

RESPONSE TO SCHEDULE 1 DETAILED IN DWER LETTER DATED 26TH NOVEMBER 2024: APPLICATION FOR A WORKS APPROVAL UNDER THE ENVIRONMENTAL PROTECTION ACT 1986 – REQUEST FOR FURTHER INFORMATION

REFERENCE: DWERVT15183~45

DWER requested information requirements	Emerald Resources (WA) Pty. Ltd. Response
<p>Please confirm whether the intent of the discharge area is for irrigation of vegetation or for evaporation.</p>	<p>The intent is for evaporation. Management measures include:</p> <ul style="list-style-type: none"> • Effluent discharge will be managed to prevent overflow from the ponds. • Maintain pipeline flow meters and mechanical pump used to discharge treated effluent. • Discharge via sprinklers during favourable conditions, avoiding very windy and rainy conditions. • Manage sprinkler discharge by rotating areas and conducting visual inspections to prevent pooling or runoff outside the evaporation area. • Daily inspections for any pooling of treated effluent when irrigation system is operating. • Spray drift from irrigation is accounted for with respects to the spray field design. • The WWTP will include low- and high-level alarms in the macerator and rising main pits, indicated by a revolving red light. • Routine maintenance and inspection of pipelines and discharge points will occur. • Effluent discharge quality monitoring undertaken on a quarterly basis. • Effluent discharge quality to the irrigation area will meet criteria listed in the DWER Environmental Protection Act Licence. • Evaporation field adequately sized to ensure nutrient loadings re well within <i>WQPN22</i> application rates of Nitrogen and Phosphorus to 480 kg/ha/year and 120 kg/ha/year. <p>These measures will prevent the potential for ponding, surface runoff or discharges beyond the evaporation site.</p>

Please provide evidence that the proposed discharge area sizing can accommodate expected nutrient concentrations in the treated wastewater discharge.

The site is located in Violet soil landscape system, described as gently undulating gravelly plains on greenstone, laterite and hardpan. Majority of soils in the Dingo Range area are classified as sandy loam to sandy-clay loam.

The soil characteristic of the evaporation / irrigation field will is sandy loam, and located more than 500m from sensitive water resources. The soils fall within the fine-grained soils category in Table 1 of WQPN22. Consequently, WQPN22 specifies limits for the application rates of Nitrogen and Phosphorus to 480 kg/ha/year and 120 kg/ha/year, respectively.

At full capacity, the WWTP is designed for 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. Table 1 in Attachment 8A provided with the Works Approval Application considers rainfall and evaporation rates resulting in an average daily volume of 26,400L/day being discharged to evaporation field.

Based on data for similar facilities at other mine-sites, the expected effluent 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, and the evaporation / irrigation field area of 3 hectares, the projected discharge concentrations of Nitrogen and Phosphorus are:

Table 1 Nutrient loading calculations

Nitrogen	Phosphorus
Target output = 15mg/L Output vol = 26,400 L/day → 396,000 mg/day / 1,000,000 → 0.396 kg/day x 365 → 144.54 kg/year Recommended loading = 480 kg/ha/year	Target output = 3mg/L Output vol = 26,400 L/day → 79,200 mg/day / 1,000,000 → 0.0792 kg/day x 365 → 28.91 kg/year Recommended loading = 120 kg/ha/year

	$144.54 / 480 = 0.30 \text{ ha to achieve target}$	$28.91 / 120 = 0.24 \text{ ha to achieve target}$
<p>Please provide a shape file of the prescribed premises boundary.</p>	<p>The evaporation field is sized at 3 ha.</p> <ul style="list-style-type: none"> • Nitrogen concentration = $9,618,800 \text{ L/year} \times 0.000015 \text{ kg/L} / 3 \text{ ha} = 48.1 \text{ kg/ha/yr}$ • Phosphorus concentration = $9,618,800 \text{ L/year} \times 0.000003 \text{ kg/L} / 3 \text{ ha} = 9.6 \text{ kg/ha/yr}$ <p>The projected discharge nutrients to the evaporation field are significantly less than those specified in <i>WQPN22</i>. Consequently, the evaporation field is more than adequately sized for nutrient loading and allows contingency should nitrogen and phosphorus concentrations or volumes fluctuate.</p> <p>A shapefile of the combined wastewater treatment plant and discharge area is provided with this response. Refer to the following:</p> <ul style="list-style-type: none"> • Development Envelope Figure.png • Development Envelope.shp • Development Envelope.shx • Development Envelope.prj • Development Envelope.dbf 	
<p>Please confirm if commissioning will be required.</p>	<ul style="list-style-type: none"> • Initial commissioning not required. However, there will be an inspection and test plan in place post construction. This would involve inspection of the wwtp structure & that it meets the overall approved design, including sign off of and inspection of the HDPE lining and the installation test sheet for QA. • The Second phase is Inspection & testing of piping, pits, transfer stations, mechanical/Electrical equipment, spray field/evaporation section as well as perimeter fencing is adequate, during this stage Raw water will be used. 	

<p>Please provide a close up map of the WWTP and the discharge area layout, including the location of any proposed emission controls.</p>	<p>A close-up map is provided as part of this response – refer to Development Figure.png.</p>
<p>Please provide any proposed applicant controls for the following emissions at a minimum:</p> <ul style="list-style-type: none"> • Spills/unintended releases of hydrocarbon or chemicals (during construction and operation); • Odour; • Spills/unintended releases of solid waste or partially treated wastewater (during commissioning and operation); and • Discharge of treated wastewater to irrigation field (aligns with row 1 information request above) 	<p>The following emission controls will be implemented during the operation of the WWTP:</p> <ul style="list-style-type: none"> • Provision of spill kits will be around hydrocarbon and chemical storage areas and in other appropriate locations. • Spills will be immediately contained and cleaned up following the Company’s Spills and Bioremediation Procedure. • Soil contaminated by hydrocarbons will be treated via bioremediation. • WWTP is located greater than 500 m from sensitive water resources. • WWTP is located greater than 500m away from nearest sensitive receptor (camp 500m away). • WWTP to be maintained as per the manufacturer’s instructions. • Pipeline to irrigation field to be bunded along entire route to protect from damage and to ensure that any leaks are contained. • Daily inspections of any pooling of treated effluent when irrigation system is operating. • Effluent discharge will be managed to prevent overflow from the ponds. • The WWTP is appropriately designed and will be operated to mitigate the risk of odour emissions. Regular inspection schedule will be implemented, and preventative maintenance will be undertaken and are expected to effectively mitigate the risk of odour emissions. • Prevailing wind direction is from the east, therefore more likely to move odour away from the mine camp, the nearest sensitive receptor. • Spray drift from irrigation is accounted for with respects to the spray field design and will be operated only during favourable weather conditions (avoid extremely windy days, rainy days or in high humidity).

- Management procedures mitigate the risk of discharge with elevated nutrient levels in soil / seepage to groundwater or surface water.
- Weekly inspections of pipeline integrity and damage.
- The solids separation tank will be regularly inspected and pumped out by a licensed sewage contactor when it reaches $\frac{3}{4}$ full.
- Evaporation/irrigation area enclosed by a 1.8 m high fence which is an effective barrier to livestock, native fauna and safety barrier to people. Access to be provided through a locked gate.
- As part of the monthly environmental inspection the WWTP fencing will be inspected for integrity and damage.
- Maintain pipeline bunding and visual inspection for leaks.
- Effluent discharge quality monitoring undertaken on a quarterly basis.
- Pipelines in the irrigation area will only be active when operating and irrigation is in progress.
- Irrigating over an area of sufficient size (as determined by Department's Water Quality Protection Note 22) to prevent excess nutrient loading.
- Flow meter installed at discharge pipe to ensure approved volume to irrigation field is not exceeded.
- Ponds will be managed with a 2-day freeboard to ensure capacity in case of extended maintenance / failure of evaporation infrastructure.