition	additional observations
Excavator	No Sidewall Instability	Groundwater Not Observed		0.5			Sandy CLAY(CL): red brown, low plasticity. Sand is fine to coarse grained, predominantly sub-rounded. [ALLUVIUM].	L/S	M	Roots present
				1.0			RR-TPE01 terminated at 0.6m Refusal due to hard excavation			

RR-TPE01 Before Disturbance

No Image

RR-TPE01 After Reinstatement

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPE01 Before and After			
JOB No	COPP210911				

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RR-TPE01 Excavation

RR-TPE01 Spoil

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPE01 Excavation and Spoil			
JOB No	COPP210911				

calibre
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ENGINEERING LOG — TEST PIT No. RR-TPE02

Client: RTIO
Project: Construction Camp
Project No: COPP210911
Location: Rhodes Ridge

Easting: 731128.0 m **Northing:** 7437034.0 m
Reduced Level: m AHD
Surface:

Horizontal Datum: MGA94
Vertical Datum: AHD
Plant: Bobcat, 5T Excavator
Operator: Mobecrete

Sheet 1 of 1
Start Date: 1/02/2024
End Date: 1/02/2024
Logged: WP
Checked: BL

TEST DATA						MATERIAL DESCRIPTION		SOIL CONDTN.		OTHER
method	support	ground water	reduced level (m)	depth (m)	field tests and samples	graphic log	NAME (AS 1726 SOIL CLASSIFICATION): Colour, plasticity/ particle characteristics, structure, geological origin, other minor components	consistency/ density	moisture condition	additional observations
Excavator	No Sidewall Instability	Groundwater Not Observed		0.5			Sandy CLAY(CL): red brown, low plasticity. Sand is fine to coarse grained, predominantly sub-rounded. [ALLUVIUM].	L/S	M	Roots present
								MD/St		
				1.0			RR-TPE02 terminated at 0.8m Refusal due to hard excavation			

RR-TPE02 Before Disturbance

RR-TPE02 After Reinstatement

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPE02 Before and After			
JOB No	COPP210911				

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RR-TPE02 Excavation

RR-TPE02 Spoil

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPE02 Excavation and Spoil			
JOB No	COPP210911				

calibre
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ENGINEERING LOG — TEST PIT No. RR-TPE03

Client: RTIO
Project: Construction Camp
Project No: COPP210911
Location: Rhodes Ridge

Easting: 731130.0 m **Northing:** 7437043.0 m
Reduced Level: m AHD
Surface:

Horizontal Datum: MGA94
Vertical Datum: AHD
Plant: Bobcat, 5T Excavator
Operator: Mobecrete

Sheet 1 of 1
Start Date: 1/02/2024
End Date: 1/02/2024
Logged: WP
Checked: BL

TEST DATA						MATERIAL DESCRIPTION		SOIL CONDTN.		OTHER
method	support	ground water	reduced level (m)	depth (m)	field tests and samples	graphic log	NAME (AS 1726 SOIL CLASSIFICATION): Colour, plasticity/ particle characteristics, structure, geological origin, other minor components	consistency/ density	moisture condition	additional observations
Excavator	No Sidewall Instability	Groundwater Not Observed					Sandy CLAY(CL): red brown, low plasticity. Sand is fine to coarse grained, predominantly sub-rounded. [ALLUVIUM].	L/S	M	Roots present
				0.5			RR-TPE03 terminated at 0.4m Refusal due to hard excavation			
				1.0						

RR-TPE03 Before Disturbance

RR-TPE03 After Reinstatement

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPE03 Before and After			
JOB No	COPP210911				

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RR-TPE03 Excavation

RR-TPE03 Spoil

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPE03 Excavation and Spoil			
JOB No	COPP210911				

calibre
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ENGINEERING LOG — TEST PIT No. RR-TPG01

Client: RTIO
Project: Construction Camp
Project No: COPP210911
Location: Rhodes Ridge

Easting: 731180.0 m **Northing:** 7437042.0 m
Reduced Level: m AHD
Surface:

Horizontal Datum: MGA94
Vertical Datum: AHD
Plant: Bobcat, 5T Excavator
Operator: Mobecrete

Sheet 1 of 1
Start Date: 1/02/2024
End Date: 1/02/2024
Logged: WP
Checked: BL

TEST DATA						MATERIAL DESCRIPTION		SOIL CONDTN.		OTHER
method	support	ground water	reduced level (m)	depth (m)	field tests and samples	graphic log	NAME (AS 1726 SOIL CLASSIFICATION): Colour, plasticity/ particle characteristics, structure, geological origin, other minor components	consistency/ density	moisture condition	additional observations
Excavator	No Sidewall Instability	Groundwater Not Observed					Gravelly SAND(SP-SC): red brown, fine to coarse grained, predominantly sub-rounded. Gravel is fine grained, sub-rounded to sub-angular. With low plasticity fines. [ALLUVIUM].			
					BULK			D	D-M	
				0.5						
				1.0			RR-TPG01 terminated at 0.8m Refusal due to hard excavation			

RR-TPG01 Before Disturbance

RR-TPG01 After Reinstatement

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPG01 Before and After			
JOB No	COPP210911				

calibre
A member of wsp

RR-TPG01 Excavation

RR-TPG01 Spoil

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPG01 Excavation and Spoil			
JOB No	COPP210911				

calibre
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ENGINEERING LOG — TEST PIT No. RR-TPG02

Client: RTIO
Project: Construction Camp
Project No: COPP210911
Location: Rhodes Ridge

Easting: 731198.0 m **Northing:** 7437036.0 m
Reduced Level: m AHD
Surface:

Horizontal Datum: MGA94
Vertical Datum: AHD
Plant: Bobcat, 5T Excavator
Operator: Mobecrete

Sheet 1 of 1
Start Date: 1/02/2024
End Date: 1/02/2024
Logged: WP
Checked: BL

TEST DATA						MATERIAL DESCRIPTION		SOIL CONDTN.		OTHER
method	support	ground water	reduced level (m)	depth (m)	field tests and samples	graphic log	NAME (AS 1726 SOIL CLASSIFICATION): Colour, plasticity/ particle characteristics, structure, geological origin, other minor components	consistency/ density	moisture condition	additional observations
Excavator	No Sidewall Instability	Groundwater Not Observed			BULK		Sandy CLAY(CL): red brown, low plasticity. Sand is fine to coarse grained, predominantly sub-rounded. [ALLUVIUM].	L/S	M	Roots present
				0.5			Gravelly CLAY(CL): red brown, low plasticity. Gravel is fine to coarse grained, sub-rounded to sub-angular. With sand, fine to coarse grained, predominantly sub-rounded. [ALLUVIUM].	H/VD		
							RR-TPG02 terminated at 0.55m Refusal due to hard excavation			
				1.0						

RR-TPG02 Before Disturbance

RR-TPG02 After Reinstatement

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPG02 Before and After			
JOB No	COPP210911				

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RR-TPG02 Excavation

RR-TPG02 Spoil

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPG02 Excavation and Spoil			
JOB No	COPP210911				

calibre
A member of wsp

Appendix B DCP Results

DYNAMIC CONE PENETROMETER RECORD SHEET

Project: **Rhodes Ridge Construction Camp**
Location: **Rhodes Ridge** **Field Engineer: Wilhem Picard**
Job Ref: **COPP210911**

Location:	RR-TPE01	RR-TPE02	RR-TPE03	RR-TPG01	RR-TPG02
Depth (mm)	Penetrometer Blows per 100 mm Depth Interval				
0-50	1	1	1	8	1
50-100	1	1	2	6	1
100-150	1	2	2	9	1
150-200	2	1	1	10	1
200-250	1	1	1	7	2
250-300	1	2	2	13	1
300-350	2	1	1	6	1
350-400	1	1	1	8	2
400-450	1	4	HB	10	1
450-500	2	5		11	2
500-550	1	4		12	18
550-600	1	6		10	HB
600-650	HB	4		11	
650-700		5		14	
700-750		4		10	
750-800		4		11	
800-850		HB		R	
850-900					
900-950					
950-1000					

Dynamic Cone Penetrometer tests done in accordance with AS 1289.6.3.2

R - Effective refusal of the penetrometer (more than 8 blows / 20 mm [20 blows / 50 mm])
HB - Refusal of the penetrometer due to hammer bounce

Appendix C Geotechnical Laboratory Results

Western Geotechnical and Laboratory Service
235 Bank Street, Welshpool WA 6106
08 9472 3465
www.westerngls.com.au

RESULTS SUMMARY MATRIX

Client	Calibre
Project	Rhodes Ridge Camp Investigation
Job ID	S12228

Sample Details		Classification																	Compaction		Strength	
Lab Sample No.	Client Reference / Sample ID	Particle Size Distribution (% Passing)													Atterberg Limits 4 Point Casagrande with Linear Shrinkage (%)				Emerson No	Dry Density / Moisture Content Relationship		Falling Head Permeability	California Bearing Ratio (%) Soaked
		AS 1289.3.6.1													3.1.1	3.2.1	3.3.1	3.4.1		AS 1289.5.2.1			
		100	75	37.5	19	9.5	4.75	2.36	1.18	0.600	0.425	0.300	0.150	0.075	LL	PL	PI	LS	AS 1289.3.8.1	MMDD	OMC	AS 1289.6.7.2	AS 1289.6.1.1
WG24.2497	RR-TPG01 (0.3-0.6)m			100	99	97	91	70	56	38	30	23	16	10	NO	NP	NP	1.0	5	1.96	15.0	1.11E-08	25
WG24.2498	RR-TPG02 (0.0-0.4)m			100	99	99	95	86	80	71	67	63	58	49	28	15	13	7.0	5	2.11	12.0	2.64E-09	18
WG24.2499	RR-TPE01 (0.0-0.5)m				100	100	98	90	82	74	70	68	64	54	30	17	13	7.0				5.17E-07	
WG24.2500	RR-TPE03 (0.0-0.4)m				100	98	96	87	80	71	66	62	55	44	30	16	14	7.5				9.25E-07	
WG24.2501	RR-BA1-01			100	78	53	39	29	25	23	21	20	18	14	25	13	12	5.5		2.58	9.5		70
WG24.2502	RR-BA2-01			100	96	90	77	52	43	33	28	25	21	17	26	16	10	5.0		2.03	13.0		40
WG24.2503	RR-BA2-02			100	94	76	61	45	41	38	36	35	31	25	26	12	14	7.0		2.39	11.5		50
	TOTAL	7.0													7.0				2.0	5.0		4.0	5.0

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

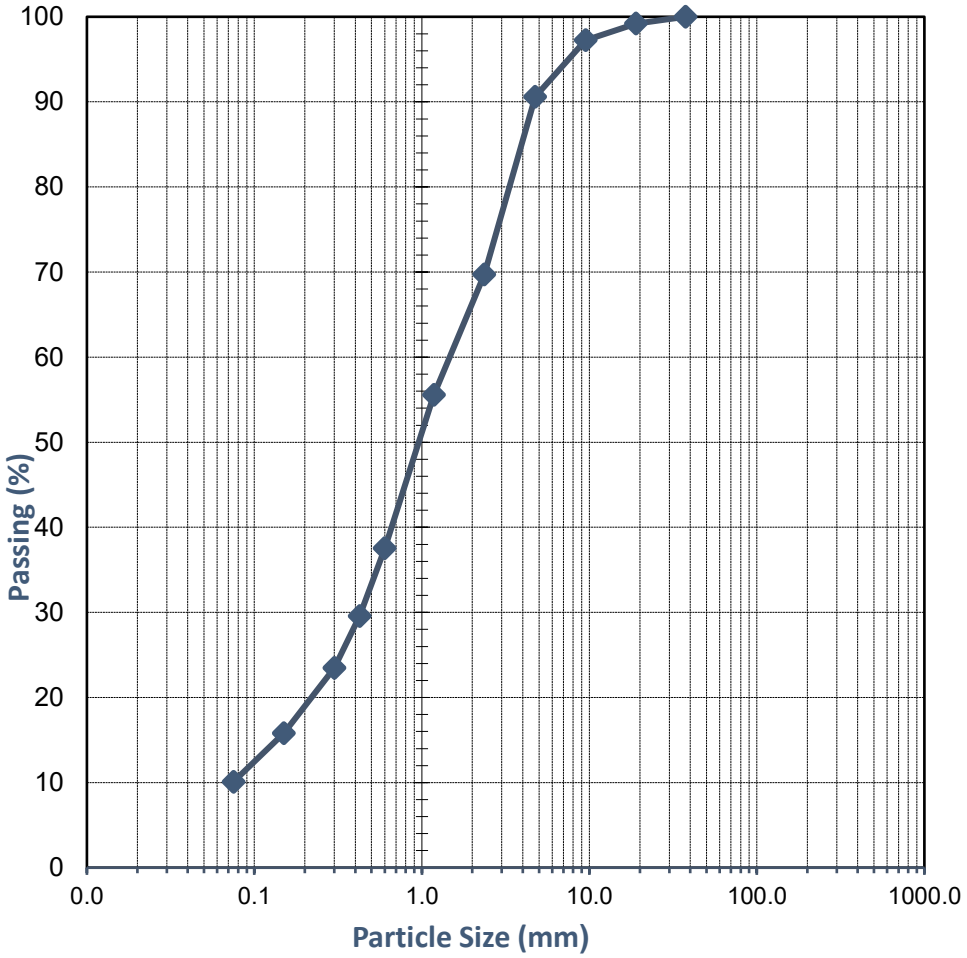
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2497_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2497
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG01 (0.3-0.6)m	*Date Tested:*	15/02 - 16/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	100
19.0	99
9.5	97
4.75	91
2.36	70
1.18	56
0.600	38
0.425	30
0.300	23
0.150	16
0.075	10



Comments:

Approved Signatory: [redacted]

Name:

Date: 16/February/2024

NATA **Accreditation No. 20599**
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2497_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2497
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG01 (0.3-0.6)m	*Date Tested:*	16/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**Not Obtainable**
AS 1289.3.2.1	**Plastic Limit (%)**	**Non-Plastic**
AS 1289.3.3.1	**Plasticity Index (%)**	**Non-Plastic**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**1.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory

[redacted]

Name

Date: 19/February/2024

NATA

Accreditation No. 20599

Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.8.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2497_1_ECN
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2497
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG01 (0.3-0.6)m	*Date Tested:*	15/02/2024

TEST RESULTS - Emerson Class Number

Sampling Method:	**Sampled by Client, Tested as Received**
Source of Material:	**Not Specified**
Soil Description:	**Silty Sand with Gravel**
Water Used:	**Distilled**

EMERSON CLASS NUMBER	**5**

Comments:

Approved Signatory: [redacted]

Name:

Date: 28/February/2024

NATA **Accreditation No. 20599**
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2497_1_MMDD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2497
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG01 (0.3-0.6)m	*Date Tested:*	15/02/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

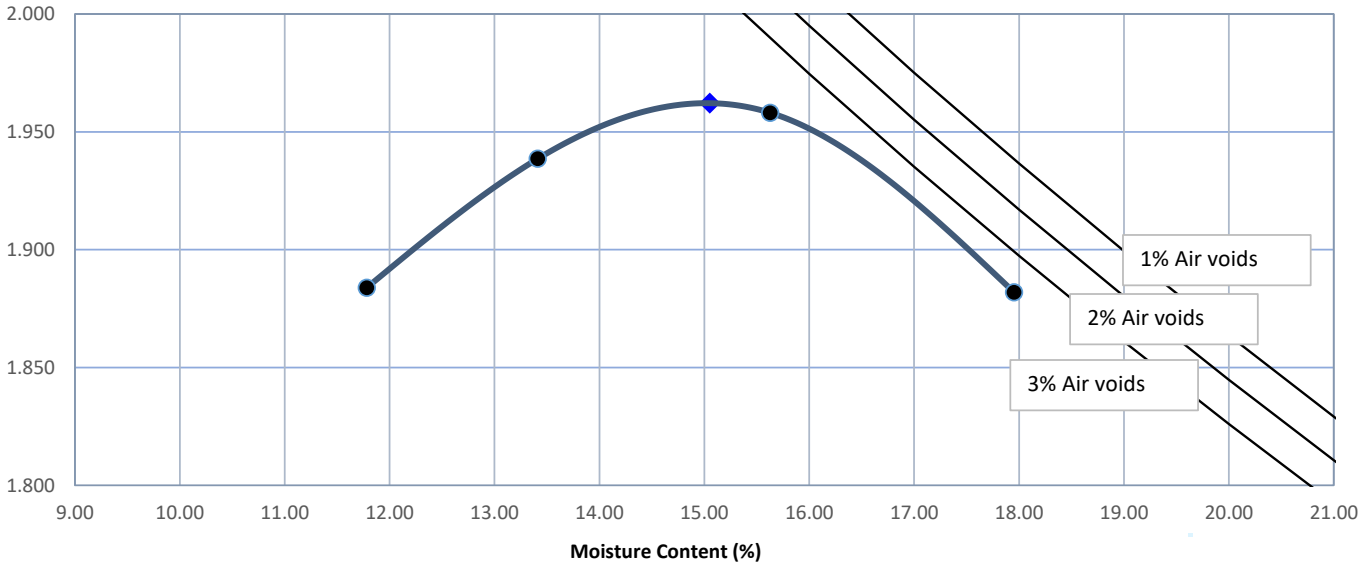
Sample Curing Time (Hours): 48

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 0 **Material + 37.5mm (%)** -

Moisture Content (%)	**11.8**	**13.4**	**15.6**	**18.0**	
Dry Density (t/m³)	**1.884**	**1.939**	**1.958**	**1.882**	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **1.96**

Optimum Moisture Content (%) **15.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 3.019 t/m³*

Approved Signatory: [redacted]

Date: 16/February/2024

NATA Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

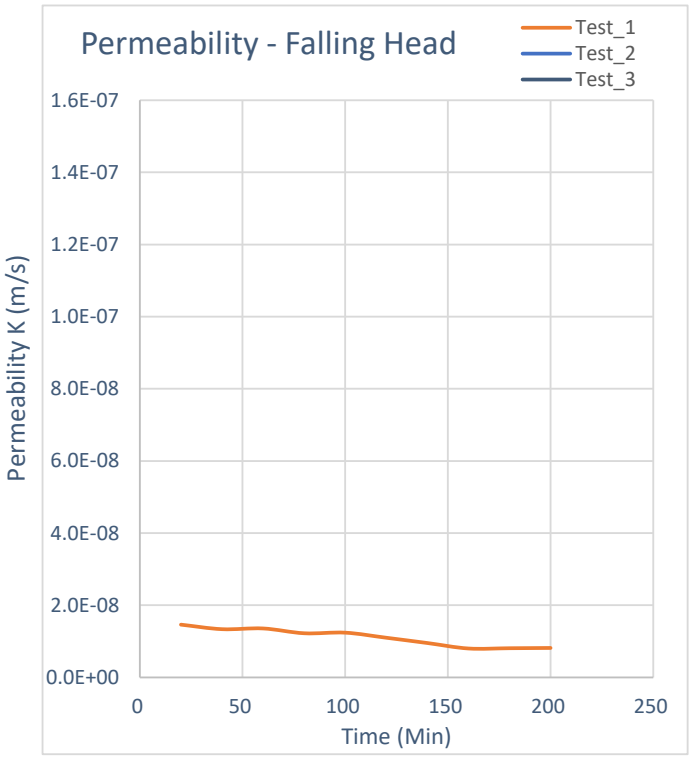
SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT AS 1289.6.7.2

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2497_1_FHPERM
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2497
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification	RR-TPG01 (0.3-0.6)m	*Date Tested:*	15/02 - 26/02/24

TEST RESULTS - FALLING HEAD PERMEABILITY

Sampling Method: Sampled by Client, Tested as Received



Compaction Details	
Compaction Method	AS 1289.5.2.1
Hammer Type	Modifed
CuringTime (Hours)	48
% Retained on 19.0mm	0
Maximum Dry Density (t/m^3)	1.96
Optimum Moisture (%)	15.0
Target Dry Density Ratio	95
Target Moisture Ratio	100

Specimen Conditions at Compaction	
Laboratory Density Ratio (%)	95.1
Laboratory Moisture Ratio (%)	99.8
Surcharge (kPa)	3

Coefficient of Permeability K_{20} (m/s) **1.11E-08**

Comments:

Approved Signatory [redacted]

Name

Date: 28/February/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

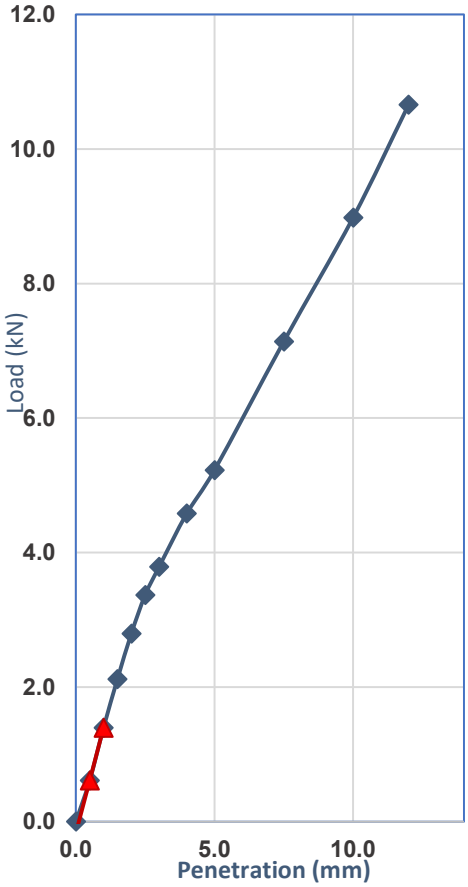
Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2497_1_SCBR
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2497
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG01 (0.3-0.6)m	*Date Tested:*	15/02 - 21/02/24

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Silty Sand with Gravel

Sampling Method: AS 1289.1.2.1-6.4b: Compacted Layers in earthworks or pavement

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	24.0
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	1.96	Optimum Moisture (%)	15.0
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.87	Moisture Content (%)	14.7
Density Ratio (%)	95.5	Moisture Ratio (%)	97.5

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	1.87	Dry Density Ratio (%)	95.5
Moisture Content (%)	18.0	Moisture Ratio (%)	119.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	16.1	Remaining Depth (%)	16.4

Correction applied to Penetration: 0.1mm

Determined at a Penetration of: 5.0mm

California Bearing Ratio (CBR): 25%

Comments:

Approved Signatory: [redacted]

Name:

Date: 22/February/2024

NATA

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

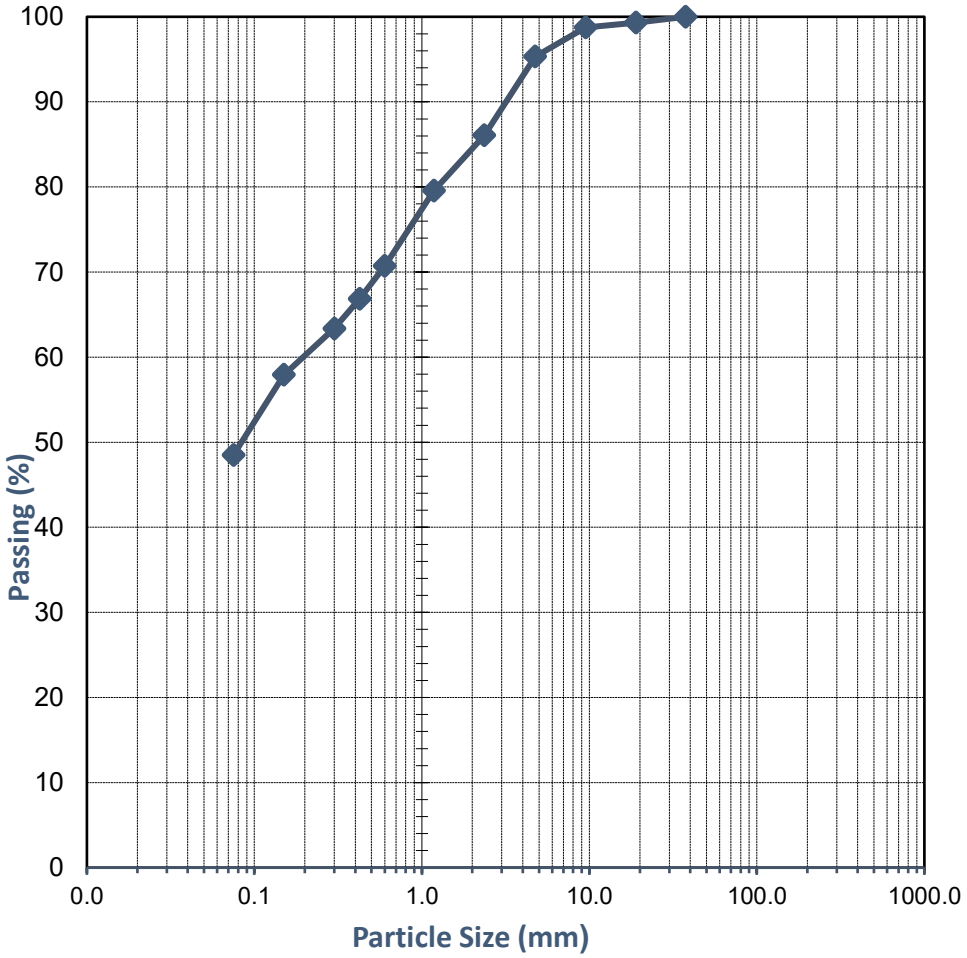
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2498_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2498
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG02 (0.0-0.4)m	*Date Tested:*	15/02 - 16/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	100
19.0	99
9.5	99
4.75	95
2.36	86
1.18	80
0.600	71
0.425	67
0.300	63
0.150	58
0.075	49



Comments:

Approved Signatory: [redacted]

Name:

Date: 16/February/2024

Accreditation No. 20599
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2498_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2498
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG02 (0.0-0.4)m	*Date Tested:*	16/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**28**
AS 1289.3.2.1	**Plastic Limit (%)**	**15**
AS 1289.3.3.1	**Plasticity Index (%)**	**13**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**7.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked**

Comments:

Approved Signatory:

Name [redacted]

Date: 19/February/2024

NATA

Accreditation No. 20599

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.8.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2498_1_ECN
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2498
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG02 (0.0-0.4)m	*Date Tested:*	15/02/2024

TEST RESULTS - Emerson Class Number

Sampling Method:	**Sampled by Client, Tested as Received**
Source of Material:	**Not Specified**
Soil Description:	**Silty Sand with Gravel**
Water Used:	**Distilled**

EMERSON CLASS NUMBER

5

Comments:

Approved Signatory: [redacted]

Name:

Date: 28/February/2024

NATA **Accreditation No. 20599**
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2498_1_MMDD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2498
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG02 (0.0-0.4)m	*Date Tested:*	15/02/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

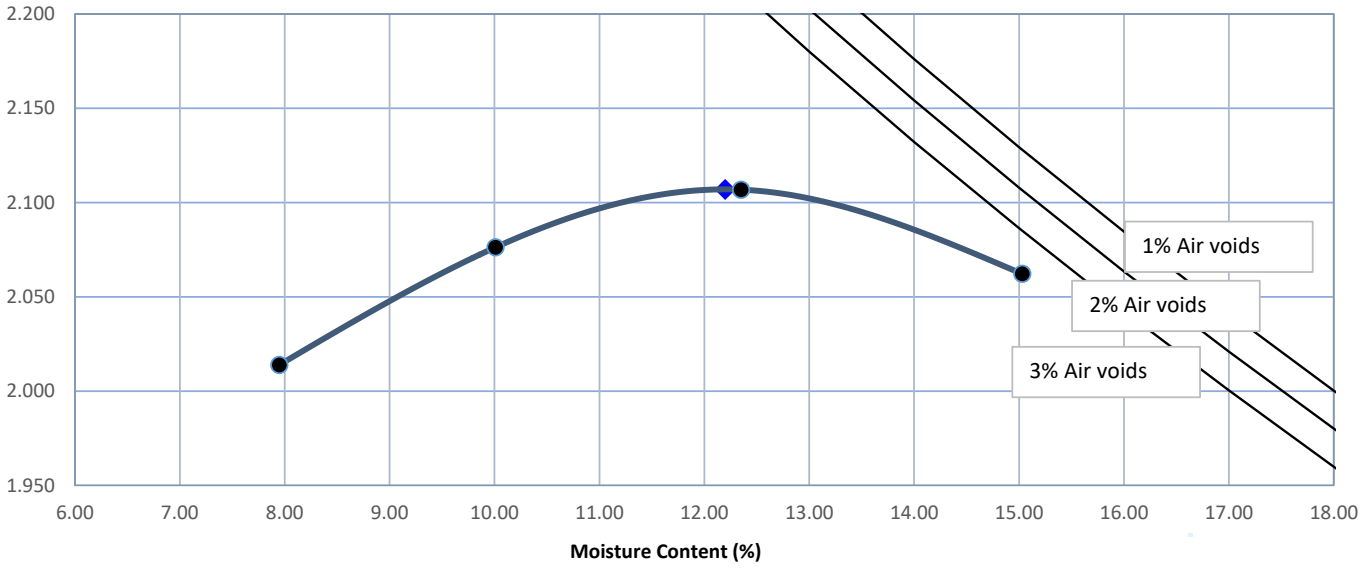
Sample Curing Time (Hours): 48

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 0 **Material + 37.5mm (%)** -

Moisture Content (%)	**7.9**	**10.0**	**12.4**	**15.0**	
Dry Density (t/m³)	**2.014**	**2.076**	**2.107**	**2.062**	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **2.11**

Optimum Moisture Content (%) **12.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 3.175 t/m³*

Approved Signatory: [redacted]

Na

Date: 16/February/2024

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WESTERN GEOTECHNICAL & Laboratory Services

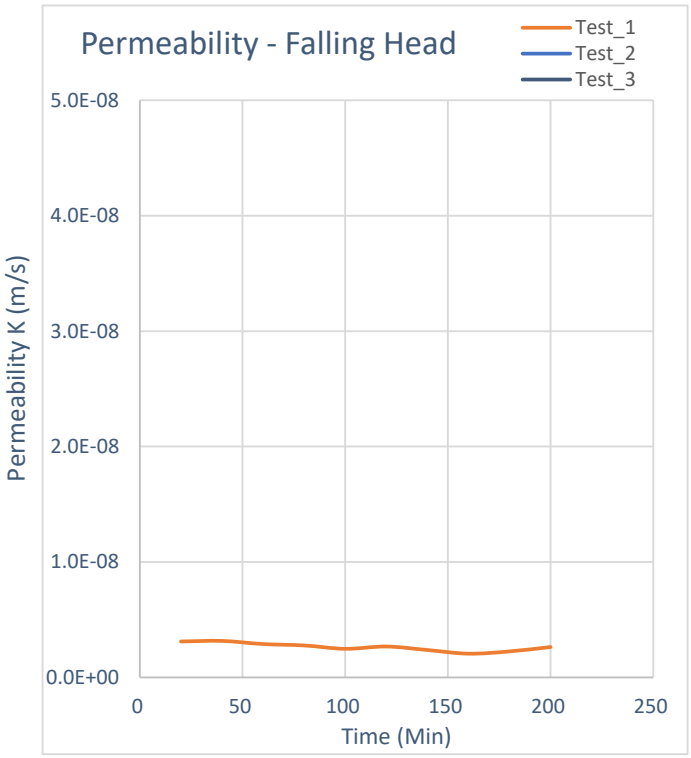
SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT AS 1289.6.7.2

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2498_1_FHPERM
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2498
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification	RR-TPG02 (0.0-0.4)m	*Date Tested:*	15/02 - 26/02/24

TEST RESULTS - FALLING HEAD PERMEABILITY

Sampling Method: Sampled by Client, Tested as Received



Compaction Details	
Compaction Method	AS 1289.5.2.1
Hammer Type	Modifed
CuringTime (Hours)	48
% Retained on 19.0mm	0
Maximum Dry Density (t/m^3)	2.11
Optimum Moisture (%)	12.0
Target Dry Density Ratio	95
Target Moisture Ratio	100

Specimen Conditions at Compaction	
Laboratory Density Ratio (%)	94.8
Laboratory Moisture Ratio (%)	101.5
Surcharge (kPa)	3

Coefficient of Permeability K_{20} (m/s) **2.64E-09**

Comments:

Approved Signatory: [redacted]

Name:

Date: 28/February/2024

NATA Accreditation No. 20599
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

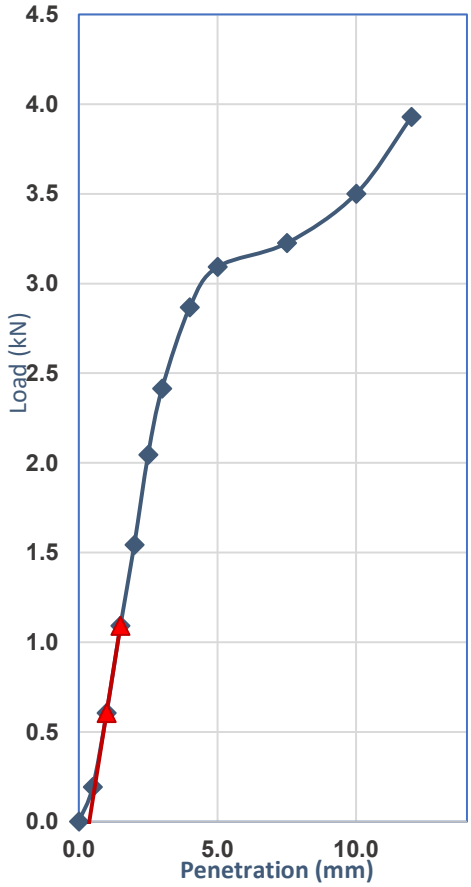
Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2498_1_SCBR
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2498
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG02 (0.0-0.4)m	*Date Tested:*	15/02 - 21/02/24

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Silty Sand with Gravel

Sampling Method: Sampled by Client, Tested as Received

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	24.0
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	2.11	Optimum Moisture (%)	12.0
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	2.01	Moisture Content (%)	11.7
Density Ratio (%)	95.5	Moisture Ratio (%)	96.0

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	2.01	Dry Density Ratio (%)	95.5
Moisture Content (%)	16.8	Moisture Ratio (%)	138.0

Specimen Conditions After Test			
Top 30mm Moisture (%)	16.6	Remaining Depth (%)	16.4

Correction applied to Penetration: 0.4mm

Determined at a Penetration of: 2.5mm

California Bearing Ratio (CBR): 18%

Comments:

Approved Signatory: [redacted]

Name:

Date: 22/February/2024

NATA

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

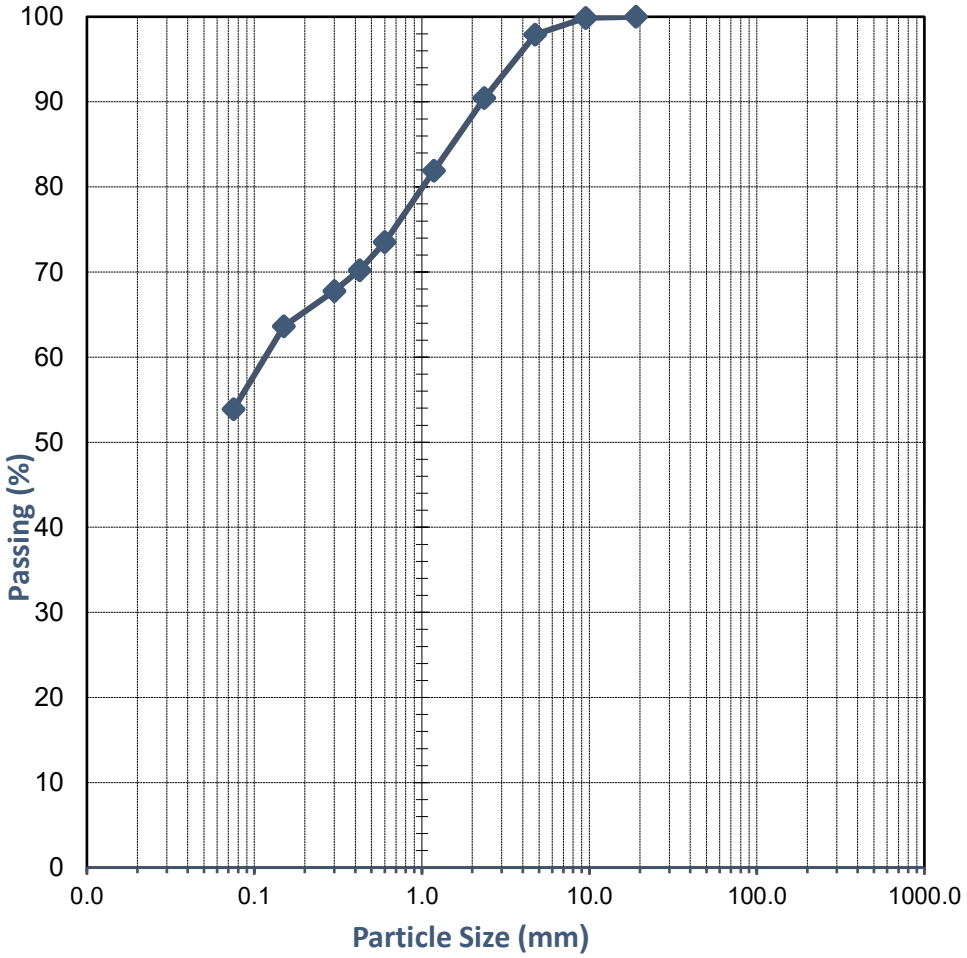
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2499_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2499
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPE01 (0.0-0.5)m	*Date Tested:*	23/02 - 26/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	100
4.75	98
2.36	90
1.18	82
0.600	74
0.425	70
0.300	68
0.150	64
0.075	54



Comments:

Approved Signatory: [redacted]

Name:

Date: 28/February/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2499_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2499
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPE01 (0.0-0.5)m	*Date Tested:*	27/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**30**
AS 1289.3.2.1	**Plastic Limit (%)**	**17**
AS 1289.3.3.1	**Plasticity Index (%)**	**13**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**7.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Curled**

Comments:

Approved Signatory: [redacted]

Name: C[redacted]

Date: 28/February/2024

NATA

Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
E-mail: Phillip.li@eprecisionlab.com

E-Precision Laboratory

FALLING HEAD PERMEABILITY TEST REPORT

Test Method: AS1289 6.7.2

Client:	Western Geotechnical Lab Services	Date Tested:	17/02/2024
Project:	Rhodes Ridge 2024	Date Reported:	22/02/2024
Lab:	EPLAB	EP Lab Job Number:	WGEO
Tested by:	Phil		
Checked by:	Phil		

Lab ID:	WG24_2499_FH		WG24_2500_FH	
Client ID:	RR-TPE01		RR-TPE03	
Depth (m):	0.00 - 0.50		0.00 - 0.40	
Sample Conditions:	Insitu		Insitu	
Surcharge Pressure (kPa):	12.5		12.5	
Initial Bulk Density (t/m³):	2.04		2.07	
Initial Moisture Content (%):	21.24		17.55	
Dry Density (t/m³):	1.68		1.76	
Saturation (Skempton's B):	1.00		1.00	
K_{20} (m/s):	**5.17×10^{-7}**		**9.25×10^{-7}**	

Notes:
Stored and Tested the Sample as received
Samples supplied by the Client

[redacted]

Authorised Signatory (Geotechnical Engineer):

Integrity Precision Innovation

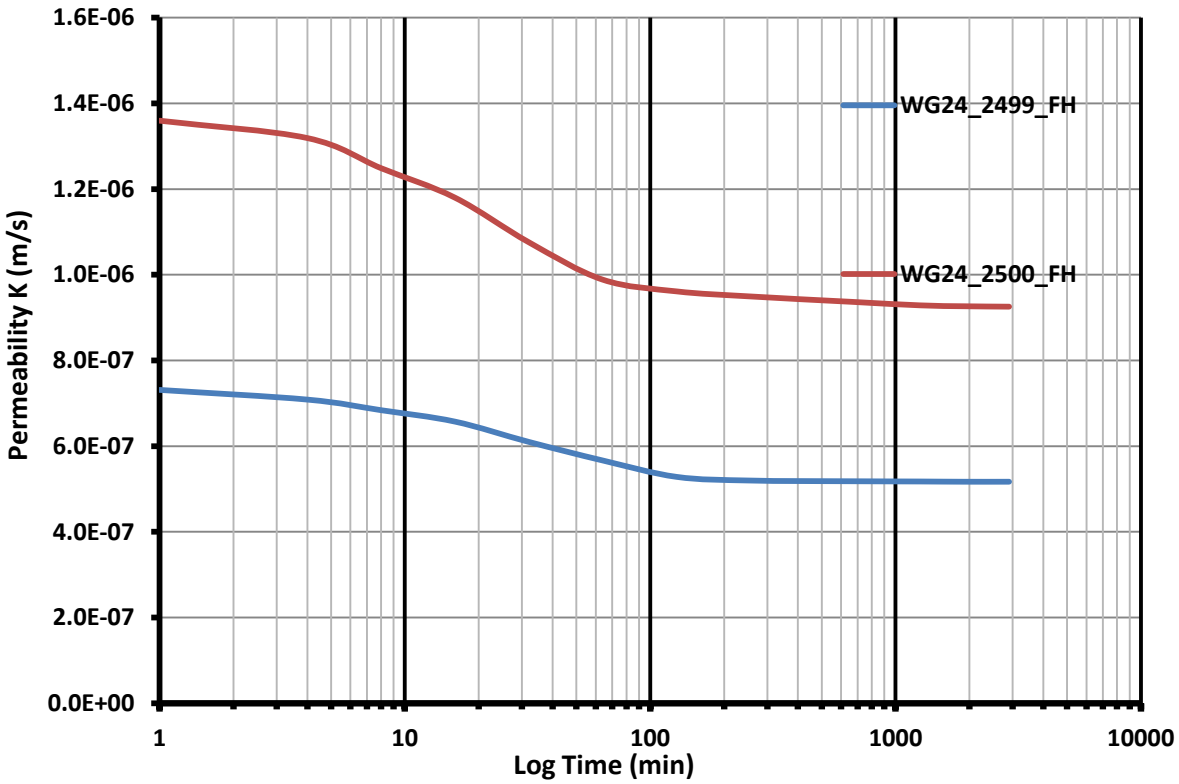
Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
E-mail: Phillip.li@eprecisionlab.com

E-Precision Laboratory

FALLING HEAD PERMEABILITY TEST REPORT

Test Method: AS1289 6.7.2

Client:	Western Geotechnical Lab Services	Date Tested:	17/02/2024
Project:	Rhodes Ridge 2024	Date Reported:	22/02/2024
Lab:	EPLAB	EP Lab Job Number:	WGEO



Notes:

Stored and Tested the Sample as received

Samples supplied by the Client

Authorised Signatory (Geotechnical Engineer): [redacted]

Integrity Precision Innovation

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

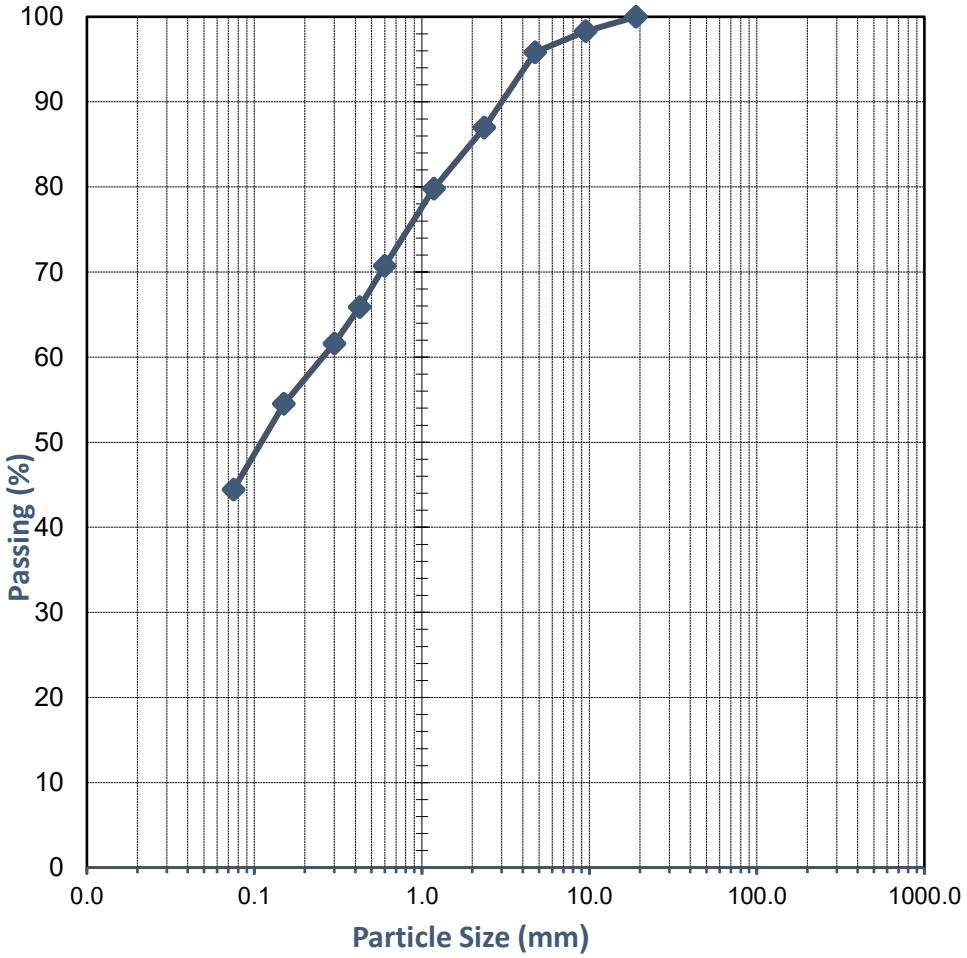
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2500_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2500
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPE03 (0.0-0.4)m	*Date Tested:*	23/02 - 26/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	98
4.75	96
2.36	87
1.18	80
0.600	71
0.425	66
0.300	62
0.150	55
0.075	44



Comments:

Approved Signatory: [redacted]

Name:

Date: 28/February/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2500_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2500
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPE03 (0.0-0.4)m	*Date Tested:*	27/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**30**
AS 1289.3.2.1	**Plastic Limit (%)**	**16**
AS 1289.3.3.1	**Plasticity Index (%)**	**14**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**7.5**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory: [redacted]

Name:

Date: 28/February/2024

NATA

Accreditation No. 20599
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

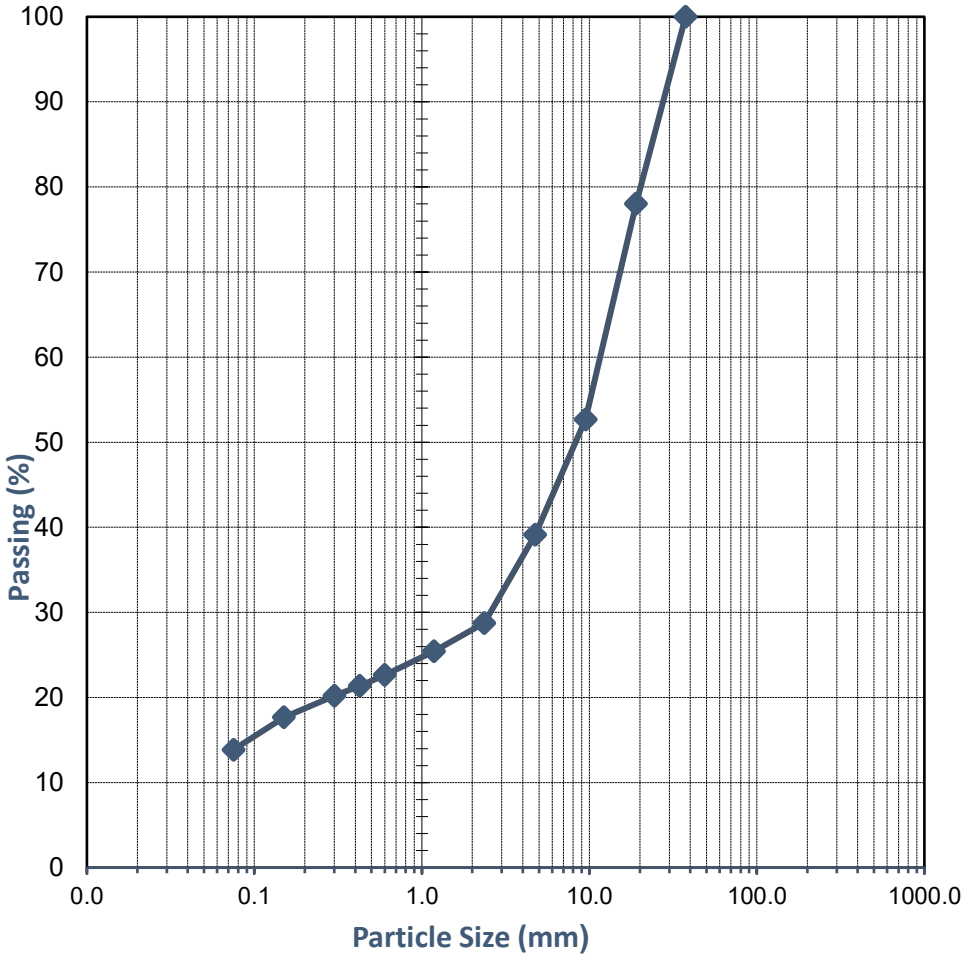
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2501_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2501
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA1-01	*Date Tested:*	15/02 - 16/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	100
19.0	78
9.5	53
4.75	39
2.36	29
1.18	25
0.600	23
0.425	21
0.300	20
0.150	18
0.075	14



Comments:

Approved Signatory: [redacted]

Name:

Date: 16/February/2024

Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2501_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2501
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA1-01	*Date Tested:*	16/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**25**
AS 1289.3.2.1	**Plastic Limit (%)**	**13**
AS 1289.3.3.1	**Plasticity Index (%)**	**12**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**5.5**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked**

Comments:

Approved Signatory: [redacted]

Name:

Date: 19/February/2024

NATA

Accreditation No. 20599
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - *AS 1289.5.2.1, AS 1289.2.1.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2501_1_MMDD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2501
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA1-01	*Date Tested:*	15/02/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

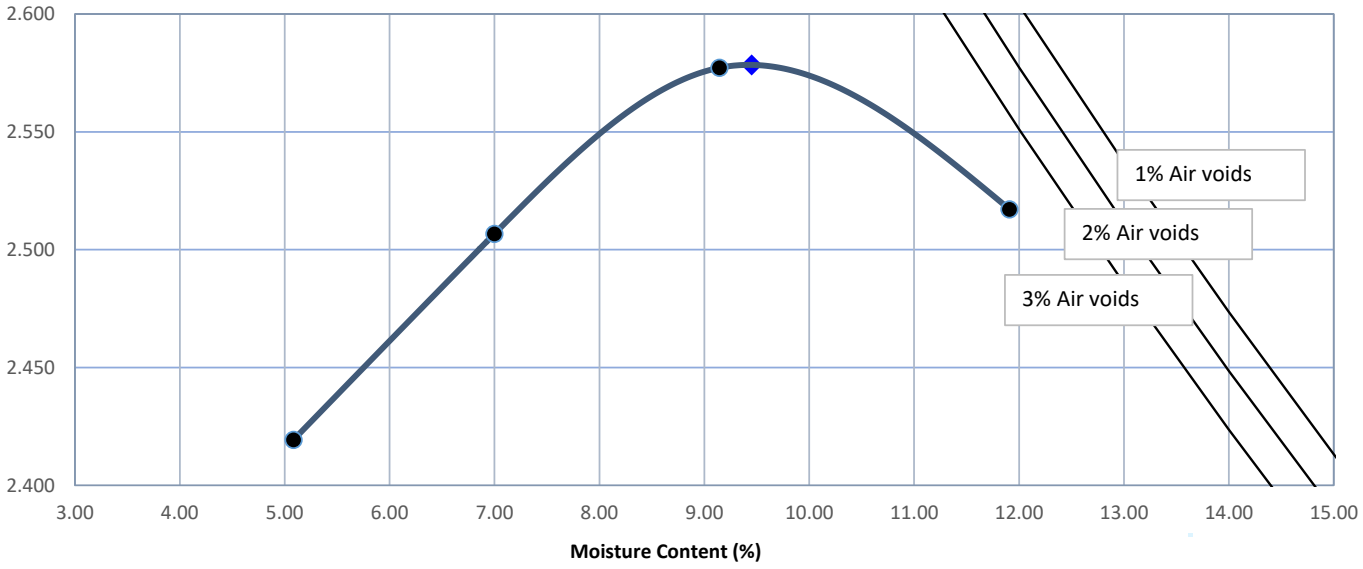
Sample Curing Time (Hours): 48

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 21 **Material + 37.5mm (%)** -

Moisture Content (%)	**5.1**	**7.0**	**9.1**	**11.9**	
Dry Density (t/m³)	**2.419**	**2.507**	**2.577**	**2.517**	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **2.58**

Optimum Moisture Content (%) **9.5**

Comments: *The above air void lines are derived from a calculated apparent particle density of 3.843 t/m³*

**Deviation from test method, greater than 20% retained on the 19.00mm sieve. Tested as per clients request. NATA accreditation does not cover the performance of this service.*

Approved Signatory: [redacted]

Na

Date: 16/February/2024

NATA ACCREDITATION

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

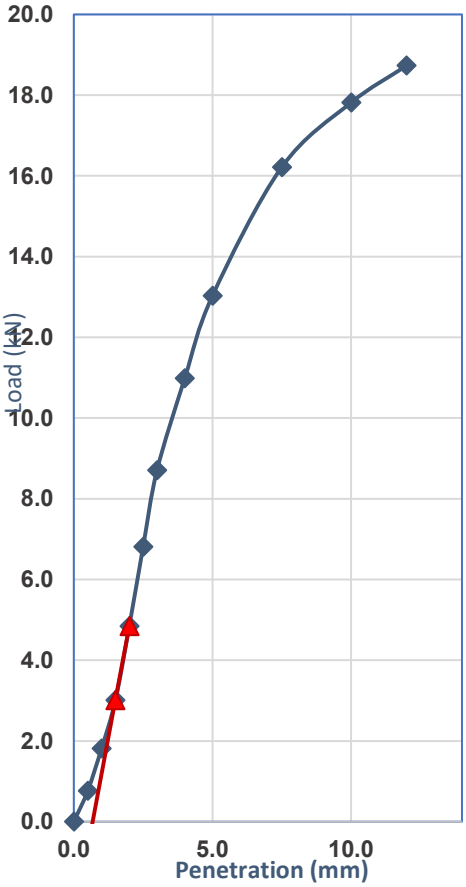
Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2501_1_SCBR
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2501
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA1-01	*Date Tested:*	15/02 - 21/02/24

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Silty Gravel

Sampling Method: Sampled by Client, Tested as Received

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	24.0
% Retained 19.0mm	21	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	2.58	Optimum Moisture (%)	9.5
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	2.44	Moisture Content (%)	9.8
Density Ratio (%)	95.0	Moisture Ratio (%)	103.5

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	2.44	Dry Density Ratio (%)	94.5
Moisture Content (%)	11.7	Moisture Ratio (%)	123.0

Specimen Conditions After Test			
Top 30mm Moisture (%)	10.4	Remaining Depth (%)	11.3

Correction applied to Penetration: 0.7mm

Determined at a Penetration of: 5.0mm

California Bearing Ratio (CBR): 70%

Comments:

Approved Signator [redacted]

Nam

Date: 22/February/2024

NATA

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

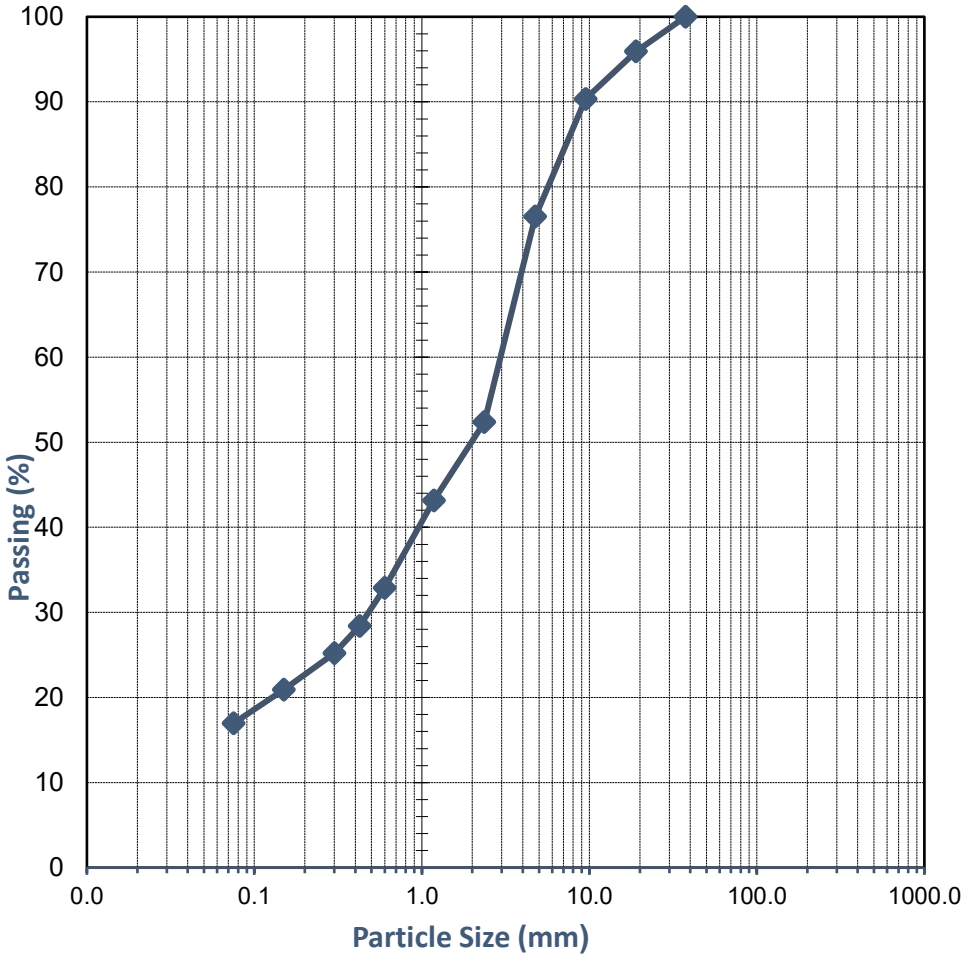
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2502_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2502
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-01	*Date Tested:*	15/02 - 16/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	100
19.0	96
9.5	90
4.75	77
2.36	52
1.18	43
0.600	33
0.425	28
0.300	25
0.150	21
0.075	17



Comments:

Approved Signatory: [redacted]

Name:

Date: 16/February/2024

NATA

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2502_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2502
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-01	*Date Tested:*	16/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**26**
AS 1289.3.2.1	**Plastic Limit (%)**	**16**
AS 1289.3.3.1	**Plasticity Index (%)**	**10**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**5.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory: [redacted]

Name:

Date: 19/February/2024

NATA

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2502_1_MMDD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2502
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-01	*Date Tested:*	15/02/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

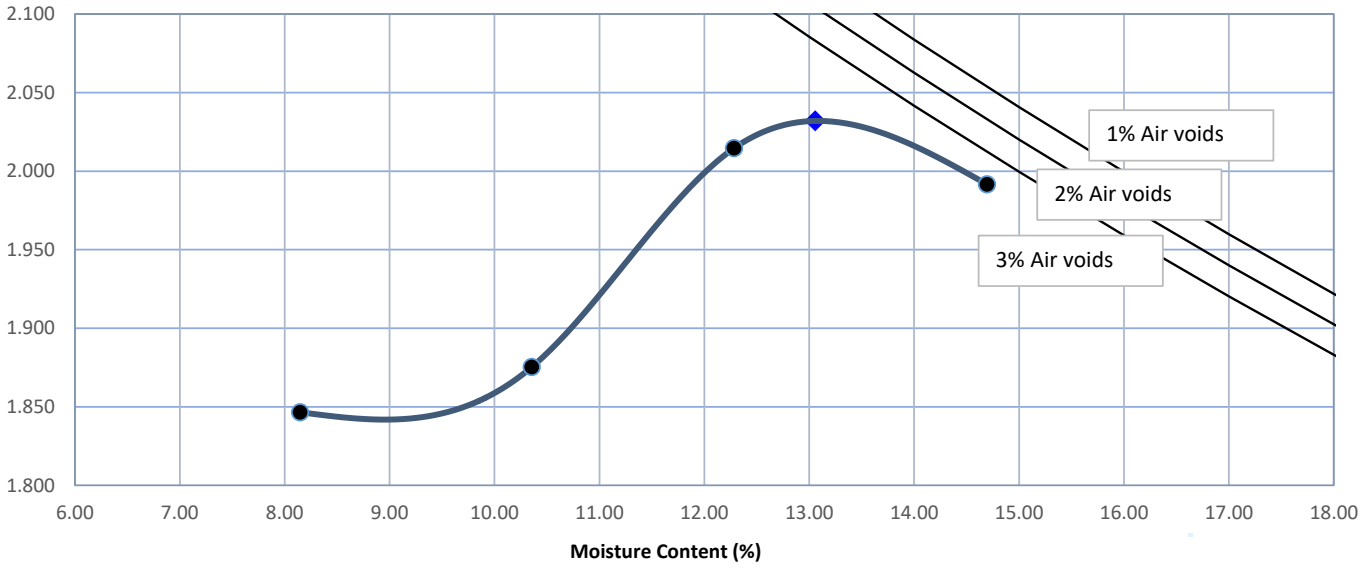
Sample Curing Time (Hours): 48

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 4 **Material + 37.5mm (%)** -

Moisture Content (%)	**8.1**	**10.4**	**12.3**	**14.7**	
Dry Density (t/m³)	**1.847**	**1.875**	**2.015**	**1.992**	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **2.03**

Optimum Moisture Content (%) **13.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.984 t/m³*

Approved Signatory: [redacted]

Na

Date: 16/February/2024

NATA **Accreditation No. 20599**
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

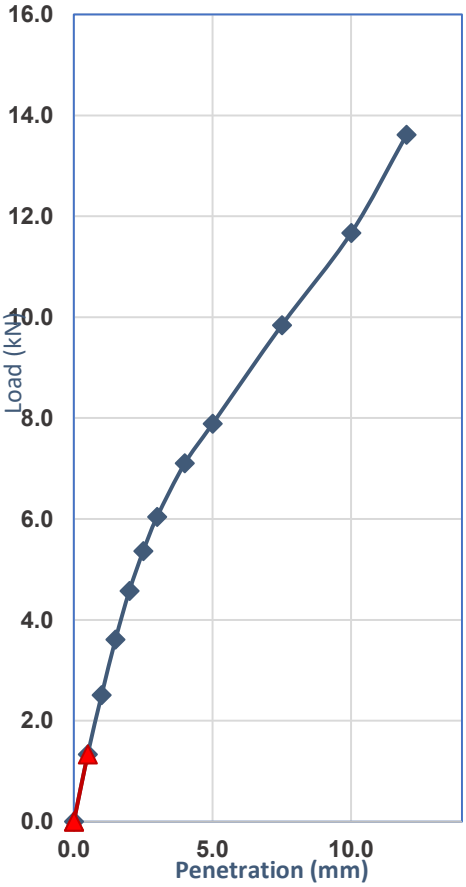
Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2502_1_SCBR
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2502
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-01	*Date Tested:*	15/02 - 21/02/24

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Silty Gravel

Sampling Method: Sampled by Client, Tested as Received

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	24.0
% Retained 19.0mm	4	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	2.03	Optimum Moisture (%)	13.0
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.94	Moisture Content (%)	12.7
Density Ratio (%)	95.5	Moisture Ratio (%)	97.0

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	1.94	Dry Density Ratio (%)	95.0
Moisture Content (%)	15.6	Moisture Ratio (%)	119.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	14.5	Remaining Depth (%)	15.7

Correction applied to Penetration: 0mm

Determined at a Penetration of: 2.5mm

California Bearing Ratio (CBR): 40%

Comments:

Approved Signatory: [redacted]

Name:

Date: 22/February/2024

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Accreditation No. 20599

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

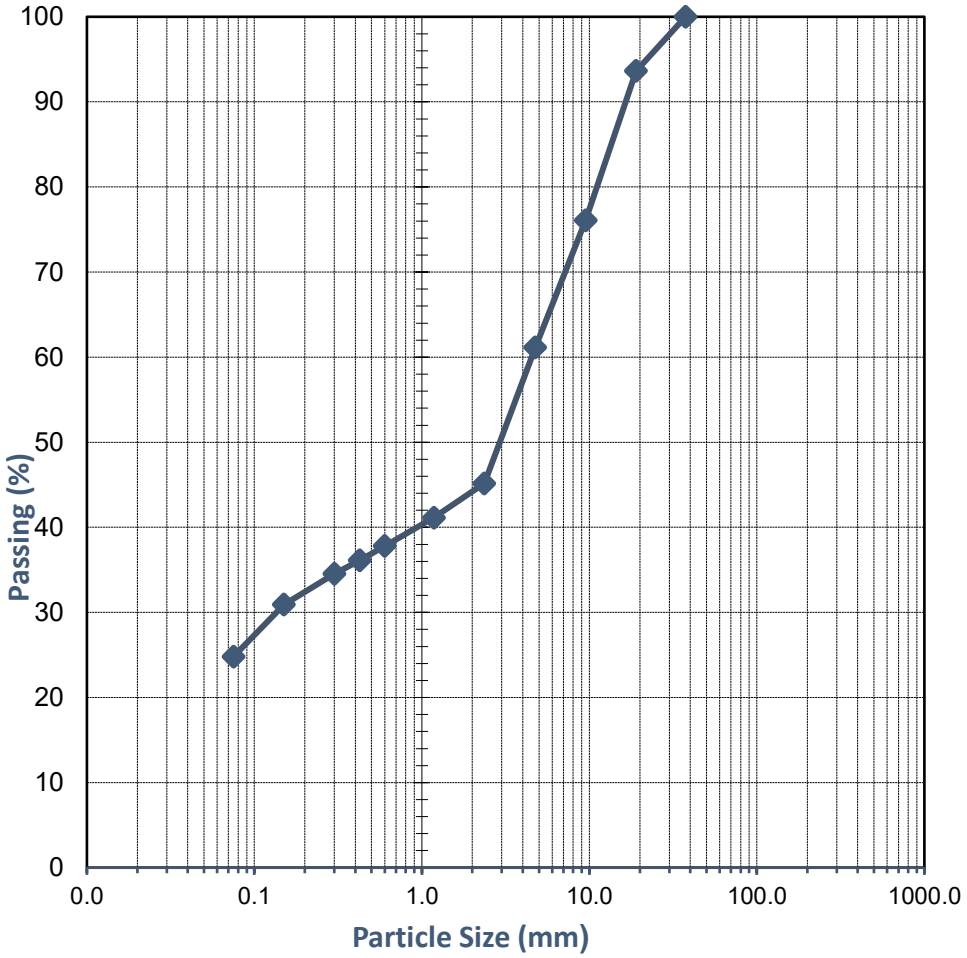
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2503_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2503
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-02	*Date Tested:*	15/02 - 16/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	100
19.0	94
9.5	76
4.75	61
2.36	45
1.18	41
0.600	38
0.425	36
0.300	35
0.150	31
0.075	25



Comments:

Approved Signatory [redacted]

Name

Date: 16/February/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2503_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2503
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-02	*Date Tested:*	16/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**26**
AS 1289.3.2.1	**Plastic Limit (%)**	**12**
AS 1289.3.3.1	**Plasticity Index (%)**	**14**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**7.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory: [redacted]

Name:

Date: 19/February/2024

NATA

Accreditation No. 20599
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2503_1_MMDD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2503
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-02	*Date Tested:*	15/02/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

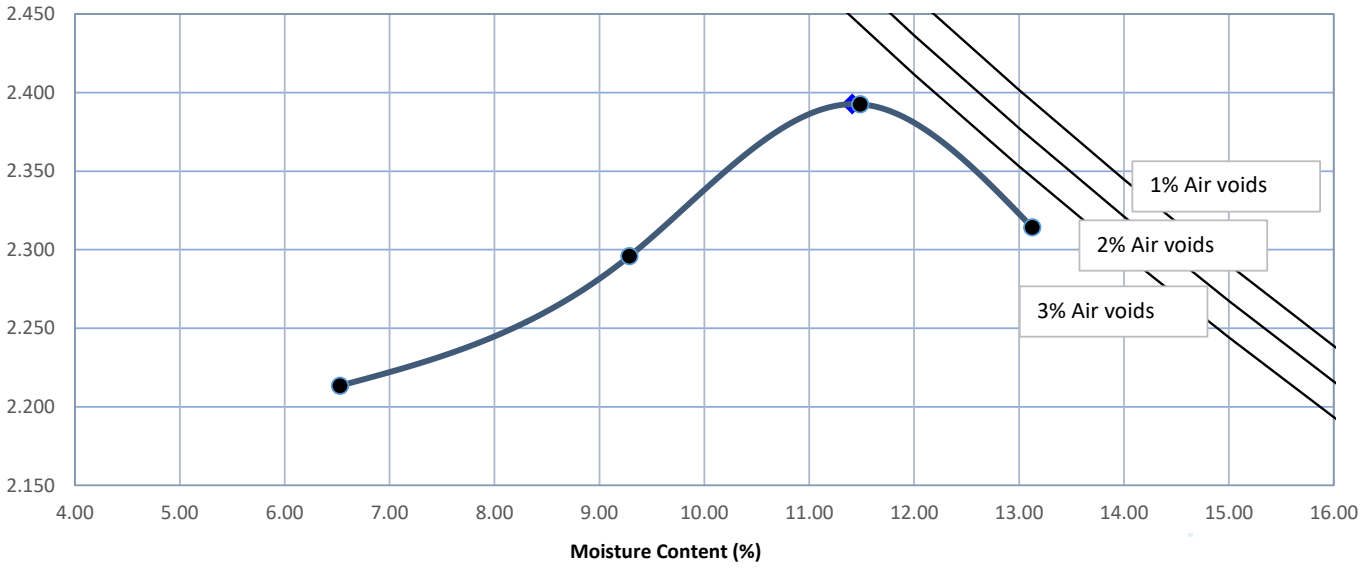
Sample Curing Time (Hours): 48

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 15 **Material + 37.5mm (%)** -

Moisture Content (%)	6.5	9.3	11.5	13.1	
Dry Density (t/m³)	2.213	2.296	2.393	2.314	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **2.39**

Optimum Moisture Content (%) **11.5**

Comments: *The above air void lines are derived from a calculated apparent particle density of 3.543 t/m³*

Approved Signatory: [redacted]

Na

Date: 16/February/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

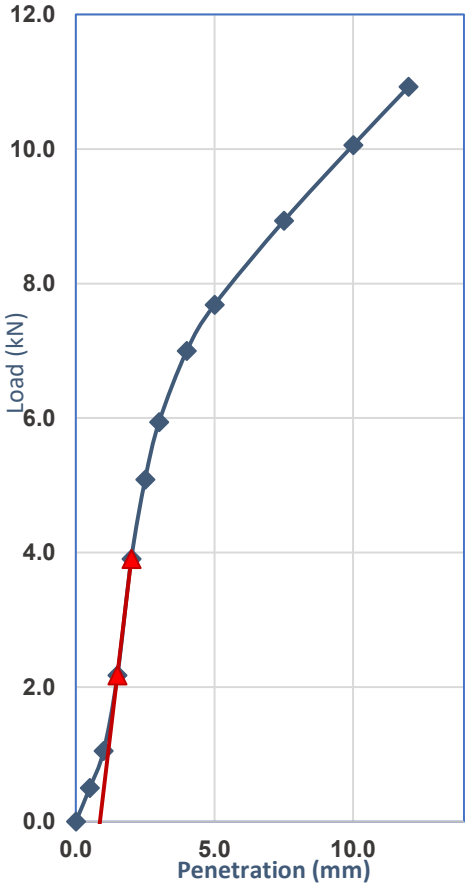
Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2503_1_SCBR
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2503
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-02	*Date Tested:*	15/02 - 21/02/24

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Silty Gravel

Sampling Method: Sampled by Client, Tested as Received

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	24.0
% Retained 19.0mm	15	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	2.39	Optimum Moisture (%)	11.5
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	2.27	Moisture Content (%)	11.6
Density Ratio (%)	95.0	Moisture Ratio (%)	102.0

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	2.27	Dry Density Ratio (%)	95.0
Moisture Content (%)	13.5	Moisture Ratio (%)	118.0

Specimen Conditions After Test			
Top 30mm Moisture (%)	12.9	Remaining Depth (%)	13.0

Correction applied to Penetration: 0.9mm

Determined at a Penetration of: 2.5mm

California Bearing Ratio (CBR): 50%

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 22/February/2024

NATA

Accreditation No. 20599

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Appendix D Geochemical Laboratory Results

						Exchangeable Cations					
						Calcium	Potassium	Magnesium	Sodium	Cation Exchange Capacity (CEC)	Exchangeable Sodium Percentage (ESP)
					RptUnits	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	%
					PQL	0.10	0.10	0.10	0.10	0.10	1.0
					Matrix	Soil	Soil	Soil	Soil	Soil	Soil
					Method	METALS-020_008A	METALS-020_008A	METALS-020_008A	METALS-020_008A	METALS-020_008A	METALS-020
Reference	Description	Sample Description	Sample Depth	Date Sampled	Type of Sample						
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPG02	0.0-0.4	01/02/2024	Soil	2.6	0.59	1.2	0.11	4.5	2.4
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE01	0.0-0.1	01/02/2024	Soil	1.6	0.42	0.77	<0.10	2.8	Not Reportable
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE01	0.1-0.5	01/02/2024	Soil	2.3	0.57	1.2	0.13	4.2	3.1
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE02	0.0-0.5	01/02/2024	Soil	2.2	0.55	1.3	<0.10	4.2	Not Reportable
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE02	0.5-0.8	01/02/2024	Soil	2.0	0.59	1.1	<0.10	3.8	Not Reportable
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE03	0.0-0.4	01/02/2024	Soil	3.0	0.72	1.4	0.14	5.3	2.7

					Count	6	6	6	6	6	6
					Maximum	3	0.72	1.4	0.14	5.3	3.1
					Minimum	1.6	0.42	0.77	<0.10	2.8	Not Reportable
					Average	2.3	0.57	1.16	0.09	4.1	2.7
					Standard Deivation	0.4	0.09	0.2	0.04	0.8	0.3
					95% Upper Confidence Limit	2.6	0.64	1.32	0.12	4.7	2.9

						Inorganics - General Physical Parameters		Inorganics - General Chemical Parameters		PBI/PRI	
						pH	Electrical Conductivity	Chloride	Sulfate	Phosphorus Buffer Index	Phosphorus Retention Index
					RptUnits	pH units	µS/cm	mg/kg	mg/kg	-	-
					PQL		2.0	10	10		
					Matrix	Soil	Soil	Soil	Soil	Soil	Soil
					Method	INORG-001	INORG-002	INORG-081	INORG-081	AGRI-003_ASPAC	AGRI-003_PRI
Reference	Description	Sample Description	Sample Depth	Date Sampled	Type of Sample						
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPG02	0.0-0.4	01/02/2024	Soil	5.4	27	<10	21	89	140
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE01	0.0-0.1	01/02/2024	Soil	5.4	11	<10	<10	130	350
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE01	0.1-0.5	01/02/2024	Soil	5.2	34	<10	27	100	160
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE02	0.0-0.5	01/02/2024	Soil	5.6	14	<10	10	93	110
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE02	0.5-0.8	01/02/2024	Soil	5.4	15	<10	11	120	200
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE03	0.0-0.4	01/02/2024	Soil	5.4	31	<10	16	65	50
					Count	6	6	6	6	6	6
					Maximum	5.6	34	<10	27	130	350
					Minimum	5.2	11	<10	<10	65	50
					Average	5.4	22	<10	15	100	168
					Standard Deivation	0.1	9	N/A	7	21	93
					95% Upper Confidence Limit	5.5	29	N/A	21	116	243

Envirolab Services (WA) Pty Ltd trading as MPL Laboratories
ABN 53 140 099 207
16-18 Hayden Court Myaree WA 6154
ph +61 8 9317 2505
[redacted]
www.mpl.com.au

Certificate of Analysis PFB0120

Client Details

Client	Calibre Professional Services One Pty Ltd
Contact	[redacted]
Address	L2, 50 St Georges Terrace, PERTH, WA, 6000

Sample Details

Your Reference	PS210911 - Rhodes Ridge Camp Investigation
Number of Samples	6 Soil
Date Samples Received	02/02/2024
Date Instructions Received	02/02/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	13/02/2024
Date of Issue	12/02/2024

Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Results Approved By

[redacted]

Laboratory Manager

Certificate of Analysis PFB0120

Samples in this Report

Envirolab ID	Sample ID	Depth	Matrix	Date Sampled	Date Received
PFB0120-01	RR-TPG02	0.00-0.40	Soil	01/02/2024	02/02/2024
PFB0120-02	RR-TPE01		Soil	01/02/2024	02/02/2024
PFB0120-03	RR-TPE01	0.10-0.50	Soil	01/02/2024	02/02/2024
PFB0120-04	RR-TPE02	0.00-0.50	Soil	01/02/2024	02/02/2024
PFB0120-05	RR-TPE02	0.50-0.80	Soil	01/02/2024	02/02/2024
PFB0120-06	RR-TPE03	0.00-0.40	Soil	01/02/2024	02/02/2024

Exchangeable Cations (Soil)

Envirolab ID	Units	PQL	PFB0120-01	PFB0120-02	PFB0120-03	PFB0120-04	PFB0120-05
Your Reference			RR-TPG02	RR-TPE01	RR-TPE01	RR-TPE02	RR-TPE02
Date Sampled			01/02/2024	01/02/2024	01/02/2024	01/02/2024	01/02/2024
Depth			0.00-0.40		0.10-0.50	0.00-0.50	0.50-0.80
Calcium	meq/100g	0.10	2.6	1.6	2.3	2.2	2.0
Potassium	meq/100g	0.10	0.59	0.42	0.57	0.55	0.59
Magnesium	meq/100g	0.10	1.2	0.77	1.2	1.3	1.1
Sodium	meq/100g	0.10	0.11	<0.10	0.13	<0.10	<0.10
Cation Exchange Capacity (CEC)	meq/100g	0.10	4.5	2.8	4.2	4.2	3.8
Exchangeable Sodium Percentage (ESP)	%	1.0	2.4	Not Reportable	3.1	Not Reportable	Not Reportable

Envirolab ID	Units	PQL	PFB0120-06
Your Reference			RR-TPE03
Date Sampled			01/02/2024
Depth			0.00-0.40
Calcium	meq/100g	0.10	3.0
Potassium	meq/100g	0.10	0.72
Magnesium	meq/100g	0.10	1.4
Sodium	meq/100g	0.10	0.14
Cation Exchange Capacity (CEC)	meq/100g	0.10	5.3
Exchangeable Sodium Percentage (ESP)	%	1.0	2.7

Certificate of Analysis PFB0120

Inorganics - General Physical Parameters (Soil)

Envirolab ID	Units	PQL	PFB0120-01	PFB0120-02	PFB0120-03	PFB0120-04	PFB0120-05
Your Reference			RR-TPG02	RR-TPE01	RR-TPE01	RR-TPE02	RR-TPE02
Date Sampled			01/02/2024	01/02/2024	01/02/2024	01/02/2024	01/02/2024
Depth			0.00-0.40		0.10-0.50	0.00-0.50	0.50-0.80
pH	pH units		5.4	5.4	5.2	5.6	5.4
Electrical Conductivity	µS/cm	2.0	27	11	34	14	15

Envirolab ID	Units	PQL	PFB0120-06
Your Reference			RR-TPE03
Date Sampled			01/02/2024
Depth			0.00-0.40
pH	pH units		5.4
Electrical Conductivity	µS/cm	2.0	31

Certificate of Analysis PFB0120

Inorganics - General Chemical Parameters (Soil)

Envirolab ID	Units	PQL	PFB0120-01	PFB0120-02	PFB0120-03	PFB0120-04	PFB0120-05
Your Reference			RR-TPG02	RR-TPE01	RR-TPE01	RR-TPE02	RR-TPE02
Date Sampled			01/02/2024	01/02/2024	01/02/2024	01/02/2024	01/02/2024
Depth			0.00-0.40		0.10-0.50	0.00-0.50	0.50-0.80
Chloride	mg/kg	10	<10	<10	<10	<10	<10
Sulfate	mg/kg	10	21	<10	27	10	11

Envirolab ID	Units	PQL	PFB0120-06
Your Reference			RR-TPE03
Date Sampled			01/02/2024
Depth			0.00-0.40
Chloride	mg/kg	10	<10
Sulfate	mg/kg	10	16

Certificate of Analysis PFB0120

PBI/PRI (Soil)

Envirolab ID	Units	PQL	PFB0120-01	PFB0120-02	PFB0120-03	PFB0120-04	PFB0120-05
Your Reference			RR-TPG02	RR-TPE01	RR-TPE01	RR-TPE02	RR-TPE02
Date Sampled			01/02/2024	01/02/2024	01/02/2024	01/02/2024	01/02/2024
Depth			0.00-0.40		0.10-0.50	0.00-0.50	0.50-0.80
Phosphorus Buffer Index	-		89	130	100	93	120
Phosphorus Retention Index	-		140	350	160	110	200

Envirolab ID	Units	PQL	PFB0120-06
Your Reference			RR-TPE03
Date Sampled			01/02/2024
Depth			0.00-0.40
Phosphorus Buffer Index	-		65
Phosphorus Retention Index	-		50

Method Summary

Method ID	Methodology Summary
AGRI-003_ASPAC	Phosphorous Buffering index (PBI) is the equilibration of a sample in a CaCl solution at a ratio of 1:10. The leachate is then centrifuged, diluted and the resultant solution is analysed colorimetrically. As per Rayment and Lyons 912c, 913c. Analyte(s) are certified to ASPAC in 2022 (Envirolab Services (WA) t/a MPL Laboratories only).
AGRI-003_PRI	Phosphorous Retention index (PRI) is the ratio of adsorbed phosphorus to the equilibrium concentration. Phosphorus is extracted using KCl and determined colourimetrically. Result value is used to calculate PRI as per Allen and Jefferey.
INORG-001	pH - Measured using pH meter and electrode based on APHA latest edition, Method 4500-H+. Please note that the results for water analyses are indicative only, as analysis can be completed outside of the APHA recommended holding times. Solids are reported from a 1:5 water extract unless otherwise specified. Alternatively, pH is determined in a 1:5 extract using 0.01M calcium chloride or a solid is extracted at a ratio of 1:2.5 (AS1289.4.3.1), pH is measured in the extract.
INORG-002	Conductivity and Salinity - measured using a conductivity cell at 25°C based on APHA latest edition Method 2510. Soil results reported from a 1:5 Soil:Water extract unless otherwise specified. Please note Resistivity is estimated by calculation and may not correlate with results otherwise obtained using the Resistivity current method (based on AS 1289.4.4.1), depending on the nature of the soil being analysed.
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
METALS-020	Determination of various metals by ICP-OES.
METALS-020_008A	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-OES analytical finish.

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFB0120

Client Details

Client	Calibre Professional Services One Pty Ltd
Your Reference	PS210911 - Rhodes Ridge Camp Investigation
Date Issued	12/02/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFB0120

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
CEC | Soil	1-6	01/02/2024	07/02/2024	07/02/2024	Yes
ESP | Soil	1-6	01/02/2024	07/02/2024	07/02/2024	Yes
Exchangeable Cations | Soil	1-6	01/02/2024	07/02/2024	07/02/2024	Yes
EC | Soil	1-6	01/02/2024	06/02/2024	07/02/2024	Yes
pH | Soil	1-6	01/02/2024	06/02/2024	07/02/2024	Yes
Chloride | Soil	1	01/02/2024	06/02/2024	07/02/2024	Yes
	2-6	01/02/2024	06/02/2024	08/02/2024	Yes
Sulfate | Soil	1	01/02/2024	06/02/2024	07/02/2024	Yes
	2-6	01/02/2024	06/02/2024	08/02/2024	Yes
PBI | Soil	1-6	01/02/2024	05/02/2024	07/02/2024	Yes
PRI | Soil	1-6	01/02/2024	05/02/2024	07/02/2024	Yes

Quality Control PFB0120

METALS-020_008A|Exchangeable Cations (Soil) | Batch BFB0614

Analyte	Units	PQL	Blank	DUP1 BFB0614-DUP1# Samp | QC | RPD %	LCS %	Spike % PFB0120-01
Calcium	meq/100g	0.10	<0.10	0.150 | 0.150 | 0.00	105	105
Potassium	meq/100g	0.10	<0.10	<0.10 | <0.10 | [NA]	104	104
Magnesium	meq/100g	0.10	<0.10	<0.10 | <0.10 | [NA]	99.7	99.1
Sodium	meq/100g	0.10	<0.10	<0.10 | <0.10 | [NA]	102	102
Cation Exchange Capacity (CEC)	meq/100g	0.10	<0.10		[NA]	[NA]
Exchangeable Sodium Percentage (ESP)	%	1.0	<1.0		[NA]	[NA]

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-001|Inorganics - General Physical Parameters (Soil) | Batch BFB0556

Analyte	Units	PQL	Blank	DUP1 BFB0556-DUP1# Samp | QC | RPD %	LCS %
pH	pH units		5.0	6.4 | 6.3 | 1.26	101
Electrical Conductivity	µS/cm	2.0	<2.0	19.3 | 21.5 | 10.8	106

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-081|Inorganics - General Chemical Parameters (Soil) | Batch BFB0557

Analyte	Units	PQL	Blank	DUP1 PFB0120-01 Samp | QC | RPD %	LCS %	Spike % PFB0120-02
Chloride	mg/kg	10	<10	<10 | <10 | [NA]	94.5	101
Sulfate	mg/kg	10	<10	21.1 | 21.3 | 0.526	93.3	102

AGRI-003_PRI|PBI/PRI (Soil) | Batch BFB0374

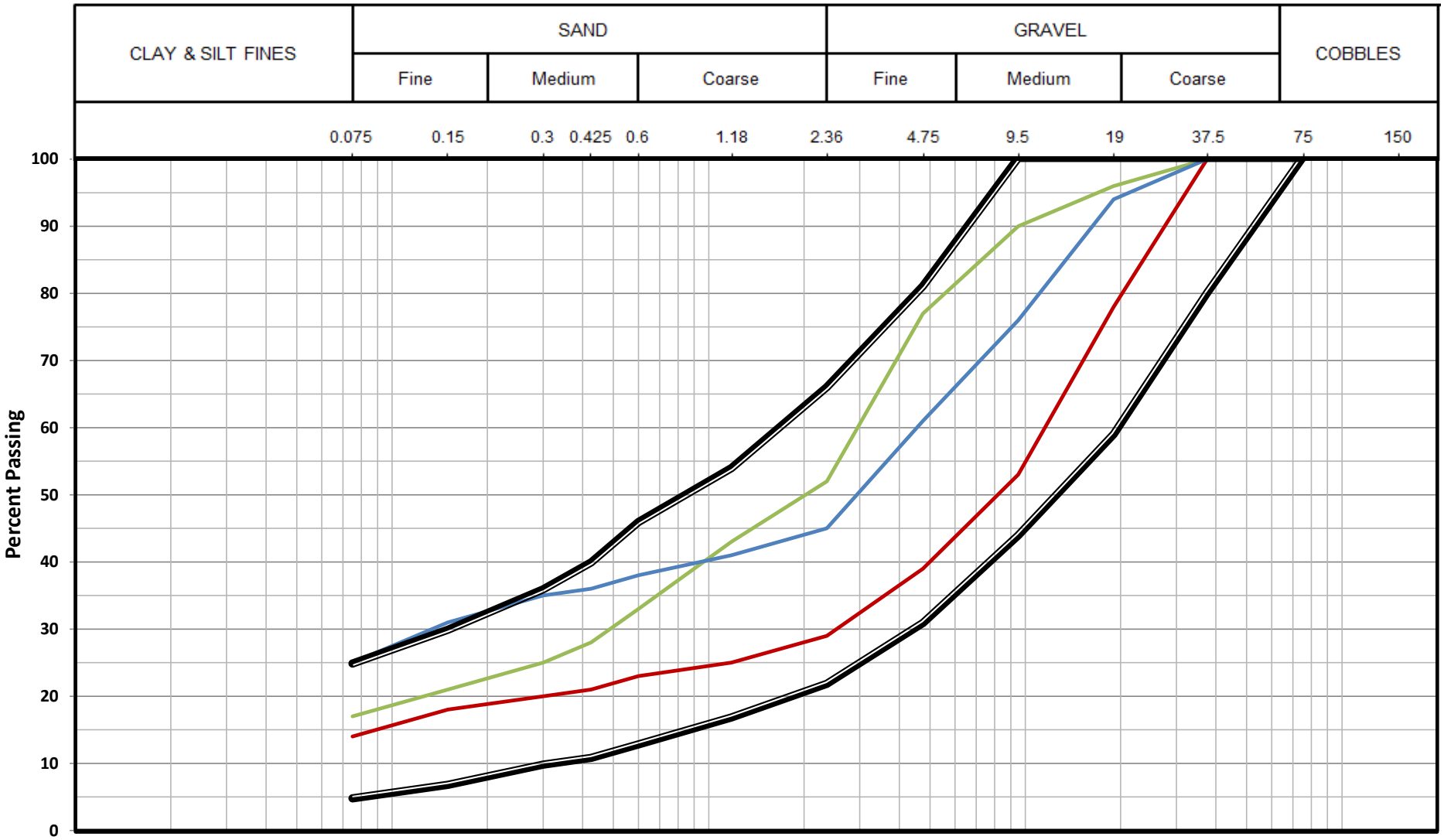
Analyte	Units	PQL	Blank	DUP1 BFB0374-DUP1# Samp | QC | RPD %	LCS %
Phosphorus Retention Index	-		0.00	198 | 192 | 3.00	104

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

AGRI-003_ASPAC|PBI/PRI (Soil) | Batch BFB0375

Analyte	Units	PQL	Blank	DUP1 PFB0120-01 Samp | QC | RPD %	LCS %
Phosphorus Buffer Index	-		0.00	89.0 | 90.4 | 1.57	83.2

Appendix E Borrow Material Assessment



RR-BA1-01 RR-BA2-01 RR-BA2-02

Type A - Select Fill - Upper Bound

Type A - Select Fill - Lower Bound

drawn	WP
approved	BL
date	05/03/24
scale	N.T.S
original size	A4

calibre

client: RTIO

project: RHODES RIDGE
RHODES RIDGE CONSTRUCTION CAMP

title: MATERIAL REUSE ASSESSMENT
TYPE A - SELECT FILL

project no: COPP210911

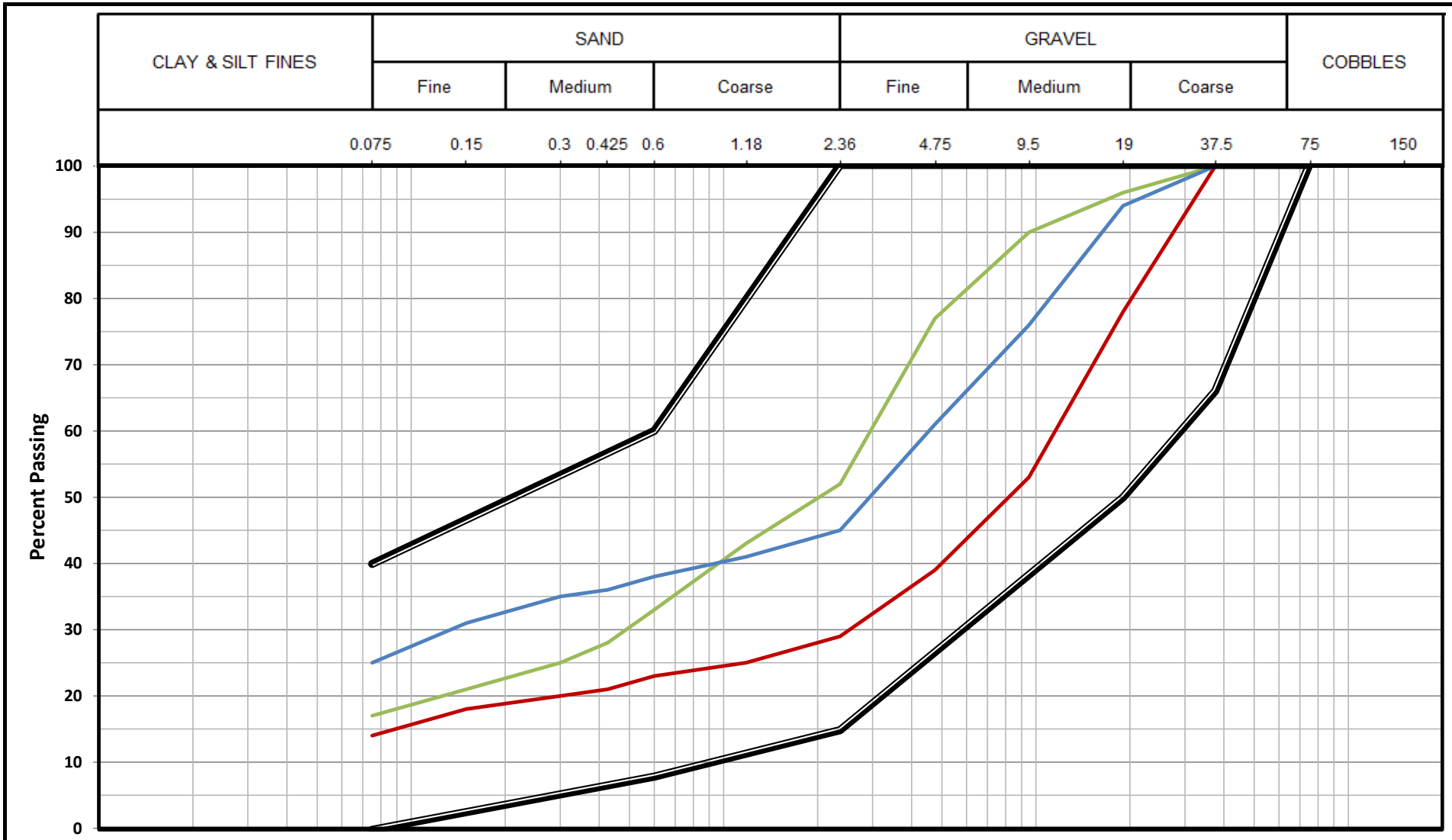
figure no: E-01

	RTIO Specification Requirements	RR-BA1-01	RR-BA2-01	RR-BA2-02					
Liquid Limit (LL)	≤35	25	26	26					
Plasticity Index (PI)	4 - 17	12	10	14					
Linear Shrinkage (LS)	≤10	6	8	7					

Meets Specification Requirements

Outside of Specification Requirements

drawn	WP	client:	RTIO
approved	BL	project:	RHODES RIDGE RHODES RIDGE CONSTRUCTION CAMP
date	05/03/24		
scale	N.T.S	title:	MATERIAL REUSE ASSESSMENT TYPE A - SELECT FILL
original size	A4	project no: COPP210911	figure no: E-02



RR-BA1-01

RR-BA2-01

RR-BA2-02

Type B - Common Fill - Upper Bound

Type B - Common Fill - Lower Bound

drawn	WP
approved	BL
date	11/03/24
scale	N.T.S
original size	A4

calibre

client: RTIO

project: RHODES RIDGE
RHODES RIDGE CONSTRUCTION CAMP

title: MATERIAL REUSE ASSESSMENT
TYPE B - COMMON FILL

project no: COPP210911

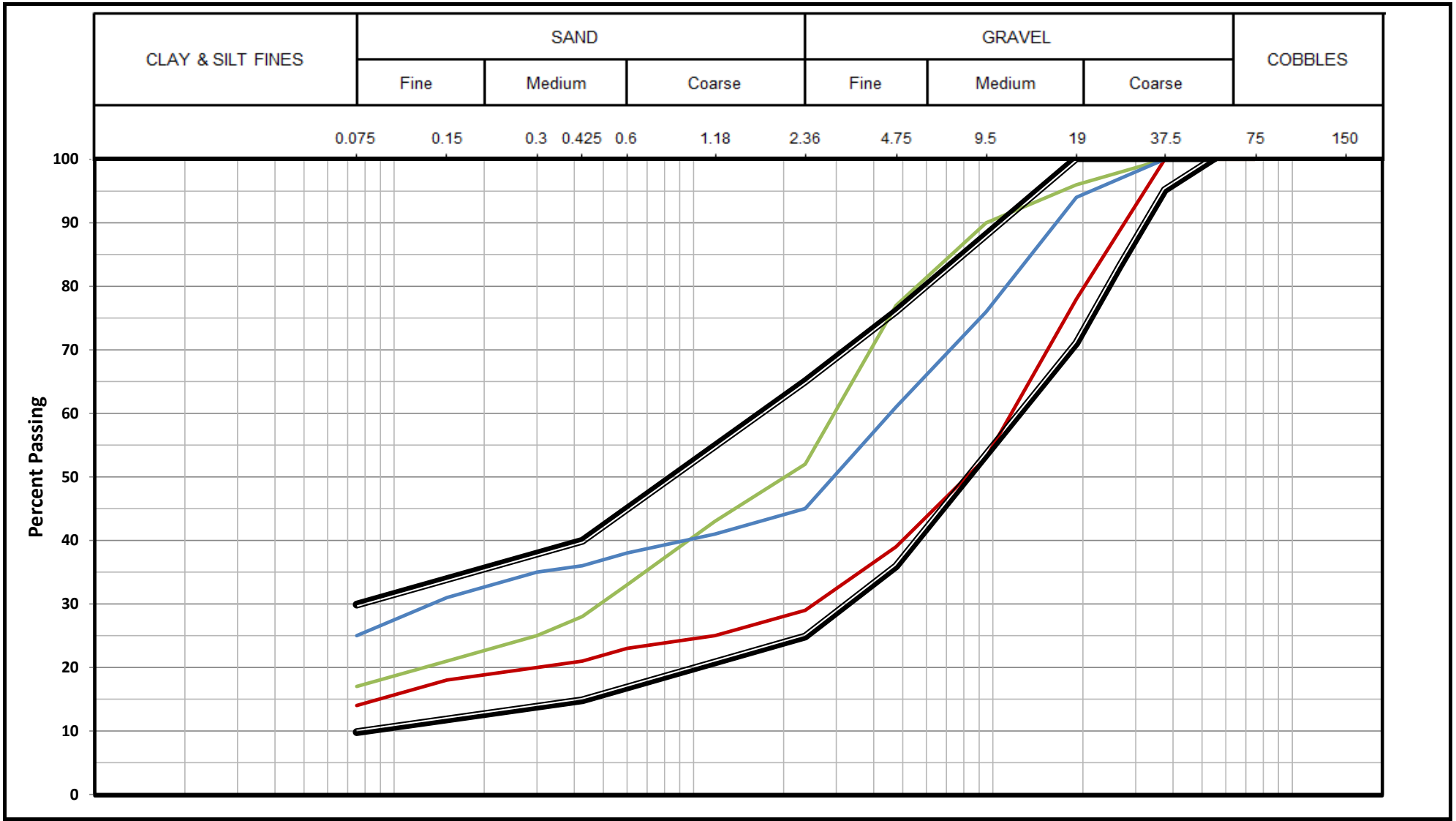
figure no: E-03

	RTIO Specification Requirements	RR-BA1-01	RR-BA2-01	RR-BA2-02					
Liquid Limit (LL)	≤40	25	26	26					
Plasticity Index (PI)	≤25	12	10	14					

Meets Specification Requirements

Outside of Specification Requirements

drawn	WP	client:	RTIO
approved	BL	project:	RHODES RIDGE RHODES RIDGE CONSTRUCTION CAMP
date	11/03/24	title:	MATERIAL REUSE ASSESSMENT TYPE B - COMMON FILL
scale	N.T.S	project no: COPP210911	figure no: E-04
original size	A4		



RR-BA1-01 RR-BA2-01 RR-BA2-02

Unsealed Basecourse - Upper Bound

Unsealed Basecourse - Lower Bound

drawn	WP
approved	BL
date	05/03/24
scale	N.T.S
original size	A4

calibre

client: RTIO

project: RHODES RIDGE
RHODES RIDGE CONSTRUCTION CAMP

title: MATERIAL REUSE ASSESSMENT
UNSEALED BASECOURSE

project no: COPP210911

figure no: E-05

	RTIO Specification Requirements	RR-BA1-01	RR-BA2-01	RR-BA2-02					
Liquid Limit (LL)	≤35	25	26	26					
Plasticity Index (PI)	4 - 15	12	10	14					
Dust Ratio (P0.075 / P0.425)	0.3 to 0.7	0.67	0.61	0.69					
Weighted PI (P0.425 * PI)	≤500	252	280	504					
CBR (%)	≥60	70	40	50					
Grading Coefficient	14 - 30	23	35	31					
Shrinkage Product	140-400	116	224	252					

Meets Specification Requirements

Outside of Specification Requirements

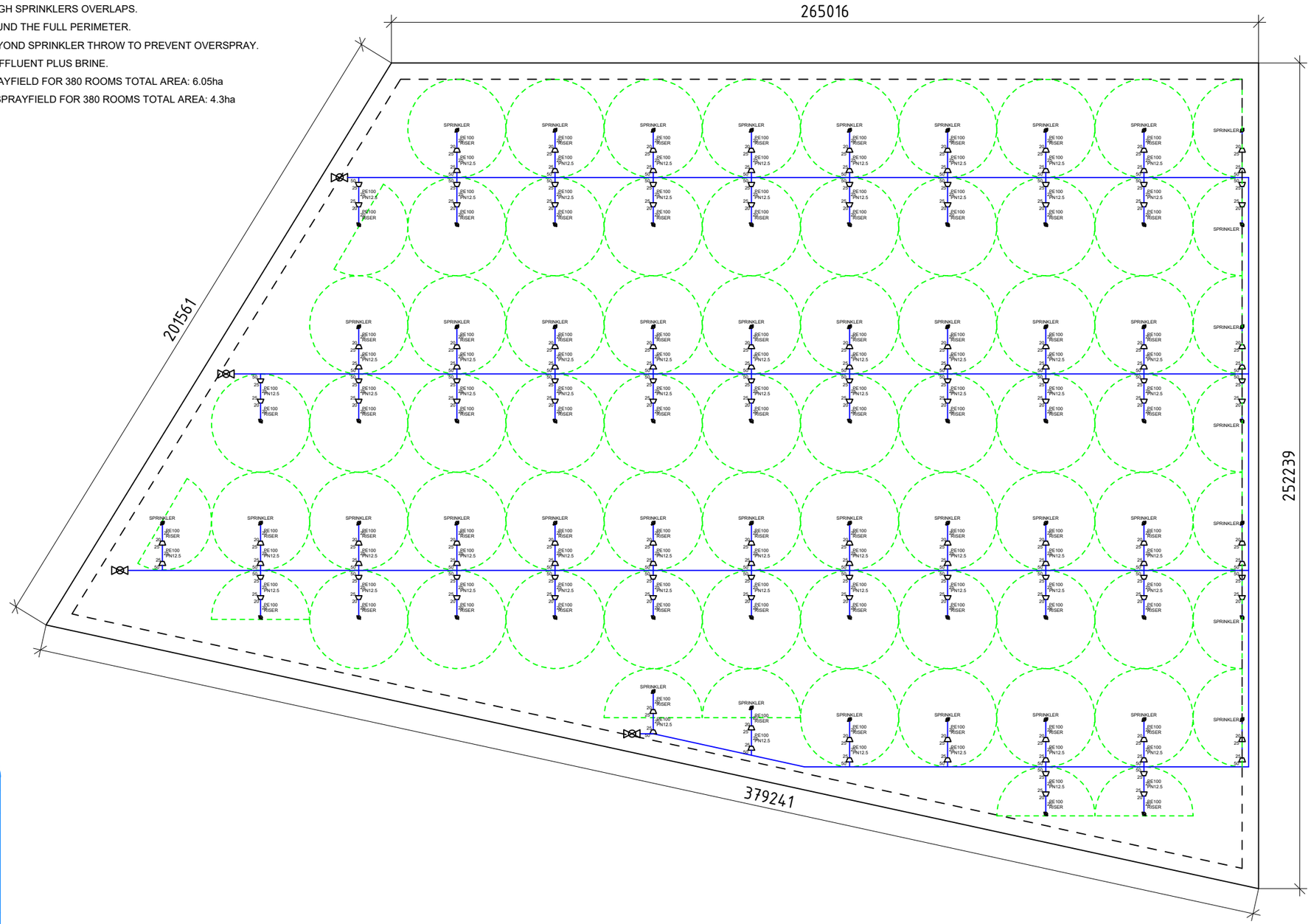
drawn	WP	client:	RTIO
approved	BL	project:	RHODES RIDGE RHODES RIDGE CONSTRUCTION CAMP
date	05/03/24	title:	MATERIAL REUSE ASSESSMENT UNSEALED BASECOURSE
scale	N.T.S	project no:	COPP210911
original size	A4	figure no:	E-06

Appendix 4

Sprayfield Design & Conceptual Layout

NOTES:

1. SPRINKLERS MODEL: IMPACT SPRINKLER - VY37.
2. NUMBER OF SPRINKLERS: 72
3. DN50 BALL VALVE ON EACH LATERAL PIPELINE.
4. LATERAL PIPELINE: 63 mm PN12.5 LILAC POLY.
5. MAIN DISTRIBUTION: 90 mm PN12.5 LILAC POLY.
6. REMOVABLE END CAPS FOR FLUSHING AT THE END OF EACH LATERAL PIPELINE.
7. SPRAYFIELD DIVIDED INTO MULTIPLE ZONES FOR OPERATIONAL ROTATION.
8. UNIFORM COVERAGE ACHIEVED THROUGH SPRINKLERS OVERLAPS.
9. FENCING AND SIGNAGE PROVIDED AROUND THE FULL PERIMETER.
10. MINIMUM 5 m SETBACK MAINTAINED BEYOND SPRINKLER THROW TO PREVENT OVERSPRAY.
11. DESIGN TO ACCOMMODATE TREATED EFFLUENT PLUS BRINE.
12. COMBINED BRINE & WASTEWATER SPRAYFIELD FOR 380 ROOMS TOTAL AREA: 6.05ha
13. WASTEWATER & RO BACKWASH ONLY SPRAYFIELD FOR 380 ROOMS TOTAL AREA: 4.3ha



ABCO WATER SYSTEMS

DRAWING ISSUED FOR

- ☐ REVIEW
- ☐ APPROVAL
- ☐ TENDER
- ☐ MANUFACTURING
- ☑ INFORMATION
- ☐ CONSTRUCTION
- ☐ PROCUREMENT
- ☐ AS BUILT

SIGNATURE

DATE 02/09/2025

	BY	DATE
DESIGNED	RT	28-08-25
DRAWN	SH	28-08-25
CHECKED	RT	28-08-25
APPROVED	BD	28-08-25

THIRD ANGLE PROJECTION

REFERENCES

REV	BY	DATE	DESCRIPTION	CHK	APP
B	SP	02-09-25	ISSUED FOR INFORMATION	RT	BD
A	SP	28-08-25	ISSUED FOR INFORMATION	RT	BD

abco water
MAKING WATER RIGHT
17 BRANT ROAD, KELMSCOTT
WESTERN AUSTRALIA 6111
www.abco.net.au (08) 9399 1662

TITLE:
RIO TINTO
RHODES RIDGE EXPANSION WWTP FEED
W-RBC142 WASTE WATER TREATMENT PLANT
SPRAY FIELD GENERAL ARRANGEMENT DRAWING

JOB/PROJECT NO: 3057P01 **DWG NO:** 3057P01-E26AA-300

SCALE: NTS **SHT SIZE** A3 **SHEET:** 1 OF 1 **REV** B

Appendix 5

Discharge Criteria Calculations

Stage 2 Component

Soil Catagories	kg/Ha/yr - Nitrogen	kg/Ha/yr - Phosphrous	
A	140	10	
B	180	20	
C	300	50	
D	480	120	<-- Soil catagory selected

Total Nitrogen	Values	Units	
EP	380	EP	<- Enter camp size (EP)
L/EP/day	310	L/EP/day	<- Enter flow per EP
Daily Flow Rate	199	m3/day	<- Design flow
Total Nitrogen in Effluent	40.0	mg/L	<- Enter target
Total Nitrogen per Year	2,905	kg TP/Year	<- Output
Total TN Allowed per Ha (Soil Category)	480.0	kg TP/Ha/Year	<- Based on soil category
Irrigation Area Required (Ha)	6.0529	Ha	<- Output
Irrigation Area Required (m2)	60,529.2	m2	<- Output
Hydraulic loading rate (mm/day)	3.3	mm/day	<- Output

Total Phosphorus	Values	Units	
Daily Flow Rate	199	m3/day	<- Design flow
Total Phosphorus in Effluent	10.0	mg/L	<- Enter target
Total Phosphorus per Year	726.4	kg TP/Year	<- Output
Total TP Allowed per Ha (Soil Category)	120.0	kg TP/Ha/Year	<- Based on soil category
Irrigation Area Required (Ha)	6.0529	Ha	<- Output
Irrigation Area Required (m2)	60,529.2	m2	<- Output
Hydraulic loading rate (mm/day)	3.3	mm/day	<- Output

Table 10: Nutrient application criteria to control eutrophication risk

Vulnerability Category	Description	Maximum Nutrient application rate kg/ha per year	
		Nitrogen	Phosphorus
A	Coarse grained soil and translucent waters	140	10
B	Coarse grained soil and turbid or dark coloured waters	180	20
C	Fine grained soil and translucent waters	300	50
D	Coarse grained soil and turbid or dark coloured waters	480	120

Stage 1 and 2 Combined

Soil Catagories	kg/Ha/yr - Nitrogen	kg/Ha/yr - Phosphrous	
A	140	10	
B	180	20	
C	300	50	
D	480	120	<-- Soil catagory selected

Total Nitrogen	Values	Units	
EP	600	EP	<- Enter camp size (EP)
L/EP/day	310.0	L/EP/day	<- Enter flow per EP
Daily Flow Rate	274.0	m3/day	<- Desgin flow
Total Nitrogen in Effluent	40.0	mg/L	<- Enter target
Total Nitrogen per Year	4,000	kg TN/Year	
Total TN Allowed per Ha (Soil Category D)	480.0	kg TN/Ha/Year	<- Based on soil category
Irrigation Area Required (Ha)	8.3342	Ha	
Irrigation Area Required (m2)	83,341.7	m2	
Hydraulic loading rate (mm/day)	3.3	mm/day	

Total Phosphorus	Values	Units
Daily Flow Rate	274.0	m3/day
Total Phosphorus in Effluent	10.0	mg/L
Total Phosphorus per Year	1,000.1	kg TP/Year
Total TP Allowed per Ha (Soil Category D)	120.0	kg TP/Ha/Year
Irrigation Area Required (Ha)	8.3342	Ha
Irrigation Area Required (m2)	83,341.7	m2
Hydraulic loading rate (mm/day)	3.3	mm/day

Table 10: Nutrient application criteria to control eutrophication risk

Vulnerability Category	Description	Maximum Nutrient application rate kg/ha per year	
		Nitrogen	Phosphorus
A	Coarse grained soil and translucent waters	140	10
B	Coarse grained soil and turbid or dark coloured waters	180	20
C	Fine grained soil and translucent waters	300	50
D	Coarse grained soil and turbid or dark coloured waters	480	120