



Government of **Western Australia**
Department of **Health**

HEALTH ACT (MISCELLANEOUS PROVISIONS) 1911
HEALTH (TREATMENT OF SEWAGE AND DISPOSAL OF
EFFLUENT AND LIQUID WASTE) REGULATIONS 1974 (Reg 4A(5)(a))

APPROVAL TO CONSTRUCT OR INSTALL AN APPARATUS FOR THE TREATMENT OF SEWAGE



Approval is hereby granted to the Applicant [REDACTED]
to construct or install the apparatus for the treatment of sewage located at

Dingo Range Gold Project Wonganoo & Barwidgee Road (30km North of Intersection) Coordinates
6,968,500mN 345,500mE

Local Government **Shire of Leonora**

TYPE OF WASTEWATER SYSTEM

**6 x 1200mm x 1500mm Naval Base Concrete Septic Tanks with 2 x Galvins Concrete Maxi A 6280L
Separation Tanks into Stabilisation Pond 1 (3691m³) and stabilisation Pond 2 (2754m³) into
Subsurface (sprinkler) Irrigation (30,000m²).**

CONDITIONS OF APPROVAL

The apparatus shall be installed in accordance with the approved plans (attached) and the conditions of approval listed below

Construction of the apparatus shall be in accordance with the requirements of the *Health (Treatment of Sewage and Disposal Of Effluent And Liquid Waste) Regulations 1974*

All materials, pipes, bends, junctions, fittings and fixtures shall be sound and free from defects and approved by the Chief Health Officer or the *Water Services Act 2012*, Section 91

All plumbing work must be carried out in accordance with the *Plumbers Licensing and Plumbing Standards Regulations 2000* (Plumbing Regulations) and meets the plumbing standards as defined in the Plumbing Regulations

Wastewater system not to be located in a trafficable area

Wastewater system not to be located at a distance less than 30 metres from any well, stream or underground source of water intended for consumptions by humans

Adherence to conditions on the Local Government Report Form

As constructed plans to be submitted to the Local Government's Environmental Health Officer.

The irrigation area to have sufficient setback to groundwater to the satisfaction of the Local Government

Stormwater and subsoil drainage (where installed) shall be diverted away from the wastewater system

This approval is valid for a period of two years. If the works are not completed after two years from the date of this approval, the applicant is required to submit a new application

The person who completes the construction or installation of the apparatus shall notify the above Local Government Environmental Health Officer to arrange an inspection and obtain a permit to use the apparatus

All works shall be left open and available for appropriate checking and testing

The system is approved to receive a maximum wastewater volume of 55,200L/day

A 1.8m high wire mesh fence with lockable gates shall be installed around the perimeter of the ponds and the irrigation field

All ponds shall be lined to minimise groundwater contamination.
All ponds shall have a minimum top embankment freeboard of 400 mm.
Wastewater ponds shall achieve a minimum 30 days retention time at all times.
Wastewater system not to be located in a trafficable area.



A licensed contractor must be engaged to remove and transport the gross solids and sludge when required.
Record weekly influent flows to the ponds.

Periodic maintenance program is required to prevent vegetation growth on the sewage ponds and to prevent clogging of the irrigation system.

All electrical components and installation for and incidental to the wastewater system, shall be in accordance with AS/NZS 3000 – Wiring Rules.

It is an offence under section 197(1) of the Health (Miscellaneous Provisions) Act 1911 to use an apparatus before it has been inspected

DELEGATE OF CHO: 

DATE: 27/9/24

APPROVAL No: 130.24

RECEIPT No: 45752116148

HEALTH (MISCELLANEOUS PROVISIONS) ACT 1911
HEALTH (TREATMENT OF SEWAGE AND DISPOSAL OF EFFLUENT AND LIQUID WASTE) REGULATIONS 1974
**APPLICATION TO CONSTRUCT OR INSTALL AN APPARATUS
FOR THE TREATMENT OF SEWAGE**



1. Application Details

Read the application instructions in Appendix 1 before filling in this form.

Referring to Figure 1 in the Appendix 1, this is an application to the:

- Local Government → [Go to Section 2](#)
- Chief Health Officer → **Receipt number required** for the payment of \$93.00 **BEFORE** this application is forwarded to the Department of Health WA. Refer to Appendix 2 for payment instructions.

Receipt Number for the payment of [REDACTED]: # **4575 2116 148**

Note: Applications without a receipt number will be returned to applicant.

[Complete Section 2 AND Section 3](#)

2. Location of System

Lot Number		House Number	
Street Name	Wonganoo road		
Town or Suburb	Leonora Shire		
Nearest crossroad	Wonganoo & Barwidgee-Yandal road, Project 30km north of intersection		
Local Government (City/Town/Shire)	Leonora shire		
Minesite (Include Minesite name, GPS coordinates and sub-locations)	Emerald Resources, Dingo Range Gold Project. MGA Zone 51 (GDA 94) - Coordinates 6,968,500mN 345,500mE		

3. Owner / Applicant Details

Owner's Name	Emerald Resources		
Applicant's Name	[REDACTED]		
Applicant's Postal Address	Ground Floor 1110 Hay Street		
Suburb	West Perth	Postcode	6005
Applicant's Phone Number	[REDACTED]		
Applicant's Email Address	[REDACTED]		

[Go to Section 4](#)

4. Premises Details

- Residential Premises → [Go to Section 4.1](#)
- Non-Residential Premises → [Go to Section 4.2](#)



4.1 Residential Premises

- Number of bedrooms
- Number of persons on premises
- Number of other dwellings on the lot
- Is this an ancillary accommodation? No Yes → LG Planning approval required
- Spa(s) on premises? No Yes: Volume Litres
- Note:

[Go to Section 5](#)

4.2 Non-Residential Premises

- Please give details of the premises and the nature of use.
Approved Mining licence, Onsite mining camp to support mining operations - Works Approval under assessment with DMIRS Registration ID # 127378
- Public buildings - please detail the licensed maximum occupancy rate: **276** persons
- Number of persons on premises and **AND** any other volumes of liquid waste generated onsite:

Please refer to DOH factsheet: "[Supplement to Regulation 29 – Wastewater system loading rates](#)" for requirements and details on calculating daily wastewater volumes.

- Expected Daily Wastewater Volume: **55,200** Litres / Day
- Note: Max occupancy 276 person x 200ltrs/person/day= 55,200ltrs

[Go to Section 5](#)

5. Treatment System Details

- Standard Septic Tank to Leach Drains or Evaporation Ponds → [Go to Section 5.1](#)
- Secondary Treatment System (STSS) -Listed on DOH website's approved list → [Go to Section 5.2](#)
- Wastewater Treatment Plants (includes Commercial STSS) → [Go to Section 5.3](#)
- Greywater Reuse System → [Go to Section 5.4](#)
- Alternative Wastewater Treatment Systems → [Go to Section 5.5](#)

5.1 Standard Septic Tanks to Leach Drains or Evaporation Ponds

- Septic Tank Sizes
- Septic Tank Manufacturer
- Leach Drain Lengths
- Leach Drain Manufacturer
- Is it an alternating system? Yes No
- Evaporation ponds require an engineer's certification, certifying the evaporation ponds are capable of disposing the total wastewater volumes that is being fed into the ponds. Please provide details and specifications of ponds with application.



[Go to Section 6](#)

5.2 Secondary Treatment System

- Name and Model of Secondary Treatment System Surface irrigation via sprinklers
- Disposal Area **30,000** m²
- Disposal Method:
 - Surface Irrigation Subsurface Irrigation Substrata Irrigation
- Copy of maintenance agreement attached? Yes No → Required.
- If leach drains are used for disposal, please complete dot point 3-5 in Section 5.1.

[Go to Section 6](#)

5.3 Wastewater Treatment Plants

- Please attach technical details and plant specifications with application. The following must be covered:

- Capacity
- Volume of treatment tanks
- Buffer tank(s) volume(s)
- Treatment train details
- Water quality objectives
- Maintenance
- Alarms
- Technical drawings of system

- Disposal Method:

- Surface Irrigation Subsurface Irrigation Substrata Irrigation

Disposal Area Size: m²

- Evaporation ponds: require an engineer's certification, certifying the evaporation ponds are capable of disposing the total wastewater volumes that is being fed into the ponds. Please provide details and specifications of ponds with application.

- Note:

[Go to Section 6](#)

5.4 Greywater Reuse System

- Name and Model of Greywater Reuse System

- Disposal Method:

- Surface Irrigation Subsurface Irrigation Substrata Irrigation

Disposal Area Size: m²

- If leach drains are used for disposal, please complete dot point 3-5 in Section 5.1.

- Note:

[Go to Section 6](#)

5.5 Alternative Wastewater Treatment Systems

Attach system's technical specifications from the manufacturer with application.

[Go to Section 6](#)

6. Information for Compliance Assessment

- Lot Size **65,132m²** m²
- Are there any existing on-site effluent disposal systems on the lot:
 No Yes → Please provide the following information:



- Local Government or Department of Health approval number(s) for all existing system(s).

EDPH Approval number # 270.14

- Please provide current details on the following:
 - The use(s) of all other premise(s); and
 - Total number of persons that will occupy all other premises on the lot;
 - Estimate total wastewater volumes that is being disposed on-site.

Current small exploration Camp, 12 person - approx 2500ltrs wastewater disposed daily

7. System and Site Layout Plans

Unless the following are provided according to the requirements specified, the application will be returned to applicant for resubmission:

- A copy of plan and specifications of the proposed apparatus showing the top and longitudinal section to a scale of not less than 1:50.
- **3 copies** of a site plan of the premises to a scale not less than 1:100, showing:
 - the position of all buildings erected or proposed and the position of the proposed and any existing apparatus including setback distances.
 - the position, type and proposed use of all fixtures intended to discharge into the apparatus;
 - the position and setback distances of all drains, pipes, inspection openings, vents, traps and junctions in relation to buildings and boundaries;
 - the size of pipes and fittings and the fall of the drains;
 - details of the proposed and any existing effluent disposal system and its setback distances to buildings, boundaries and trafficable areas; and
 - the source of water supply to be used in connection with the apparatus if premises is not supplied by a non-reticulated mains supply.
- **Applications to the Chief Health Officer: For plans that are larger than A3, an electronic copy will need to be provided in a data disc with application OR via email to WWApps@health.wa.gov.au together with the receipt / receipt number for the [REDACTED] issued by the Department of Health WA. The premises address is to be identified in the email "Subject" field.**

8. Site and soil evaluations

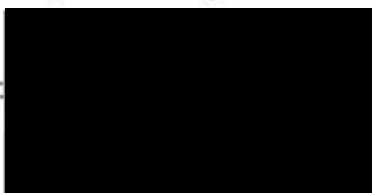
Where required, site and soil evaluations should be provided in accordance with AS/NZS 1547 *On-site domestic wastewater management*. The requirements of the site and soil evaluation may be varied, based on existing site information or where health or environmental impacts are considered minimal. A SSE is a written report that examines the various aspects of a site in relation to sewage collection, treatment and on-site disposal to ensure adequate management over time. For more details please refer to the [Guidance on Site-and-soil evaluation for on-site sewage management](#).

9. Declaration and Signature of Applicant

I hereby apply as the owner, or the person authorised to act on behalf of the owner, for approval to construct or install the apparatus as referred to above. I have completed Section 1-6 of this application form and provided plans that meet the requirements detailed in Section 7.

Also attached (if required) is a local government report for an application to the Chief Health Officer.

Applicants Signature:



Date: 30-07-2024

Please print name:

(If this application is to be approved by the CHO, please ensure the \$93.00 application fee is paid prior to submission – Refer to Appendix 1 & 2 for further details)



LOCAL GOVERNMENT REPORT

(TO BE PROVIDED WHERE AN APPLICATION TO CONSTRUCT OR INSTALL AN APPARATUS IS MADE TO THE CHIEF HEALTH OFFICER, PUBLIC HEALTH)
(Local Government Use Only)

1. APPLICANT / LOCATION DETAILS

Owner's Name Emerald Resources Applicant's Name Dylan Fraser
Street Town or Suburb Sir Samuel
Lot or Pt Lot No. House No. Local Government Shire of Leonora



2. SITE CONDITIONS

Nature of Soil: Sand Gravel Loam Clay
 Other, specify: Sedimentary silts, loam and Gravel

Depth from natural ground level to highest known permanent/seasonal or tidal watertable (mm)

Distance from natural water bodies - N/A metres

Will the apparatus be installed in any of the following locations:

- Within 30 m of a well, bore, watercourse, dam intended to be used for human consumption Yes No
- In an area likely to be subject to flooding or inundation in a 1:10 year return event. Yes No
- In Sewage sensitive areas? Yes No
- In Public drinking water source areas? Yes No

If yes to any of the above, describe course of action taken:

- Is the information on Section 6 of the application form correct? Yes No
- Has a DA been issued for this development? Yes No
- Are there any conditions imposed on the planning approval regarding an onsite wastewater system? Yes No

List the conditions:

3. RECOMMENDATIONS OF LOCAL GOVERNMENT

- Approval recommended (subject to the conditions listed below)
- Approval not recommended (reasons for refusal attached)

4. CONDITIONS OF APPROVAL

Type of Disposal System and Dimensions (if different from application form):

Other Conditions:

See Attached

(Any further conditions should be attached)

Delegate of Local Government Terry Sargent

Local Government Approval No : STA 2502

Date. 09/08/2024



Appendix 1

Instructions for completing application form:

- Complete Sections 1-8 in full.
- Ensure plans and drawings are according to the specifications detailed in Section 7 of the application form.
- Ensure relevant application fees detailed in Appendix 2 are paid.
- Should you need assistance, contact your local government's Environmental Health Officer.

For applications to the Chief Health Officer, Public Health ONLY:

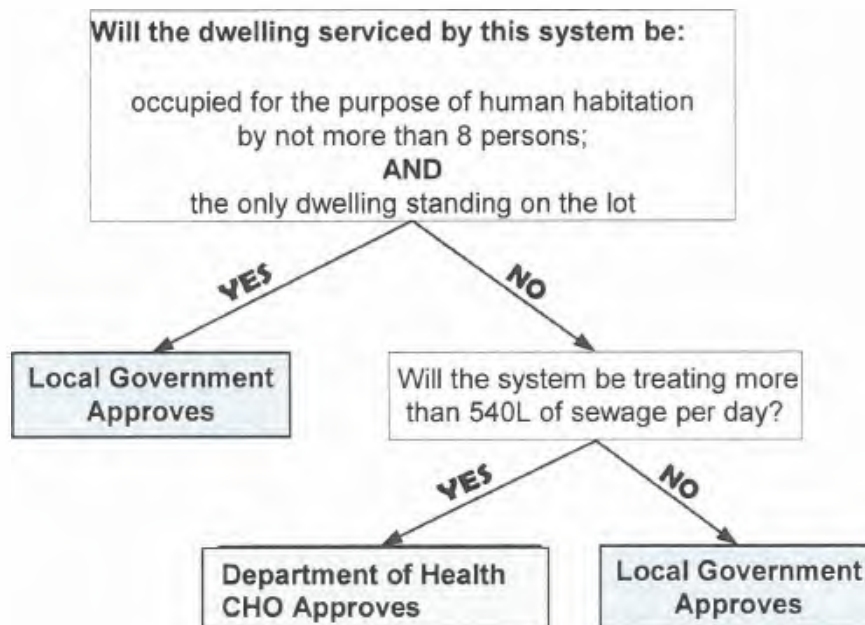
- Ensure you have recorded your receipt number for the payment of [REDACTED] in Section 1 of the application form.
- To submit your application you can either email to WWApps@health.wa.gov.au. OR
- Send by post to:

Environmental Health Directorate
PO Box 8172
PERTH BUSINESS CENTRE WA 6849

Compliance with regulations:

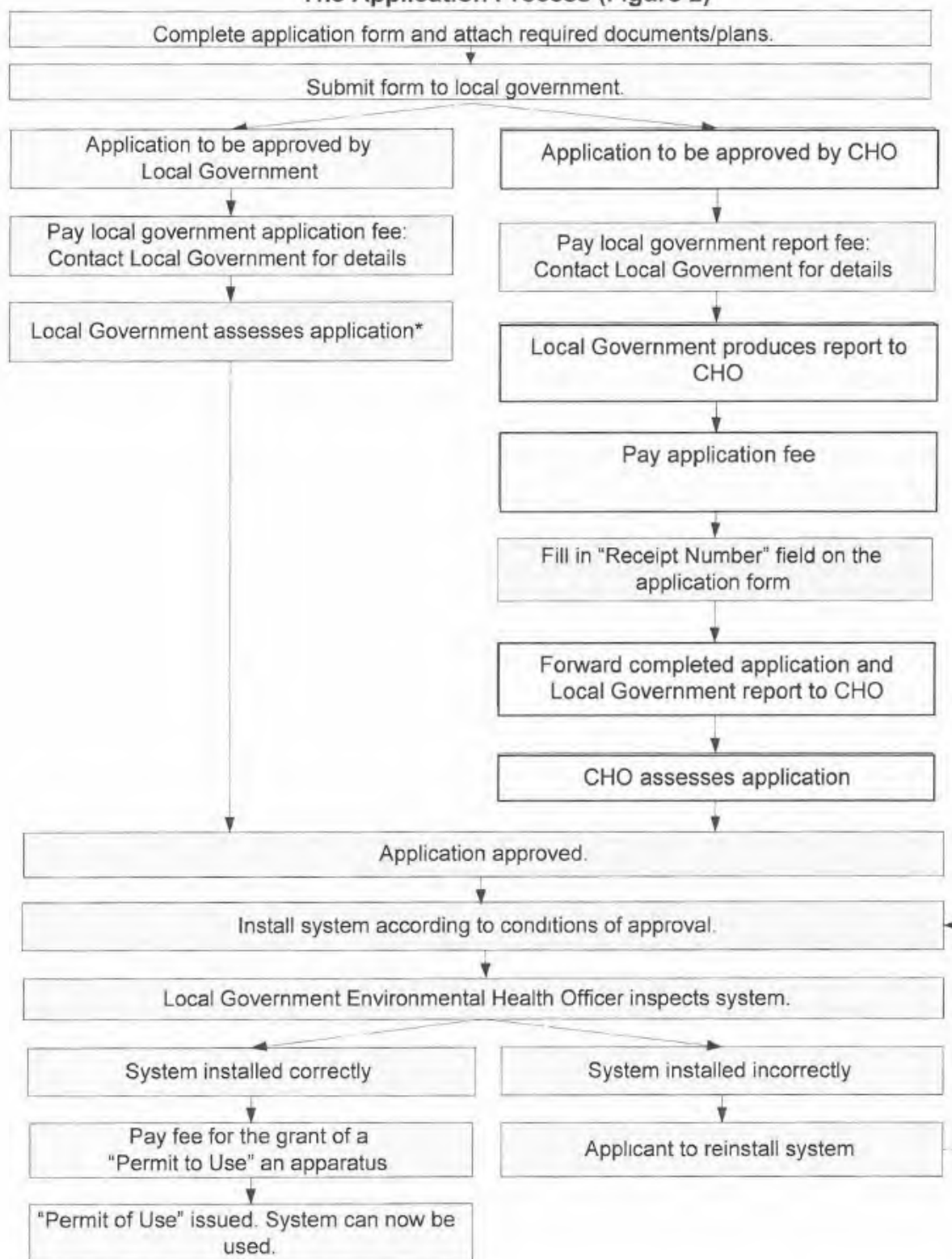
- Construction of the apparatus shall be in accordance with the requirements of the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974.
- Approval will not be given for the installation of an apparatus where sewer connection is available as provided for by either section 72 or section 81 of the Health Act 1911.

Who approves your application? (Figure 1)



CHO Chief Health Officer

The Application Process (Figure 2)



*Unapproved applications will be returned to applicant with reasons for refusal included.

Appendix 2

The following fees will apply:

Local government application fee (paid to local government) [REDACTED]

AND
(when CHO approval is required)

Health Department of WA application fee:

(a) with a local government report [REDACTED]

(b) without a local government report* [REDACTED]

Local government report fee

recommended fee [REDACTED]

(This fee is set by the local government and paid to the local government)

When the application is approved:

Fee for the grant of a permit to use an apparatus [REDACTED]

(including all inspections)

*only permitted when local government fails to provide a local government report within 28 days of request.

For applications to the Chief Health Officer, the [REDACTED] application fee can be made through the following options:

Option 1: By Telephone

Ring (08) 9222 2000 and request to be put through to the "Accounts Officer".

Option 2: By Email

Complete "Payment Form" overleaf and email the **PAYMENT FORM ONLY** to WWapps@health.wa.gov.au

Option 3: By Cheque

Send cheque with the completed "Payment Form" overleaf to:

Environmental Health Directorate
PO Box 8172
PERTH BUSINESS CENTRE WA 6849

Note: Processing times for cheques may take up to 10 business days before a receipt number can be issued. You will not be able to submit your application form without a receipt number.

Applic. STA 2502

Shire of Leonora: Local Government Report

Recommended Conditions of Approval



1. Construction of the apparatus shall be in accordance with the requirements of the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974.
2. Prior to use, inspection and testing of the system is required and a "permit to use" must be issued by the Environmental Health Officer.
3. The wastewater system must not be located in trafficable areas.
4. The surface irrigation area is to be fenced or suitably protected, to prevent access by fauna and/or livestock
5. All materials, pipes, bends, junctions, fittings and fixtures shall be sound and free from defects and shall be authorised and installed in accordance with the Australian Standard 3500 National Plumbing and Drainage Code.
6. All works shall be undertaken by, or under the supervision of a licensed plumber.
7. This approval is valid for a period of two (2) years from the date of this approval. If the works are not completed after 2 years from the date of this approval, the applicant is required to submit a new application.



WILSHAW

EMERALD RESOURCES WA PTY LTD

DINGO RANGE GOLD PROJECT

WASTEWATER TREATMENT PLANT

**OVERVIEW
AND
DESIGN CAPACITY**

JOB No. 8469

JULY 2024



Rev	Prepared	Reviewed	Approved	Date	Description
A				30.07.2024	Issued for Client Review



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Appendices

Appendix A – Drawings



1 INTRODUCTION

At the request of Emerald Resources NL, the following report summarises the proposed Wastewater Treatment Plant (WWTP) and its design capacity, which is to be installed at the North Laverton Gold Project mine site. As per discussions with the Client, the scope of the project is limited to the design of the separation tank, primary and secondary ponds, evaporation basin and irrigation system. Design of the sewage transfer stations and piping to the separation tank has been undertaken by the Client.

2 WASTEWATER TREATMENT PLANT OVERVIEW

The WWTP design has been based on a 276-room village operating at 100% occupancy at the request of the Client. With common design practice to assume an occupancy rate of 80% at any given time, enables the village to expand to 345-rooms without a redesign of the proposed WWTP.

The WWTP will consist of a separation tank which discharges into the primary stabilisation pond. A weir in the primary stabilisation pond allows effluent to overflow into the secondary stabilisation pond. Effluent is then periodically discharged into an evaporation/irrigation field by means of a pump and system of irrigation sprays.

Drawing 363-L-001 included in Appendix A shows the approximate arrangement and location of the WWTP in relation to the village.

Drawing Nos. 363-L-002 & 363-L-003 shows the layout and details of the WWTP.

3 DESIGN CAPACITY OF SEWAGE SYSTEM

3.1 Stabilisation Ponds

The WWTP only treats sewage from the North Laverton Village. There are no additional municipal wastes treated.

The proposed stabilisation ponds will be lined with 1.6mm HDPE.

The bank widths of the proposed stabilisation ponds is 3m which exceeds the minimum required width of 2.4m dictated by the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*.

The downstream (i.e. internal) and upstream (i.e. external) slopes of the proposed stabilisation pond sides are 1 in 3 which complies with the *Health Regulations*.

The banks of the primary stabilisation ponds are 2.3m higher than the base of the pond, with overflow channels into the secondary ponds at 1.8m high. The banks of the secondary stabilisation pond is 2.0m higher than the base of the pond, with the overflow channel into the evaporation/irrigation field at 1.5m high. This is in line with the recommended freeboard of 400mm given in the Department of Water's *Water Quality Protection Note 39*.

With the proposed stabilisation pond design as per Drawing No. 363-L-002, and with the primary and secondary ponds filled to depths of 1.8m and 1.5m respectively, the following will be available:

Primary Pond Area:	1,953 m ²
Primary Pond Vol.:	3,691 m ³
Secondary Pond Area:	1,793 m ²
Secondary Pond Vol.:	2,754 m ³



3.2 Evaporation / Irrigation Field

With the proposed evaporation/irrigation field design as per Drawing No. 363-L-001, the following will be available:

Evaporation Field Area:	30,000 m ²
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4 CALCULATED INFLOWS

4.1 Stabilisation Ponds

Assuming 276 personnel on site and 200 litres per person per day, the combined outflows from the village will be $276 \times 200 = 55,200$ litres per day, which equates to 1,679 kL per month.

This monthly flow-rate was then combined with the mean monthly rainfall data and the monthly pan evaporation rates for Leinster (approximately 120km south-west of the North Laverton Mine), as shown below:

Monthly Influent Volume		1679	kL			
Primary & Secondary Stabilisation Pond Area		3746	m ²			
Month	Historical Gross Evaporation (mm)	Historical Gross Evaporation (kL)	Historical Mean Rainfall (mm)	Historical Mean Rainfall (kL)	Net Evaporation (Evap'n - R'fall) (kL)	Calculated Excess Requiring Discharge (kL)
Jan	450	1685.7	39.4	147.6	1538.1	140.9
Feb	350	1311.1	39.9	149.5	1161.6	517.4
Mar	300	1123.8	35.8	134.1	989.7	689.3
Apr	200	749.2	23.7	88.8	660.4	1018.6
May	150	561.9	13.8	51.7	510.2	1168.8
Jun	80	299.7	14.1	52.8	246.9	1432.1
Jul	100	374.6	15.0	56.2	318.4	1360.6
Aug	125	466.3	8.5	31.8	436.4	1242.6
Sep	200	749.2	4.1	15.4	733.8	945.2
Oct	300	1123.8	11.3	42.3	1081.5	597.5
Nov	400	1498.4	16.2	60.7	1437.7	241.3
Dec	400	1498.4	22.4	83.9	1414.5	264.5
Annual Total	3055.0	11444.0	244.2	914.8	10529.3	9618.7
Monthly Avg	254.6	953.7	20.4	76.2	877.4	801.6
Daily Avg	8.4	31.4	0.7	2.5	28.8	26.4

Table 1 - Primary & Secondary Stabilisation Ponds

With a primary pond volume of 3,691m³, the detention time will be $3,691 \div 55.2 = 66.9$ days.

With a secondary pond volume of 2,754 m³, the detention time will be a further $2,754 \div 55.2 = 49.9$ days.

A flowmeter will be installed to measure the effluent outflows from the stabilisation ponds and readings will be taken monthly.



4.2 Evaporation / Irrigation Field

Using a similar methodology to that of the stabilisation ponds, and using the monthly Calculated Excess Requiring Discharge volumes from Table 1, the capacity of the evaporation / irrigation field is shown below:

Evaporation Basin Area		30000	m ²				
Month	Historical Gross Evaporation (mm)	Historical Gross Evaporation (kL)	Historical Mean Rainfall (mm)	Historical Mean Rainfall (kL)	Net Evaporation (Evap'n - R'fall) (kL)	Treated Water Discharge from Ponds (kL)	Treated Water - Net Evaporation (kL)
Jan	450	13500	39.4	1197	12303.0	140.9	-12162.1
Feb	350	10500	39.9	1074	9426.0	517.4	-8808.6
Mar	300	9000	35.8	711	8289.0	689.3	-7599.7
Apr	200	6000	23.7	414	5586.0	1018.6	-4567.4
May	150	4500	13.8	423	4077.0	1168.8	-2908.2
Jun	80	2400	14.1	450	1950.0	1432.1	-517.9
Jul	100	3000	15.0	255	2745.0	1360.6	-1384.4
Aug	125	3750	8.5	123	3627.0	1242.6	-2384.4
Sep	200	6000	4.1	339	5681.0	945.2	-4715.8
Oct	300	9000	11.3	486	8514.0	597.5	-7916.5
Nov	400	12000	16.2	672	11328.0	241.3	-11086.7
Dec	400	12000	22.4	7326	4674.0	264.5	-4409.5
Annual Total	3055.0	91650.0	244.2	13470.0	78180.0	9618.8	-68561.2
Monthly Avg	254.6	7637.5	20.4	1122.5	6515.0	801.6	-5713.4
Daily Avg	8.4	251.1	0.7	36.9	214.2	26.4	-187.8

Table 2 – Evaporation/Irrigation Field

As the Net Evaporation for the 12 month period greatly exceeds the Treated Water Discharge from Ponds for the same period, the evaporation / irrigation field has sufficient capacity for the hydraulic loading.

The soil characteristic of the evaporation / irrigation field will be sandy clay loam, and it will be located more than 500m from sensitive water resources. Consequently, *WQPN22* specifies limits for the application rates of Nitrogen and Phosphorus to 480 kg/ha/year and 120 kg/ha/year, respectively.

Based on data for similar facilities at other mine-sites, the expected concentrations of Nitrogen and Phosphorus are 15 mg/L and 3 mg/L, respectively. Using these figures, combined with the projected annual total Treated Water Discharge from Ponds volume from Table 2, and the evaporation / irrigation field area of 3 hectares, the projected discharge concentrations of Nitrogen and Phosphorus are:

Nitrogen concentration = $9,618,800 \times 0.000015 / 3 = 48.1$ kg/ha/yr

Phosphorus concentration = $9,618,800 \times 0.000003 / 3 = 9.6$ kg/ha/yr

The projected discharge nutrients to the evaporation / irrigation field are significantly less than those specified in *WQPN22*. Consequently, the evaporation / irrigation field is adequate.

5 FINDINGS & RECOMMENDATIONS



5.1 Stabilisation Ponds

Based on the sewage flow from the village, as well as the mean rainfall and evaporation rates, the stabilisation ponds are of sufficient capacity.

The WWTP (i.e. the stabilisation ponds and evaporation/irrigation field) will be surrounded by a 2.2m high wire mesh fence, with a locked access gate, in compliance with the *Health Regulations*.

The WWTP will be maintained to ensure there is no vegetation on the banks of the ponds.

The proposed stabilisation ponds will be lined with 1.6mm HDPE, which exceeds the permeability requirement in *WQPN39* and has an approximate UV lifetime of 20 years.

5.2 Evaporation / Irrigation Field

Based on the treated water discharge from the stabilisation ponds, as well as the mean rainfall and evaporation rates, the evaporation / irrigation field is of sufficient capacity.

The discharge nutrients also fall within the limits specified in *WQPN22*.

Emerald Resources will implement a monitoring regime for the WWTP as follows:

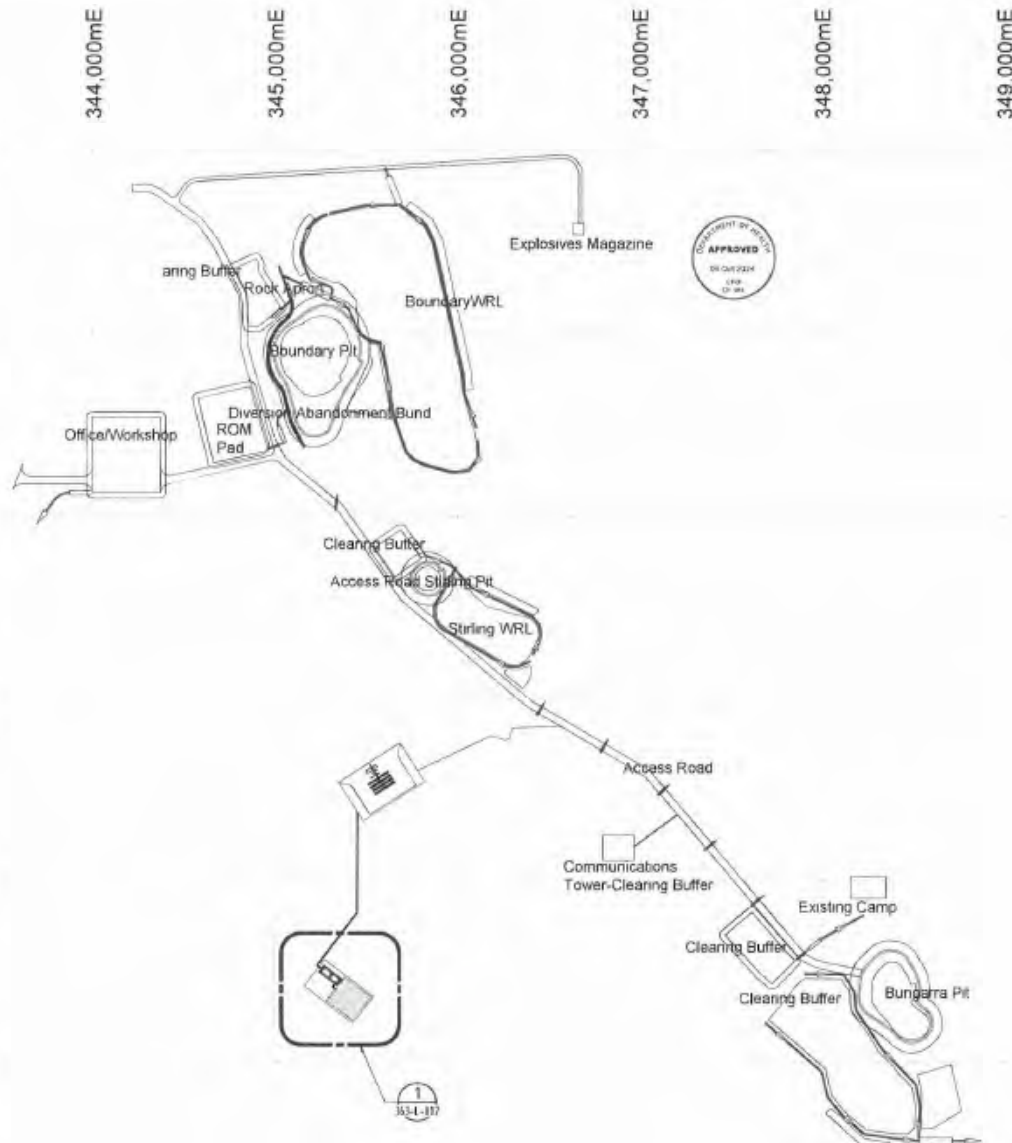
- Quarterly samples taken from the sampling point at the stabilisation ponds to ensure that the Phosphorus and Nitrogen concentrations comply with *WQPN22*
- Accurate monthly measuring of flows at the discharge of the village sewage transfer station and at the discharge of the stabilisation ponds
- Egress points for fauna
- Weekly inspections of the stabilisation pond banks and HDPE liner as well as the sprinklers to ensure operation as per design
- The solids separation tank will be regularly inspected and pumped out by a licenced sewage contractor when it reaches $\frac{3}{4}$ full



Appendix A

Drawings

Drawing Number	Revision	Title
363-L-001	A	Dingo Range – Site Plan Layout
363-L-002	A	Dingo Range – Wastewater Treatment Plant – Layout
363-L-003	A	Dingo Range – Wastewater Treatment Plant – Details
363-L-004	A	Dingo Range – Irrigation Area Sprinkler Detail



THIS IS A CERTIFIED PRACTISING ENGINEER DESIGNED STRUCTURE ANY STRUCTURAL MODIFICATIONS REQUIRES APPROVAL OF WILSHAW FAILURE TO DO SO VOIDS THE DESIGN

**PRELIMINARY ISSUE
NOT FOR CONSTRUCTION**

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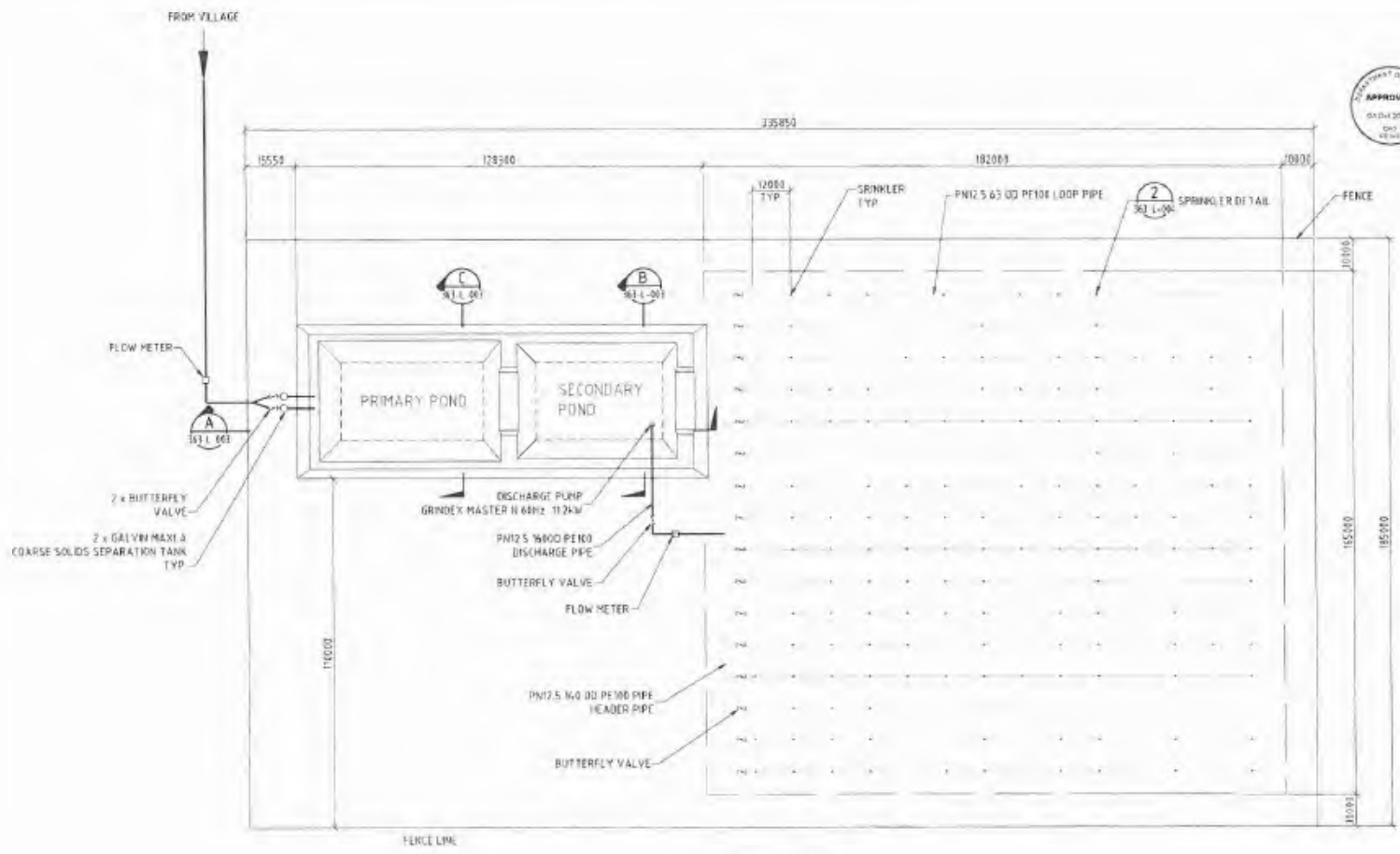
363-L-001	OPERATIVE DETAILS
363-L-002	DETAILS
363-L-003	LAYOUT
363-L-004	REFERENCE DRAWING

4	TG	20 JUL 2024	ISSUED FOR CONSTRUCTION
REV	BY	DATE	REVISION

PROJECT APPROVED	BY	DATE
TITLE SHEET APPROVED		
DESIGNED		
DRAWN	TG	JULY 2024

CLIENT	EMERALD RESOURCES WA PTY LTD
TITLE	DINGO RANGE GOLD PROJECT VILLAGE WASTE WATER TREATMENT PLANT SITE PLAN LAYOUT

SCALE	NTS	CHECKED BY	DATE
8469	A1	YULDELIVE	
DRAWING NO.	363-L-001	REV. NO.	A
- DO NOT SCALE - - IF IN DOUBT ASK -			



DETAIL 1
363-L-001

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NO. 1 214 NO. 1 043 NO. 4 321	EMERALD RANG DETAILS SITE PLAN (PART 1)	A	TG	30/12/2016	ISSUED FOR CLIENT REVIEW
DATE:	DESCRIPTION:	NO.	BY	DATE	REVISIONS
		46	ZY	04/12	REVISED

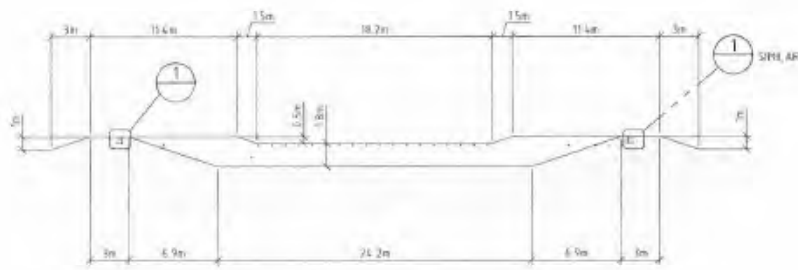
PROJECT APPROVED	BY	DATE
DESIGN APPROVED		
DESIGNED	GP	04/12/16
DRAWING CHECKED	GP	04/12/16
DRAWN	TG	04/12/16



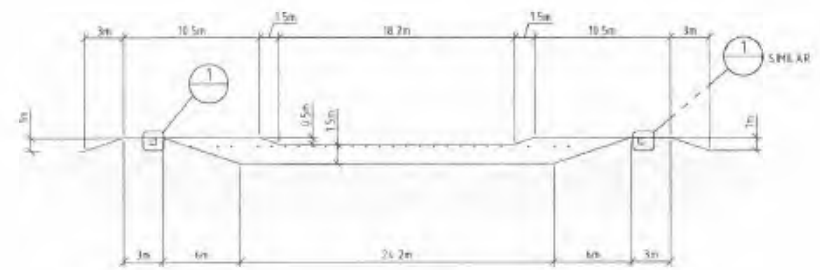
CLIENT	EMERALD RESOURCES WA PTY LTD
TITLE	DINGO RANGE GOLD PROJECT VILLAGE WASTE WATER TREATMENT PLANT LAYOUT
SCALE	1:750
DWG NO.	8469
DRAWING	363-L-002
REV. NO.	A

SCALE	1:750
DWG NO.	8469
DRAWING	363-L-002
REV. NO.	A

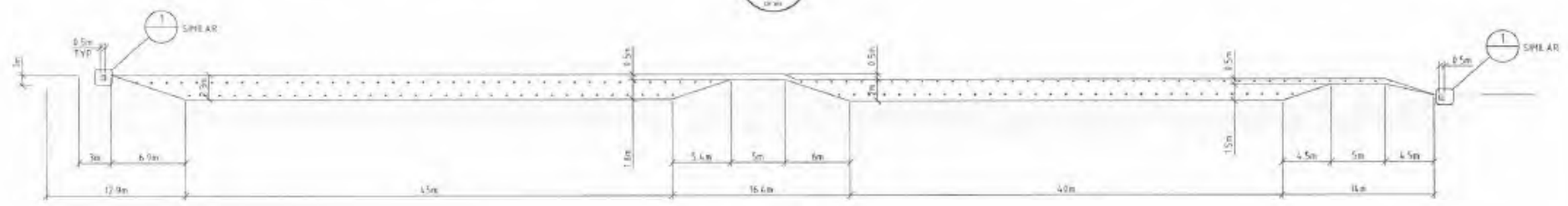
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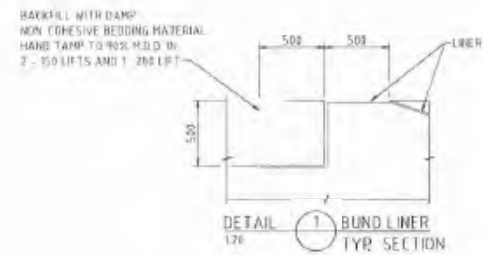
SECTION C
1:200 363-L-002



SECTION B
1:200 363-L-002



SECTION A
1:200 363-L-002



STABILISATION PONDS	
① PRIMARY POND VOLUME	= 3691 m ³
① PRIMARY POND SURFACE AREA	= 1953 m ²
② SECONDARY POND VOLUME	= 2754 m ³
② SECONDARY POND SURFACE AREA	= 1793 m ²

EVAPORATION / IRRIGATION BASINS	
① EVAPORATION BASIN AREA	= 30000 m ²

GENERAL NOTES

1 BUND WALLS AND FLOOR BUND WALLS SHOULD BE CONSTRUCTED USING SUITABLE LOCAL CLAY MATERIAL IMPORTED, SPREAD AND COMPACTED IN LAYERS. COMPACTION SHALL BE DEEMED ADEQUATE FOR 500 MM THICK LAYERS WHEN PROOF ROLLED WITH A MINIMUM OF FIVE (5) PASSES OF A SINGLE DRUM PEDESTRIAN SIZE VIBRATING ROLLER WITH TOTAL MASS NOT LESS THAN 350 kg. AFTER THE BUND WALLS HAVE BEEN CONSTRUCTED TO THE MINIMUM REQUIRED HEIGHT THE SIDES SHALL BE CAREFULLY SHAPED TO PRODUCE A UNIFORMLY GRADED FLAT SURFACE TO THE DIMENSIONS AND SHAPES SHOWN ON THE DRAWINGS. EXCAVATE AROUND THE PERIMETER OF THE BUND WALL TO PROVIDE A SUITABLE KEY FOR THE IMPERVIOUS MEMBRANE. ANY DAMAGE OR PENETRATION OF THE LINER MUST BE MADE GOOD BY LINER INSTALLATION CONTRACTOR.

2 BUND PREPARATION AND LINER INSTALLATION TO BE AS PER SUPPLIER/INSTALLERS INSTRUCTION.

LINER PERMEABILITY TO BE LESS THAN 10⁻⁷

LINER TO BE UV STABILISED/RESISTANT

LIFE EXPECTANCY OF LINER TO BE 75 YEARS OR GREATER

TOLD THE FREE EDGES OF THE BUND LINER DOWN INTO THE ANCHOR TRENCH AND BACK FILL AS SHOWN

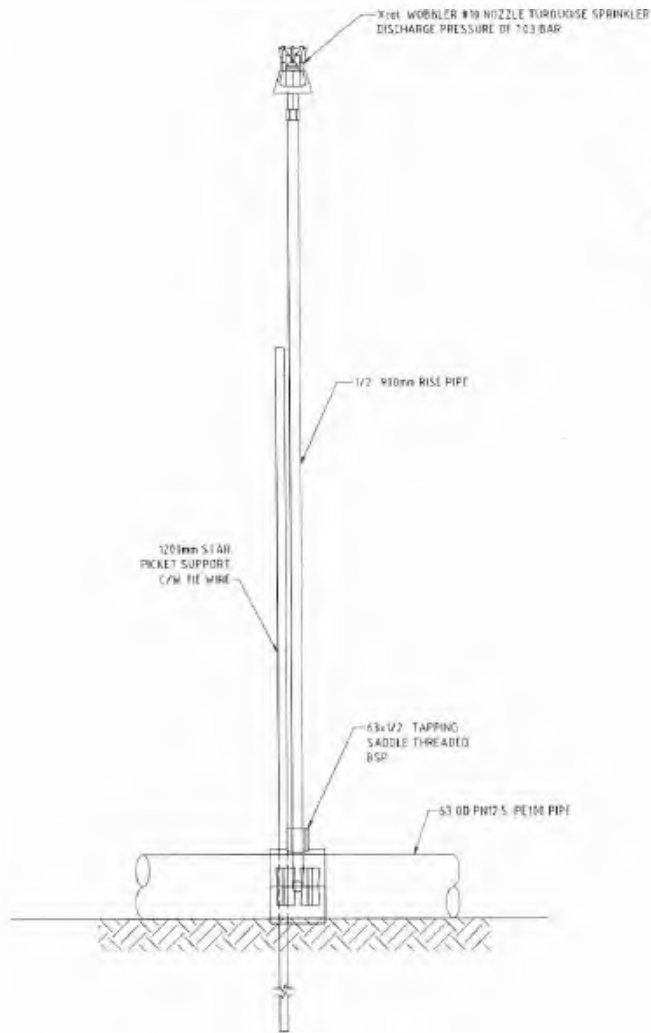
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	DELIVERED BY:	REFERENCE DRAWING:	NO BY DATE REVISION	CND/APP	+61 8 9447 9000 // wilshaw.com.au	SCALE 1:200 DRAWING NO 8469 SHEET NO A1 PROJECT NO 363-L-003 REV No A DO NOT SCALE - IF IN DOUBT ASK	WILSHAW ENGINEERING 100/100 WILSHAW DRIVE WILSHAW WA 6107 TEL: 08 9447 9000 WWW.WILSHAW.COM.AU



DETAIL 2
13 363-L-002

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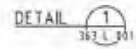
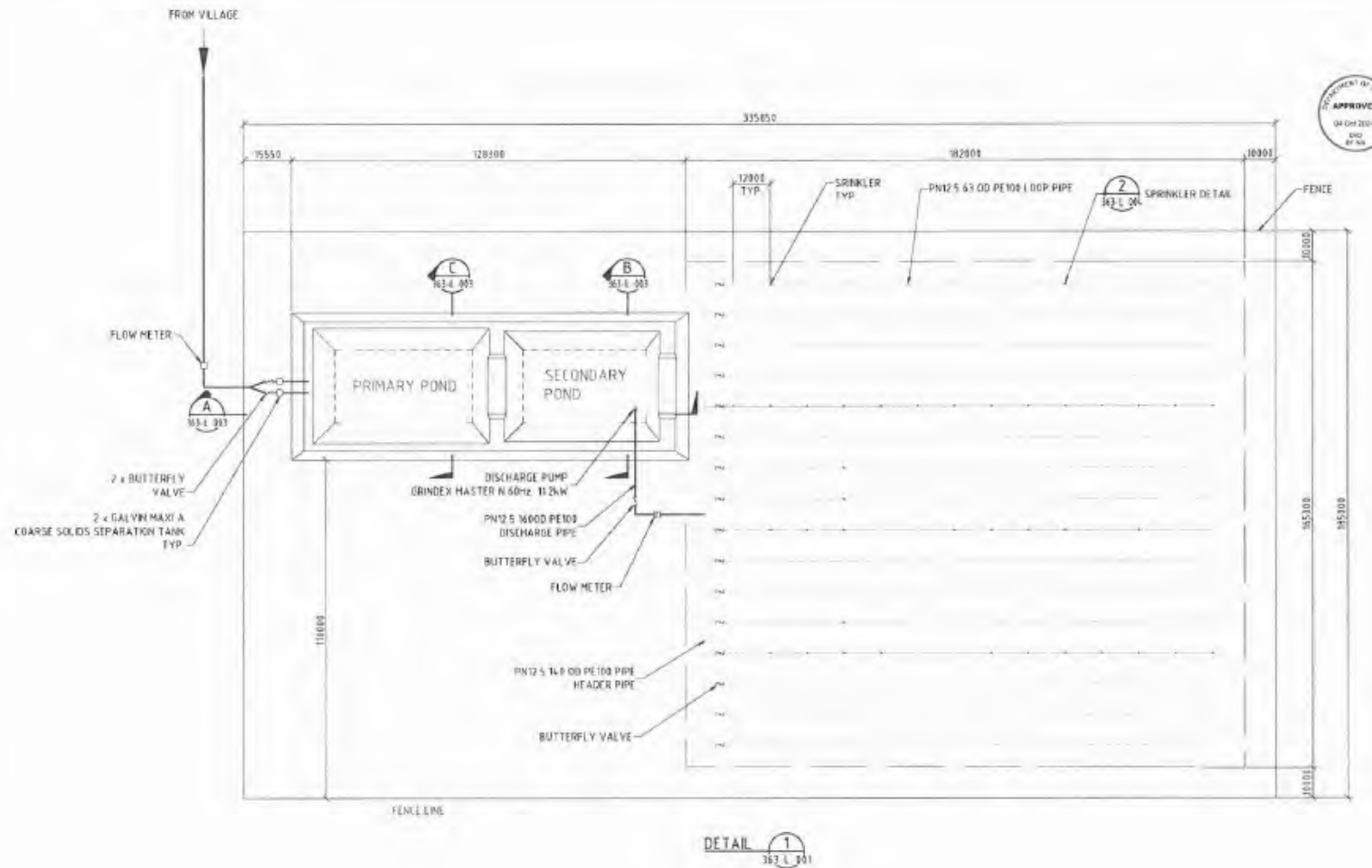
NO. I. 111	DETAILS	A. 15	03/01/2024	ISSUED FOR CLIENT REVIEW	(SIGNED)
NO. I. 432	LAYOUT	NO. 01.	DATE	REVISION	(SIGNED)
NO. I. 101	SITE LAYOUT				

PROJECT APPROVED	BY	DATE
DESIGN APPROVED		
(SIGNED)	GP	06/01/2024
DRAWING CHECKED	GP	06/01/2024
DRAWN	TG	JULY 2024

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CLIENT
EMERALD RESOURCES WA PTY LTD
TITLE
DINGO RANGE GOLD PROJECT
VILLAGE WASTE WATER TREATMENT PLANT
SPRINKLER DETAIL

SCALE 1:150	DATE 04/09/2024	REV No. A
JOB No. 8469	A1	
DRAWING No. 363-L-004		
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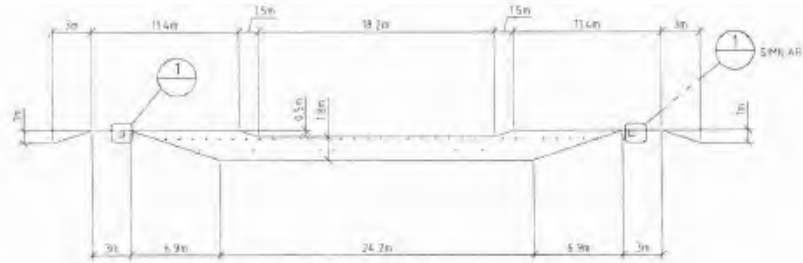
NO.	DATE	DESCRIPTION	BY	DATE	REVISION
1	06/09/2024	ISSUED FOR CLIENT REVIEW	GP		
2	06/10/2024	ISSUED FOR CLIENT REVIEW	GP		
3	06/10/2024	ISSUED FOR CLIENT REVIEW	TG		

PROJECT APPROVED	DESIGN APPROVED	DESIGNED BY	DATE	DRAWING CHECKED	DATE	DRWN	DATE
		GP	06/09/2024	GP	06/10/2024	TG	06/10/2024

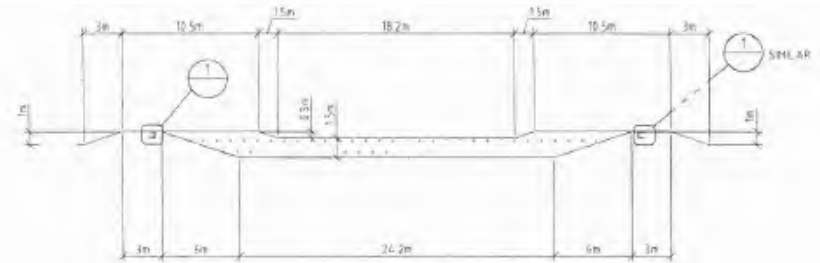


CLIENT	EMERALD RESOURCES WA PTY LTD
TITLE	DINGO RANGE GOLD PROJECT VILLAGE WASTE WATER TREATMENT PLANT LAYOUT

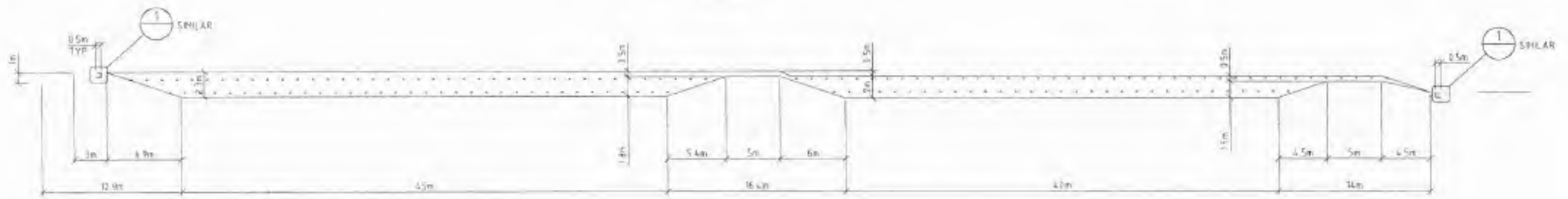
SCALE	1:750
DRG NO.	8469
REV. NO.	A1
DRAWING NO.	363-L-002
REV. NO.	A
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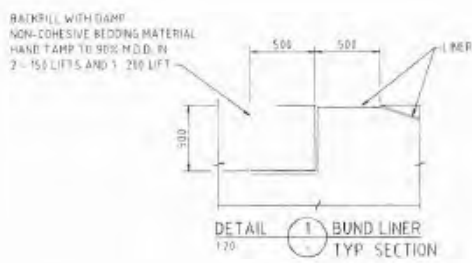
SECTION C
1/200 363-L-002



SECTION B
1/200 363-L-002



SECTION A
1/200 363-L-002



STABILISATION PONDS	
1 PRIMARY POND VOLUME	= 3691 m ³
1 PRIMARY POND SURFACE AREA	= 1953 m ²
2 SECONDARY POND VOLUME	= 2754 m ³
2 SECONDARY POND SURFACE AREA	= 1793 m ²

EVAPORATION / IRRIGATION BASINS	
1 EVAPORATION BASIN AREA	= 30000m ²

GENERAL NOTES:

- BUND WALLS AND FLOOR BUND WALLS SHOULD BE CONSTRUCTED USING SUITABLE LOCAL CLAY MATERIAL IMPORTED, SPREAD AND COMPACTED IN LAYERS. COMPACTION SHALL BE DEEMED ADEQUATE FOR 500mm THICK LAYERS WHEN PROOF-ROLLED WITH A MINIMUM OF FIVE (5) PASSES OF A SINGLE DRUM PEDESTRIAN SIZE VIBRATING ROLLER WITH TOTAL MASS NOT LESS THAN 350kg. AFTER THE BUND WALLS HAVE BEEN CONSTRUCTED TO THE MINIMUM REQUIRED HEIGHT THE SIDES SHALL BE CAREFULLY SHAPED TO PRODUCE A UNIFORMLY GRADED FLAT SURFACE TO THE DIMENSIONS AND SHAPES SHOWN ON THE DRAWINGS. EXCAVATE AROUND THE PERIMETER OF THE BUND WALL TO PROVIDE A SUITABLE KEY FOR THE IMPERVIOUS MEMBRANE. ANY DAMAGE OR PENETRATION OF THE LINER MUST BE MADE GOOD BY LINER INSTALLATION CONTRACTOR.
- BUND PREPARATION AND LINER INSTALLATION TO BE AS PER SUPPLIER/INSTALLERS INSTRUCTION. LINER PERMEABILITY TO BE LESS THAN 10⁻¹¹. LINER TO BE UV STABILISED/RESISTANT. LIFE EXPECTANCY OF LINER TO BE 15 YEARS OR GREATER. FOLD THE FREE EDGES OF THE BUND LINER DOWN INTO THE ANCHOR TRENCH AND BACK FILL AS SHOWN.

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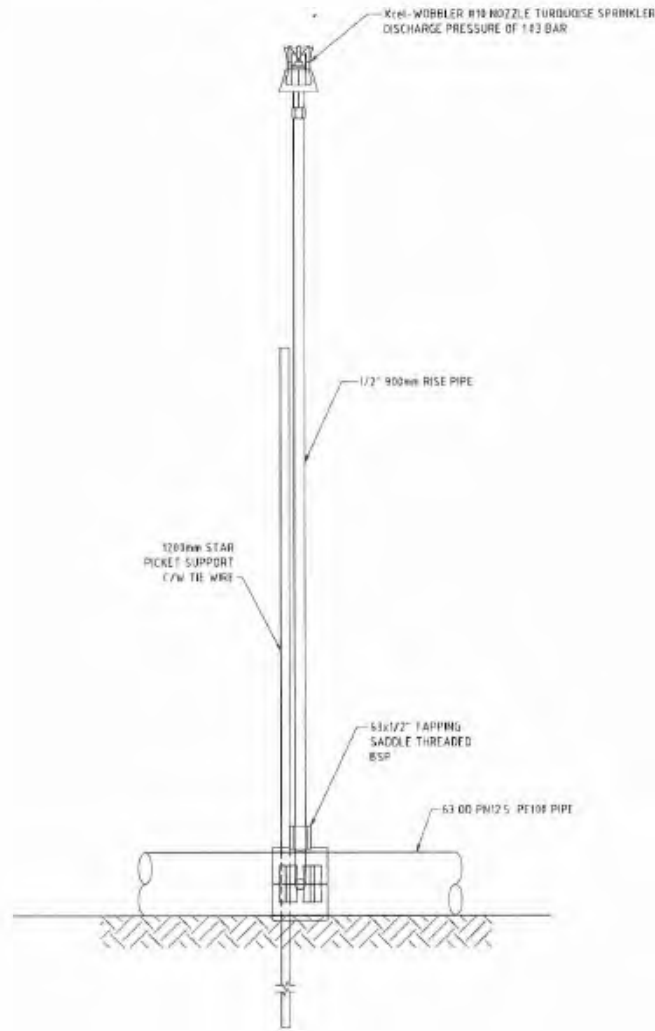
NO.	REV.	DATE	DESCRIPTION
1	001	20/01/2021	ISSUED FOR CLIENT REVIEW

PROJECT APPROVED	BY	DATE
DESIGN APPROVED		
DRAWING CHECKED	GP	16/11/2020
DRAWN	TG	06/11/2020

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CLIENT	EMERALD RESOURCES WA PTY LTD
TITLE	DINGO RANGE GOLD PROJECT VILLAGE WASTE WATER TREATMENT PLANT DETAILS

SCALE	1/200
PROJECT NO.	8469
DRAWING NO.	363-L-003
REV. NO.	A



DETAIL 2
13 363 L 002

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363 L 002	DETAILS				
363 L 002	LAYOUT				
363 L 001	SITE PLANS (APPENDIX)				
REFERENCE DRAWING					

A	TG	06 OCT 2014	ISSUED FOR CLIENT REVIEW
No	BY	DATE	REVISION
			CHG/APPD

PROJECT APPROVED	BY	DATE
DESIGN APPROVED		
DESIGNED	GP	JULY 2014
DRAWING CHECKED	GP	JULY 2014
DRAWN	TG	JULY 2014



CLIENT	EMERALD RESOURCES WA PTY LTD
TITLE	DINGO RANGE GOLD PROJECT VILLAGE WASTE WATER TREATMENT PLANT SPRINKLER DETAIL

SCALE	1:750	DATE OF APPROVAL	04 OCT 2004
JOB NO.	8469	DATE OF ISSUE	04 OCT 2004
DRAWING No.	363-L-004	REV No.	A
- DO NOT SCALE -		- IF IN DOUBT ASK -	

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Time Zone: Sydney, Australia

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