



Application for Works Approval

Part V Division 3 of the *Environmental Protection Act 1986*

Works Approval Number	W6586/2021/1
Applicant	Oasis @ Newman Pty Ltd
ACN	612 951 710
File number	DER2021/000388
Premises	Oasis @ Newman 44 Great Northern Highway Newman WA 6753 Legal description Lot 44 on Deposited Plan 171724 As defined by the premises map attached to the issued works approval
Date of report	22/03/2022
Proposed Decision	Works approval granted

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A/SENIOR MANAGER
WASTE INDUSTRIES
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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1. Decision summary

This decision report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of the premises. As a result of this assessment, works approval W6586/2021/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) has considered and given due regard to its regulatory framework and relevant policy documents which are available at <https://dwer.wa.gov.au/regulatory-documents>.

2.2 Application summary and overview of premises

On 2 July 2021 the Applicant (Oasis @ Newman Pty Ltd) submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act). The application is for the construction of a Category 54 sewage facility at the premises. The premises is approximately 5.6 km south of Newman.

The Applicant holds a current Registration R2504/2020/1 for a smaller sewage facility designed to treat up to 70 m³ per day of wastewater generated from the accommodation facility and associated amenities at the Premises. The Applicant is in the process of expanding its short-term accommodation facility from 374 rooms to 672 rooms for approximately 900 people, requiring an upgrade of its existing Wastewater Treatment Plant (WWTP). Treated effluent from the WWTP will be disposed for irrigation in plants and grassed areas within the site.

The pump station and the three balance tanks from the original wastewater treatment plant (WWTP) will be retained for the new WWTP. No modifications are required for this infrastructure.

The premises also encompasses:

- Groundwater Licence GW45976 – one groundwater bore is located within the premises abstracting from a depth of 77 metres;
- A Reverse Osmosis (Plant) – processing groundwater for drinking; and
- Generators located on site, currently supplying the existing accommodation village and WWTP – will also supply the upgraded WWTP once constructed. Fuel is stored onsite in bunded ponds.

The premises relates to the category and assessed design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W6586/2021/1 and Table 1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guideline: Risk Assessments* (DWER 2020) are outlined in works approval W6586/2021/1.

Table 1: Prescribed Premises category and capacity

Prescribed Premises category description (Schedule 1, <i>Environmental Protection Regulations 1987</i>)	Assessed production capacity
Category 54 Sewage facility: premises – (a) on which sewage is treated (excluding septic tanks); or (b) from which treated sewage is discharged onto land or into waters.	250 m ³ per day

2.3 WWTP construction and operation

The Applicant is proposing to install an AquaSol branded, packaged, secondary wastewater treatment system that is designed to treat up to 250 m³ per day of wastewater using sequential batch reactors and bacteria to digest and break down organic waste. The WWTP will operate as follows:

- Sewerage is pumped from the existing main pump station to three 25kL existing balance tanks. Feed sewerage is initially screened by a rotating screen that is built into a 40-foot high-cube shipping container. The screen rotation is automatic and self-clearing which purges captured large solids into a 1000 litre bulker bag being used as a waste bin, which is then sent to landfill for disposal. The screen removes large solids down to 2 mm. The liquid sewerage feed that is purged of large solids is then directly fed into an aerobic tank;
- The aerobic tank will have a minimum volumetric capacity of 50kL where it acts as a buffer and break tank. A 2.2kW submersible aerator is installed to provide oxygen to bacteria and promote biodegradation;
- Two submersible sump pumps inside the aerobic tank pump aerated wastewater out to a sequential batch reactor (SBR) array. Pumped wastewater flow from the aeration tank is divided among the five tanks. Each tank is 50kL which gives an overall SBR capacity of 250kL. This increased batch volume allows for a 5-times increase in residence time. Further biodegradation is promoted by 2.2kW aerators in each tank and from the increased reaction time. Each SBR has its own dedicated submersible extraction pump which transfers aerated wastewater to two polish tanks;
- Polished water is then further treated through mechanical, chemical and UV sterilization modules in the Filtration and Disinfection Process Plant;
- The sludge tank is 32kL and draws from the base of each SBR tank. SBR tanks have actuated sludge drainage valves at the base of each tank which connect to a Return Activated Sludge (RAS) and Waste Activated Sludge (WAS) pump manifold. One sludge pump draws SBR tank sludge through a suction manifold and discharges to the sludge tank. A portion of this may be returned to the aerobic tank. Return and Waste diversion is controlled by two actuated valves (RAS and WAS). Flocculant is dosed into the RAS and WAS pump discharge to promote the formation of solid aggregates which improve solids settling in the sludge tank. A submersible sump pump is installed at height in the sludge tank which returns settled sludge water into the aerobic tank at the start of the process;
- Settled sludge is pumped from the sludge tank into a drying bag. This bag is constructed from woven polypropylene to meet AS 3668-1989 and housed in a reserved area inside the Filtration and Disinfection sea container;
- Pumps inside the filtration plant draw water from the polish tank in preparation for filtration and disinfection. PAC and chlorine are stored in chemical storage dosing tanks which are in the sea container. PAC flocculant is dosed directly into the stream to promote solids aggregation. This improves the efficiency at which the media filters can capture solids. Chlorine is dosed to disinfect the water. A static inline mixer promotes turbulent mixing of water with PAC and chlorine;
- Chemically treated water is fed through five 450mm diameter media filters arranged in parallel. The media includes a mixture of coarse gravel, sand, and fine glass beads which remove particulates down to 3µm. Additionally, water is filtered through cartridge filters removing particles up to 1µm;
- Filtered water passes through two parallel UV sterilizers for further disinfection before being discharged to irrigation. A polish loop return line is provided for re-filtration.

Irrigation and polish return is controlled by actuated valves;

- Online water analysis will be used to monitor the free available chlorine (FAC), pH, and turbidity before its final discharge to irrigation;
- All the alarms in the system will be recorded in the PLC. All wiring will be completed to Australian standards. System control will be via Delta PLC & HMI.

The system shall treat the wastewater to meet AS/NZS 1547:2000 and defined process limits. The WWTP will treat wastewater to a secondary level, disinfect with chlorine and use liquid aluminium to flocculate and reduce phosphate levels. Aquasol are contracted to perform regular maintenance on the WWTP and undertake sampling on a monthly basis. The system treatment time is 2.5 days.

Process flow diagrams and WWTP schematics are included in Figure 1, 2 and 3 below.

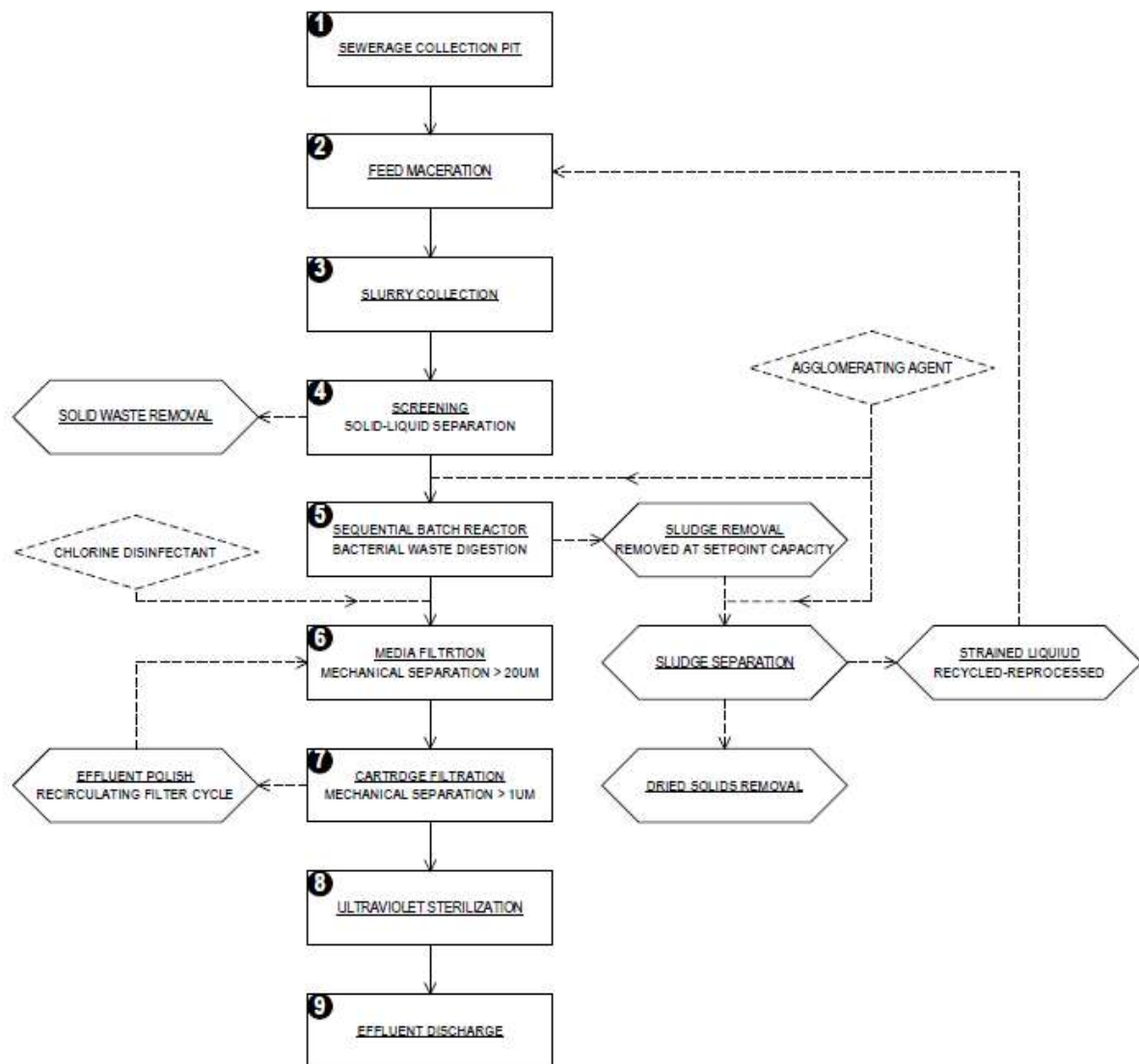


Figure 1: Process flow diagram

2.4 Irrigation of blended effluent

Once treated, the wastewater will be disposed of via a subsurface drip-irrigation pipeline system which will be installed within the garden beds and lawns in the surrounding accommodation facility and around the perimeter of the premises.

Additional to the treated effluent, the WWTP effluent stream for irrigation will incorporate brines originating from the reverse osmosis plant which will be disposed of as a blended effluent. The reverse osmosis plant is anticipated to produce 33 m³/day of brines, with this volume to be incorporated into the final permissible discharge volume of 250 m³/day over the irrigation area within the premises. The Applicant has advised they intend to construct the WWTP and associated water filtration system, then decommission the reverse osmosis system to reduce the daily irrigation output.

The Applicant intends on installing 67,200 m² of pipeline at the premises for disposal of the treated wastewater via irrigation of the gardens. It is considered this length of pipeline will not be sufficient to adequately dispose of 250 m³ per day of blended effluent from the WWTP. As such, the Applicant has requested to limit disposal to a total volume of 134 m³ per day of blended effluent via irrigation, which will be sufficiently managed by the receiving soils at the premises and the 67,200 m² of pipeline intended to be installed.

The Applicants proposed monitoring schedule for the discharge to land potential contaminants within treated effluent from the WWTP are detailed in Section 4.1 below. Similarly, the Nutrient Irrigation Management Plan proposed by the Applicant is detailed in Section 4.3.

3. Legislative context

3.1 State Planning Policy

State planning policies provide the highest level of planning policy control and guidance in Western Australia. Prepared under Part 3 of the *Planning and Development Act 2005*, *State Planning Policy 1 State Planning Framework Policy* (SPP 1.0) brings together existing State and regional policies, strategies, plans and guidelines within a central State Planning Framework. It sets the context for decision-making on land use and development in Western Australia. Subsequent to Policy 1, draft *State Planning Policy 2.0 – Environment and natural resources policy* (SPP 2.0) defines the principles and considerations that represent good and responsible planning in terms of environment and natural resource issues within the framework of the State Planning Strategy. The objectives of the policy are to:

- Integrate environment and natural resource management with broader land use planning and decision-making.
- Protect, conserve and enhance the natural environment.
- Promote and assist in the wise and sustainable use and management of natural resources.

Specifically, the draft *State Planning Policy 2.9 Planning for Water* aims to deliver greater clarity around how water-related provisions are implemented. The draft SPP 2.9 and Guidelines incorporate improvements that will lead to better planning decision-making through consideration of appropriate management measures to achieve optimal water resource and development outcomes.

The Shire of East Pilbara is the responsible Planning Authority for the in granting of approvals in accordance with SPP requirements.

3.2 Shire of East Pilbara

The Shire of East Pilbara was invited to comment on the proposal on 8 September 2021 and provided the following information. The Shire issued planning consent in 2021 for the following developments at Oasis @ Newman:

- Additional rooms, additional parking and light industrial area.
- Facades and bus shelter.
- Retrospective development approval – Accommodation, Gym, Dining room extension and Water Tank.
- Manager’s residence.

The effect of these approvals is that the structures and developments shown on the Oasis Master Plan inclusive of all of the accommodation units, and in association with the development approvals, have received planning approval from the Shire of East Pilbara. Subsequently the Shire issued building permits in 2021 for these structures at the premises.

A building permit for the WWTP infrastructure was also issued in 2021. This building permit has a condition to the effect that construction of the treatment plant must not commence until Department of Health WA have issued approval to construct and install an apparatus for the treatment of sewage.

3.3 Department of Health

The Government Sewerage Policy (2019) provides guidance on the provision of sewerage services in Western Australia and is implemented under specific legislation as applied by various government departments including the Department of Health, the Department of Water and Environmental Regulation and planning and development processes of local government authorities.

On site sewerage disposal is detailed in the policy to ensure the premises is capable of accommodating the disposal without endangering public health or the environment. Requirements of the policy applicable to the premises are detailed in Table 2 below.

Table 2: Government Sewerage Policy 2019 requirements

Government Sewerage Policy
Subsection
5.2 Onsite sewage disposal The premises size must exceed 4 hectares for onsite disposal
5.2.2 Separation from water resources An onsite sewage system is not to be located within: <ul style="list-style-type: none">• 100 metres of any bore used for public drinking water supply.• 100 metres of a waterway and not within a waterway foreshore area.
5.2.3 Separation from groundwater The discharge point of the onsite sewage system should be at least two metres above the highest groundwater level, taking into account the range of seasonal groundwater conditions, when in public drinking water source areas.

Government Sewerage Policy
Subsection
<p>5.2.4 Land application area</p> <p>Each lot should be of sufficient size to accommodate development and an unencumbered land application area for the disposal of sewage in accordance with Schedule 2 of this policy.</p>
<p>5.2.5 Type of on-site treatment system required</p> <p>Secondary treatment systems with nutrient removal will generally be required in public drinking water source areas and sewage sensitive areas.</p>
<p>6.2 Secondary treatment systems – maintenance requirements</p> <p>System providers are required to ensure that maintenance of the system is undertaken in accordance with the <i>Code of Practice for the Design, Manufacture, Installation and Operation of Aerobic Treatment Units</i>, which includes:</p> <ul style="list-style-type: none"> • Servicing at regular intervals as specified by Department of Health • Submission of maintenance reports to the local government and Department of Health.
<p>Definition: Secondary treatment system</p> <p>A sewage treatment system which produces treated sewage of secondary standard, i.e. 20 mg/L of Biochemical Oxygen Demand (BOD), 30 mg/L of Total Suspended Solids (TSS) and 10 cfu/100 mL of Escherichia coli (for example, an aerobic treatment unit).</p>
<p>Definition: Secondary treatment system with nutrient removal</p> <p>A secondary treatment system that discharges treated sewage with phosphorus and nitrogen concentrations of less than 1 mg/L and 10 mg/L respectively.</p>

The Department of Health (DoH) was invited to comment on the proposal on 8 September 2021 and provided the following information.

Water Supply and Wastewater Management

In relation to wastewater management, the DoH has also received an application for approval for an upgraded onsite WWTP, however, will not support this proposal unless the following can be demonstrated:

1. The development proposal is located within a public drinking water source area (P3) and the disposal area is proposed in very close proximity to the Fortescue River. The Government Sewerage Policy requires a 100 m buffer between environmentally sensitive areas and disposal areas;
2. Confirmation that the wastewater treatment systems and disposal areas comply with the Government Sewerage Policy requirements;
3. Confirmation that the proposal is supported by DWER;
4. Detailed plans are to be provided of the disposal areas, including measurements that show all buildings including accommodation, supporting amenities, car parks or other hard stand areas, caravans and boundaries. All minimum setback distances are also to be shown as per Regulatory Requirements. To include the square meterage of all proposed disposal areas. Based on the submitted proposal, 62,500 m² of disposal area is required, however this needs to be demonstrated.

5. Details of the irrigation methods proposed. Spray irrigation cannot be used near accommodation or supporting buildings, such as laundries, restaurants and similar amenities.
6. A permeability test is normally requested as per AS/NZS 1547:2012 requirements and the disposal area sized accordingly.
7. Update the Recycled Water Quality Management Plan.

The DoH have concerns that the lot may be overdeveloped, therefore the above will be required prior to supporting this proposal.

Medical Entomology

Historically, the risk from mosquitoes and mosquito-borne diseases such as Ross River (RRV) and Murray Valley encephalitis (MVE) virus disease is low for this area, although cases of RRV occur annually in the Shire of East Pilbara. There is the potential for mosquitoes to breed in the development in on-site infrastructure, surface water management system and constructed water bodies if they are poorly designed.

It is the recommendation of the DoH that the Applicant work with the Shire of East Pilbara to determine the extent of the risk from mosquitoes and mosquito-borne disease; ensure sewerage and water management infrastructure does not create or contribute to mosquito breeding; and if necessary, implement a mosquito management plan.

Approval to construct or install an apparatus for the treatment of sewage

Subsequently, on 1 March 2022 the Department of Health granted “Approval to construct or install an apparatus for the treatment of sewage” to the Applicant for use of a sequencing batch reactor array with tertiary (filtration and disinfection) treatment plus a 6.76 hectare irrigation area. Conditions of this approval, relevant to DWER assessment, include:

- Limiting the WWTP system to receive a maximum volume of 134,000 L/day;
- WWTP to be maintained and serviced adequately to ensure water quality targets consistent with the Government Sewerage Policy (2019) for a secondary treatment system;
- Any proposal for increased irrigation area will be subject to a site and soil evaluation in accordance with Australian and New Zealand standard: *Onsite Domestic Wastewater Management – AS/NZS 1547:2012*.
- It is an offence under section 107(4) of the *Health (Miscellaneous Provisions) Act 1911* to use an apparatus before it has been inspected and a “Permit to use” the apparatus issued.

Key Findings:

1. The Delegated Officer notes the premises is larger than 4 hectares, the WWTP will be more than 100 metres from a drinking water bore and from the Fortescue River, and the depth to groundwater is estimated to be 10 metres below ground surface, all exceeding the minimum requirements of the Government Sewerage Policy (2019).
2. The Delegated Officer notes the Applicant proposes to install a secondary treatment system as required by the Government Sewerage Policy (2019), therefore the treatment must meet the limits defined within the Government Sewerage Policy (2019).
3. The Delegated Officer notes the Applicant proposes to discharge treated sewage to land via irrigation, therefore the discharges must meet the limits for nutrient removal specified in the definition as required by the Government Sewerage Policy (2019).
4. The Delegated Officer notes the Applicant has obtained Department of Health approval for the WWTP.

3.4 Country Areas Water Supply Act 1947

The *Country Areas Water Supply Act 1947* (CAWS Act) is used to inform government's land use planning framework in order to protect important surface water and groundwater sources.

Water Source Protection Planning Branch within DWER has confirmed the proposed land use of a WWTP is considered compatible with Water Quality Protection Note 25: Land use compatibility tables for public drinking water source areas (2021) with the application of conditions 13, 22, 24 and 28, and that the use of irrigating recycled water for waste management is considered compatible with the application of conditions 23, 25 and 28. Table 3 below details those conditions and the applicability to the premises thereby requiring controls to afford protection to the water sources.

Table 3: Water Quality Protection Note 25 conditions

WQPN 25 Condition
13. The department does not support this activity within protection zones (WHPZs and RPZs) unless special circumstances apply.
22. Where organic materials and/or turbid wastewaters are stored, adequate bunding should prevent the escape of potential contaminants (such as pathogens and nutrients) into the environment, including planning for contingencies such as storms and floods.
23. A nutrient and irrigation management plan should be prepared. Additional note: The Applicant should ensure the irrigation area is and remains vegetated as this is part of the system. Fertiliser and pesticide use should be limited.
24. Hydrocarbons, chemicals and other toxic or hazardous substances should be stored so there is no discernible risk of contamination of groundwater or surface water. This should include effective secondary barriers to contain the system, such as double walled tanks and bunding. Restrictions apply for storage tanks. A contingency plan for managing and responding to spills should be in place.
25. The use of recycled water for irrigating vegetation needs to be in accordance with the Department of Health's <i>Guidelines for the non-potable use of recycled water in Western Australia</i> .
28. This land use/activity may require assessment under the <i>Environmental Protection Act 1986</i> .

Key Findings:

5. The Delegated Officer notes high priority groundwater and surface water resources are located within the vicinity of the premises which must be protected from potential risks during operation of the proposed WWTP and discharges via subsurface irrigation.
6. The Delegated Officer notes the WWTP needs to be consistently maintained and verified as achieving treatment to AS/NZS 1547:2012 standards.
7. The Delegated Officer notes groundwater sampling of the surficial aquifer is necessary to identify any potential degradation or nutrient impacts once the WWTP becomes operational, however there are currently no monitoring bores located at the premises.

3.5 Dangerous Goods (Storage and Handling of Non-explosives) Regulations 2007

Hazardous substances intended to be used in the WWTP include chlorine and sodium hypochlorite. The Applicant has committed to storing these substances in tanks constructed of HDPE and located within bunds. Storage is in accordance with AS 3780-2008 *Storage and Handling of Corrosive Substances*. The Applicant may be required to hold a Dangerous Goods Licence issued by the Department of Mines, Industry Regulation and Safety.

4. Modelling and monitoring data

4.1 Odour management plan

The Applicant has an Odour Management Plan in place to ensure the design, construction and operation of the WWTP manages potential impacts of odour emissions. Possible locations of odour source at the WWTP include the collection systems, in-system pump stations, water tank lids and the screen. Chemical dosing with sodium hypochlorite at the beginning of the treatment process aims to increase the pH of the sewage to above pH 8, reducing the odours emanating from sewage collection systems

The treatment tanks on site will be also covered in order to prevent fugitive emissions of odorous gases. The covers are designed to minimise odour leakage and ensure negative pressure under the covers during normal operation.

Operational monitoring to determine excessive odour emissions is by onsite staff trained to use common sense on unusual smells. Operators will be trained to reduce, or temporarily stop, the operations if they are unable to control odour impact to a satisfactory level.

4.2 Noise emissions

The Applicant has prepared a Noise Management Plan that advises noise emissions are not expected to be over the allowed limit. Acoustic boxes will be installed in specific equipment such as the sea containers if needed. Operational monitoring to determine excessive noise emissions is by onsite staff trained to use common sense on unusual noises.

Noise emissions are reduced by pumps being enclosed inside sea containers and the use of submersible aerators to achieve noise emissions of 50 db.

Key Finding:

8. The Delegated Officer notes there has been no noise modelling conducted to ensure compliance with the *Environmental Protection (Noise) Regulations 2004*.

4.3 Nutrient Irrigation Management Plan

The Applicant intends to dispose of treated wastewater via subsurface drip irrigation within the garden beds and lawns of the accommodation facility, and around the perimeter of the premises. The soils present at the premises are a combination of sands, gravel and clay, therefore loam type was chosen to calculate the irrigation rate, being 4 L/m²/day. At full capacity accepting up to 250 m³ per day of wastewater and incorporating RO brines into the effluent stream, the volume of blended effluent that could be generated will require up to 62,500 m² of pipeline for disposal (Table 4). The premises will have 67,400 m² of pipeline installed within an available undeveloped area of 6.74 hectares (Figure 4). The WWTP is anticipated to have an actual daily throughput of 178.8 m³ of wastewater based on the actual size of the hotel expansion plans, and the RO plant is anticipated to produce 33 m³/day of brines.

Table 4: Calculation of disposal area required for volume of blended effluent and components

Total design capacity of WWTP	250 m³ (250,000 L)
Soil irrigation rate	4 L/m ² /day
Area required	250,000 L/day ÷ 4 L/m ² /day = 62,500 m ²
Anticipated actual throughput of WWTP	178.8 m³ (178,800 L)
Soil irrigation rate	4 L/m ² /day
Area required	178,800 L/day ÷ 4 L/m ² /day = 44,700 m ²
Anticipated RO brine production	33 m³ (33,000 L)
Soil irrigation rate	4 L/m ² /day
Area required	33,000L/day ÷ 4 L/m ² /day = 8250 m ²
Actual area available	67,400 m²

Pesticides and herbicides are not proposed to be used at the premises.

Nitrogen removal will occur by simultaneous nitrification-denitrification processes, where ammonium will be converted to nitrite and nitrate under aerobic conditions, and nitrate will be converted to nitrogen gas under anaerobic conditions. This will occur in the aerobic tank and the five sequential batch reactor tanks.

Phosphorus removal will occur with the addition of the flocculant poly aluminium chloride in the pipeline leading to the sludge tank to precipitate phosphates.

Key Finding:

- The Delegated Officer notes that the blended effluent stream consisting of the anticipated actual throughput volume of the WWTP (178.8 m³), and the anticipated RO brine production (33 m³) will have a required area of disposal (52,950 m²) less than the actual available area (67,400 m²).

CALCULATION OF IRRIGATED AREAS:

Land size per attached: 7.97 ha

Less Buildings:

- Billabong: 21 buildings = 1,542.00 sqm
- Fortescue: 10 buildings = 864.00 sqm
- Oasis: 6 lower buildings = 492.50 sqm
- Kallenia: 63 buildings = 4,426.72 sqm
- Towradgi: 63 buildings = 4,808.16 sqm
- $\Sigma = 12,133.38$ sqm

Subtotal of irrigation 6.74 hectares (per application)

Less:

- Bore area 100m clearance: 7461.28 sqm

Plus:

- New landscaping areas as marked (to replace areas lost by bore clearance):

1. 1,104.17 sqm
2. 3,078.85 sqm
3. 1,119.90 sqm
4. 2,061.00 sqm
5. 329.16 sqm
- 7,693.08 sqm

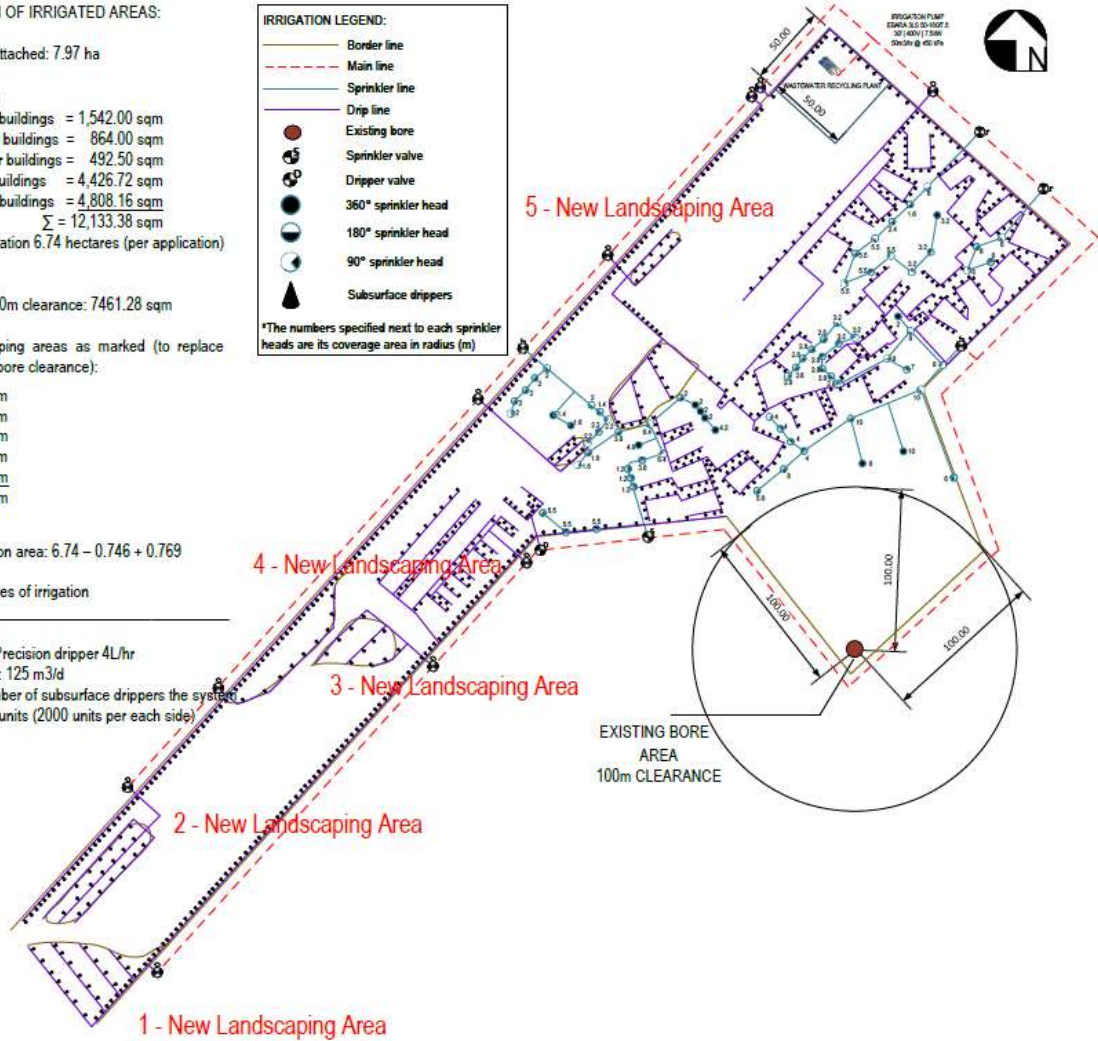
Total reticulation area: 6.74 - 0.746 + 0.769

= 6.763 hectares of irrigation

Dripper type: Precision dripper 4L/hr

Flow available: 125 m³/d

Maximum number of subsurface drippers the system can run: 4000 units (2000 units per each side)



IRRIGATION LEGEND:

- Border line
- - - Main line
- Sprinkler line
- Drip line
- Existing bore
- ⊙ Sprinkler valve
- ⊙ Dripper valve
- ⊙ 360° sprinkler head
- ⊙ 180° sprinkler head
- ⊙ 90° sprinkler head
- ▲ Subsurface drippers

*The numbers specified next to each sprinkler heads are its coverage area in radius (m)

DATE: 27.01.22	DRAWING TITLE: IRRIGATION PLAN LAYOUT		AQUASOL Water Treatment Solutions 52-56 GERRINGBARRA AVE HALLGATA WA 4906 T: +61 8 9248 7533 A/CN: 157 631 411	SI TYPE: ORTHO/ISOMETRIC SHEET SIZE: A3 SCALE: 1:2500 PAGE: 1 OF 3
DESIGN: MP	DOCUMENT No: AQ-OAS-IRR-002	REVISION: C		
DRAWN: MP	© Copyright 2022. This document is and shall remain the property of Aquasol and may only be used for the purposes or demonstration in accordance with terms outlined in this document or attached documents. Unauthorised use of this document or design in any form whatsoever is prohibited, and Aquasol reserves the right to take legal action.			
PROJECT: IRRIGATION PLANT	CLIENT: DRESS NEWMAN			

Figure 4: Total available area for disposal of blended effluent

4.4 Monitoring of discharges to land

The WWTP is designed to AS/NZS 1547:2000 to achieve specific processing limits in the treated wastewater output, as specified in Table 5. The Applicant has committed to conducting weekly monitoring during commissioning and ongoing monthly monitoring of the treated wastewater outputs to measure actual water quality against the expected design quality process limits. Turbidity, chlorine and pH will be monitored continuously via online systems. In addition, flow rates will be measured to determine volumetric flow outputs discharged to land.

Where non-compliance with discharge limits occurs, the Applicant has advised modifications will be made to the system within 24 hours for online alterations, 48 hours for onsite emergency alterations and 14 days for major system alterations, plus irrigation stopped if needed.

Table 5: Anticipated design process limits for treated wastewater quality

Parameter	Process Limit
pH	6.5 – 8.5
<i>E. Coli</i>	< 10 cfu/110 mL
Biochemical Oxygen Demand (BOD)	< 20 mg/L
Turbidity	< 5 NTU
Total Nitrogen	< 10 mg/L
Total Phosphorus	< 1 mg/L
Chlorine	0.2 – 2.0 mg/L

The Applicant has conducted nitrogen and phosphorus sampling of underlying soils across the premises, with samples collected from three locations within the irrigation area. Testing was conducted to determine the leachable concentrations of nitrogen and phosphorus (Table 6).

Table 6: Determination of leachable nitrogen and phosphorus in soil samples

Parameter	Sample BH1	Sample BH2	Sample BH3
Total Nitrogen	3.0 mg/L	0.31 mg/L	0.59 mg/L
Total Phosphorus	0.75 mg/L	0.21 mg/L	0.31 mg/L

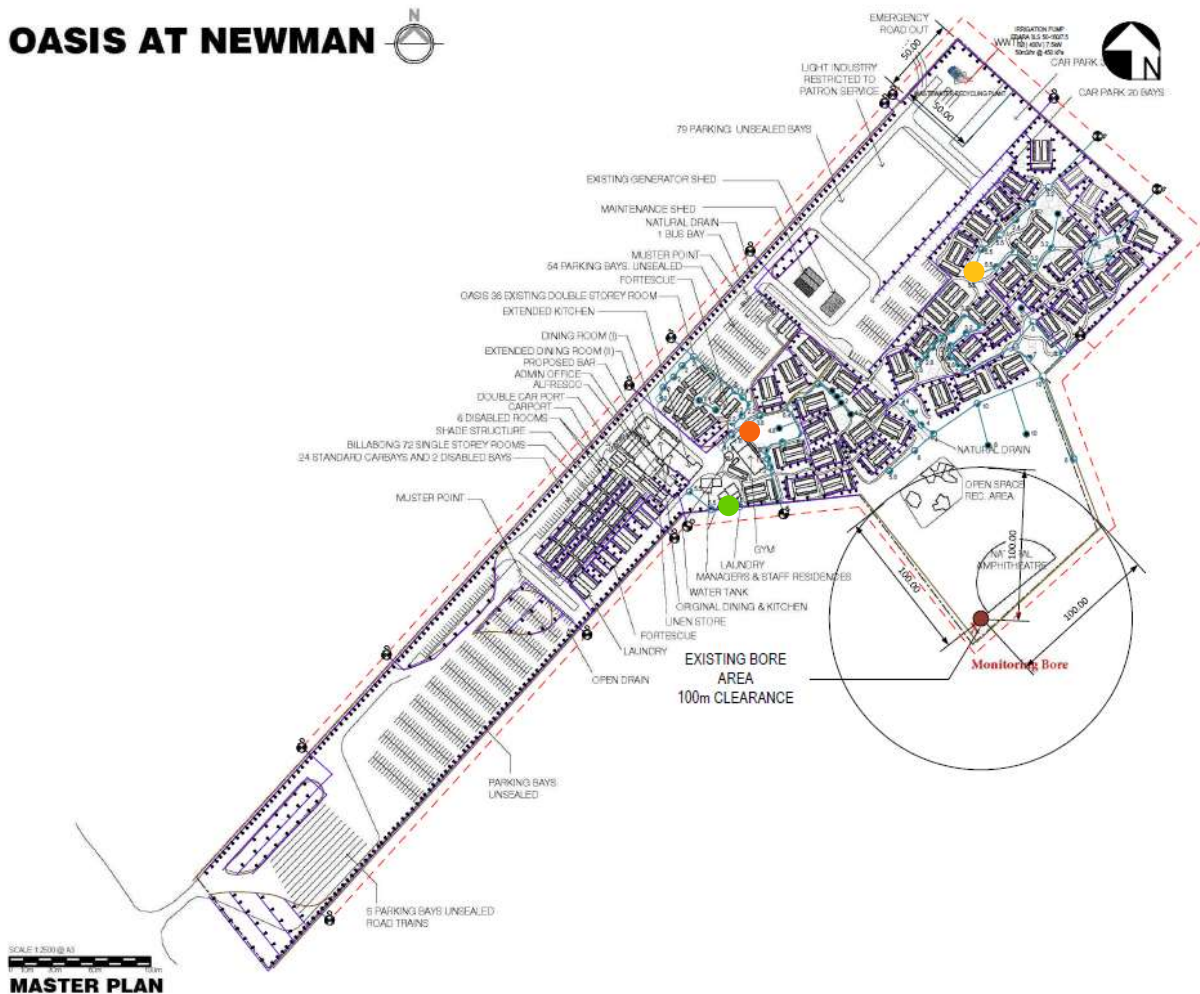


Figure 5: Soil sample locations – BH1 (green) BH2 (orange) and BH3 (yellow)

Key Finding:

10. The Delegated Officer notes the design of the WWTP aims to achieve AS/NZS 1547:2012, consistent with the most recent Australian Standard.
11. The Delegated Officer notes the WWTP will be designed to achieve specific processing limits, which are consistent with the Guidelines for the Non-Potable Uses of Recycled Water in Western Australia (Department of Health 2011).
12. The Delegated Officer notes the analytical suite of parameters proposed for monitoring of discharges to land will provide limited information on treatment quality associated with operational discharges.
13. The Delegated Officer notes when discharges exceed specified limits, the system will be modified to correct this exceedance within various time periods up to 14 days.
14. The Delegated Officer notes that no information has been provided regarding soil nutrient retention capacity.
15. The Delegated Officer notes that the total phosphorus anticipated process limit from the WWTP, and hence anticipated application rate via irrigation, are comparable to the total phosphorus soil nutrient concentration, outlined within WQPN 22.
16. The Delegated Officer notes that the nitrogen and phosphorus concentrations within soil samples obtained prior to irrigation will provide a baseline for soil concentrations should any concerns with nutrient loading within soils be raised during operation of the WWTP.

4.5 Monitoring of groundwater

One bore exists at the premises which is primarily used for the purpose of drinking and human use at the premises after processing through the reverse osmosis plant. The Applicant has collected one suite of groundwater sampling from this bore, some in January 2021 and the remainder July 2021 to determine existing levels of groundwater parameters at the premises. Table 7 shows the results of that monitoring.

The Applicant has advised of the intention to install three groundwater monitoring bores (Figure 6) as a priority to obtain a full suite of baseline groundwater data and conduct an ongoing groundwater monitoring program during operation of the WWTP.

Table 7: Groundwater monitoring results

Parameter	Groundwater levels
pH	7.6
E. Coli	< 1 cfu/110 mL
Turbidity	0.5 NTU
Total Dissolved Solids (TDS)	580 mg/L
Total Suspended Solids (TSS)	<5 mg/L
Ammonium-Nitrogen (NOx-N)	3.1 mg/L
Total Nitrogen	3.1 mg/L
Total Phosphorus	0.17 mg/L
Aluminium	< 0.01 mg/L
Cadmium	< 0.0001 mg/L
Copper	< 0.001 mg/L
Iron	0.01 mg/L
Lead	< 0.001 mg/L
Nickel	< 0.001 mg/L
Zinc	0.005 mg/L

Key Finding:

17. The Delegated Officer notes the Applicant's intention to install three groundwater monitoring bores at the premises and has committed to an ongoing groundwater monitoring program.
18. The Delegated Officer notes that the analytical suite of parameters measured in groundwater to date provides limited information on current quality of groundwater sources.



Figure 6: Installation location for future groundwater monitoring bores

5. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk Assessments* (DWER 2020).

To establish a risk event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

5.1 Receptors

5.1.1 Human receptors

In accordance with the *Guideline: Risk Assessment* (DWER 2020), the Delegated Officer has excluded the Applicant's employees, visitors, and contractors from its assessment. Protection of these parties often involves different exposure risks and prevention strategies and is provided for under other state legislation.

Table 8 and Figure 7 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental Siting* (DWER 2020)).

Table 8: Sensitive human receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Residential Premises	<ul style="list-style-type: none">• Neighbouring commercial premises on the adjacent north eastern boundary, with the sensitive premises being located 130 metres from the WWTP location. <p>The Delegated Officer considers that due to the close proximity of this premises there is the potential for impacts to occur, so it is considered as a receptor in this assessment.</p> <ul style="list-style-type: none">• Township of Newman 5.6 km north <p>The Delegated Officer considers that due to distance there is no likely impact upon these residences, so it is not considered further as a receptor within this assessment.</p>

5.1.2 Environmental receptors

Table 9 and Figure 7 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental Siting* (DWER 2020)).

Table 9: Sensitive environmental receptors and distance from prescribed activity

Environmental receptors	Distance from prescribed activity
Threatened Fauna	<p>Vulnerable <i>Macrotis lagotis</i> (Bilby) 520m south east</p> <p>Protected under an International Agreement <i>Plegadis falcinellus</i> (Glossy ibis) 520m south</p> <p>The Delegated Officer considers that due to distance there is no likely impact upon these threatened fauna species, so they are not considered further as a receptor within this assessment.</p>
Groundwater	<p>The premises is located within a Priority 3 Public Drinking Water Source Protection Area with a Priority 1 area immediately surrounding the premises boundary, and within the Newman Water Reserve Proclaimed Groundwater Area.</p> <p>The Applicant holds a groundwater bore licence (GWL 204041) for 3,000 kL per annum, which is used for potable water supply at the premises. Abstraction from the bore occurs at 77 metres below ground level. This bore is 100m away from any discharge irrigation pipelines. The other nearest registered groundwater bore is 3km away across the Fortescue River which will act as a hydraulic boundary to water movement through the surficial formations.</p> <p>According to DWER records, no groundwater degradation or nutrient impacts have been reported in the vicinity of the premises. Protection of these groundwater sources is a priority environmental outcome for the Delegated Officer.</p>
Surface water	<p>The proposed WWTP and irrigation field are located 104 m northeast of the Fortescue River, which flows from the southwest to Ophthalmia dam in the north east, which is the recharge area for the drinking water bore field. The river is ephemeral and only flows after heavy rainfall events.</p>

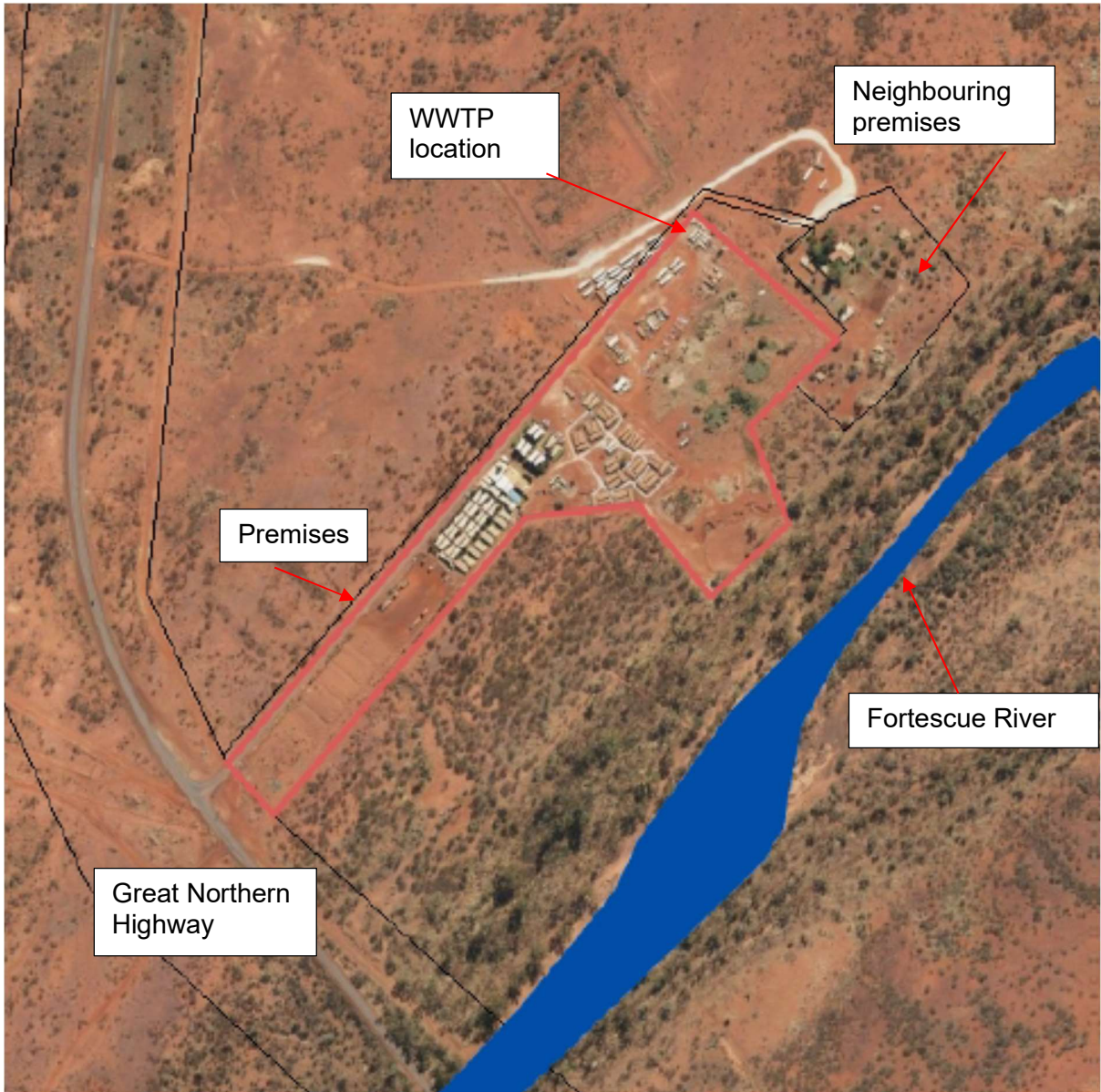


Figure 7: Premises boundary and distance to sensitive receptors

5.2 Pathways

5.2.1 Wind direction and strength

Prevailing wind patterns can provide a direct pathway for transmission of dust and odours by air, so prevailing wind patterns that may carry these emissions to sensitive receptors have been considered in this assessment. The closest Bureau of Meteorology (BoM) weather station which records wind frequency data is Newman Airport (BoM site 007176). Prevailing winds during mornings are on average from the east, north east and south east, and swing variably to the north, north east, east and south east during afternoons (Figure 8). This pathway has been considered in the risk assessment table in section 5.4.

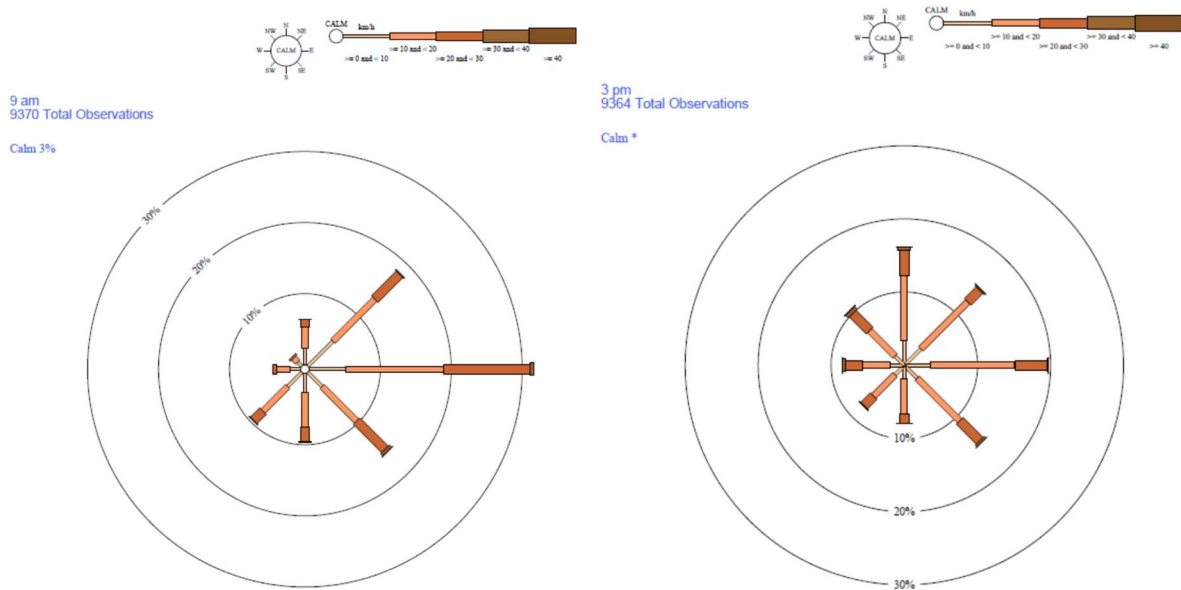


Figure 8: Wind roses for 9 am and 3 pm at Newman Airport (BoM site 007176)

Source: Bureau of Meteorology website www.bom.wa.gov.au

5.2.2 Groundwater movements

Groundwater movement can provide a direct pathway through subsurface seepage into soils for transmission of contaminants. Operation of the WWTP and subsequent irrigation of treated wastewater has the potential to alter the groundwater quality and subsequently impact the beneficial uses of groundwater, be that impacts to public health or the environment. DWER has reviewed the application to identify all high priority water sources located within the vicinity of the premises (Table 9) and what level of risks the operation of the WWTP poses to these resources.

The post drilling static water level for the onsite drinking water bore was measured at 10 metres below ground level (bgl) and the existing water quality is fresh (~580 mg/LTDS) with a neutral pH (7.6).

Groundwater flow in the shallow surficial aquifer is likely to be towards the Fortescue River to the southeast of the premises and generally mimics the direction of surface water flows. Recharge occurs mostly by leakage from stream beds during runoff. Water quality and quantity is heavily influenced by the quality and quantity of surface water flows.

5.3 Emission sources and applicant controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this decision report are detailed in Table 10 below. Table 10 also details the control measures the Applicant has proposed to assist in controlling these emissions, where necessary.

Table 10: Proposed applicant controls

Sources	Emission	Potential pathways	Proposed controls
Construction			
Construction, mobilisation and positioning of infrastructure	Dust	Air / wind dispersion	<ul style="list-style-type: none"> Use of existing infrastructure including the pump station and three 25kL balance tanks. Use of a pre-constructed WWTP which will require only minor assemblage onsite.
	Noise		
Operation & Commissioning			
Treatment of sewage	Odour	Air / wind dispersion	<ul style="list-style-type: none"> Odour management plan for the addition of sodium hypochlorite to increase the pH of the sewage from pH 7 to pH 8.5.
	Noise		<ul style="list-style-type: none"> Acoustic equipment to be installed if needed.
	Seepage of untreated wastewater	Subsurface seepage	<ul style="list-style-type: none"> The WWTP is enclosed within sealed tanks and sea containers.
	Overtopping of plant	Overland flow	<ul style="list-style-type: none"> WWTP consists of sealed tanks. Tanks have a 'high level' warning once reached to stop further wastewater entering the tank and prevent overtopping. Automatic alarms on pumps to advise of malfunctions.
	Contamination of stormwater	Overland flow Subsurface seepage	<ul style="list-style-type: none"> The Applicant has installed a drainage system to divert stormwater away from the WWTP. The WWTP is enclosed within sealed tanks and sea containers.
	Spills of hydrocarbons and chemicals	Overland flow	<ul style="list-style-type: none"> Flocculants are stored in tanks designed to meet AS 3780.2008 and banded with polyethylene. Fuel for the generator is stored in banded pods.

Sources	Emission	Potential pathways	Proposed controls
Irrigation of treated wastewater and RO brines to gardens	Treated wastewater containing pathogens and nutrients at concentrations not fit for purpose	Direct contact with irrigation water Overland flow and runoff Subsurface seepage	<ul style="list-style-type: none"> • Treatment of wastewater to meet AS/NZS 1547:2000 and specific processing limits • Automatic chlorination system for accurate dosing. • Subsurface irrigation to prevent direct contact with irrigation water. • Buffer of 104m between irrigation pipeline and the Fortescue River. • Signage to warn recycled wastewater is used on lawns and is non potable.

5.4 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 0. Where linkages are incomplete they have not been considered further in the risk assessment.

Where the Applicant has proposed mitigation measures/controls (as detailed in Section 0), these have been considered when determining the final risk rating. Where the Delegated Officer considers the Applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the Applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 11.

Works approval W6586/2021/1 that accompanies this decision report authorises construction and commissioning. The conditions in the issued works approval, as outlined in Table 11 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence is required following the commissioning phase authorised under the works approval to authorise emissions associated with the ongoing operation of the premises. A risk assessment for the operational phase has been included in this decision report, however licence conditions will not be finalised until the department assesses the licence application.

Table 11: Risk assessment of potential emissions and discharges from the premises during construction, commissioning and operation

Risk events					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient ²	Conditions of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Construction								
Construction, mobilisation and positioning of infrastructure	Dust	Air / wind dispersion	Adjacent neighbouring premises located 130 m from the WWTP	Refer to Section 5.3	Due to the short-term duration of construction, emissions of dust are likely to be negligible thereby no risk event is anticipated.			
	Noise	Impacting amenity		Refer to Section 5.3	Due to the short-term duration of construction, emissions of noise are likely to be negligible thereby no risk event is anticipated.			
Operation & Commissioning								
Treatment of sewage	Odour	Air / wind dispersion Impacting amenity	Adjacent neighbouring premises located 130 m from the WWTP	Refer to Section 5.3	C = Minor L = Possible Medium Risk	No	Condition 17	<p>Proposed works will increase the current throughput of the WWTP from 70 m³/day up to 250 m³/day. The Odour Management Plan is limited to modification of pH levels only, which will not minimise all odours associated with the full process. The Applicant has not provided any odour modelling data to support the level of odour emissions anticipated. The potential for increased odour emissions from inflow infrastructure and the treatment process is possible.</p> <p>Prevailing winds are strong and generally from an easterly direction which will direct concentrated odours away from the neighbouring premises.</p> <p>The Delegated Officer considers the prevailing winds and a separation distance of 130m</p>

Works Approval: W6586/2021/1

Risk events					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient ²	Conditions of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
								<p>sufficient to ensure increased odour emissions will not result in a significant impact upon amenity.</p> <p>To determine if odour emissions are creating an impact upon amenity, the Delegated Officer has included conditions requiring the recording of complaints during commissioning activities and reporting these to the CEO. Further assessment of this risk will be undertaken in the subsequent Licence application.</p>
	Noise	Air / wind dispersion Impacting amenity	Adjacent neighbouring premises located 130 m from the WWTP	Refer to Section 5.3	C = Minor L = Unlikely Medium Risk	No	Condition 17	<p>The Applicant has not provided any noise modelling data to support the level of noise emissions anticipated, however Delegated Officer considers the separation distance of 130m sufficient to ensure noise emissions will not result in a significant impact upon amenity.</p> <p>To determine if noise emissions are creating an impact upon amenity, the Delegated Officer has included conditions requiring the recording of complaints during commissioning activities and reporting these to the CEO. Further assessment of this risk will be undertaken in the subsequent Licence application.</p> <p>Noise emissions may be subject to the provisions of the <i>Environmental Protection (Noise) Regulations 2004</i>.</p>

Works Approval: W6586/2021/1

Risk events					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient ²	Conditions of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
	Seepage of untreated and treated wastewater	Subsurface seepage Impacts to the quality of groundwater	P1 and P3 Public Drinking Water Source Area (PDWSA)	Refer to Section 5.3	C = Major L = Unlikely Medium Risk	No	Condition 1	<p>The upgraded WWTP is designed with sealed tanks, enclosed within sea containers and the floor of the sea containers painted with an impervious epoxy resin to prevent seepage of wastewater out of the WWTP.</p> <p>The Delegated Officer considers the controls proposed by the Applicant are sufficient to prevent an emission occurring under most circumstances.</p> <p>As this risk is mitigated by adequate implementation of these Applicant controls, the Delegated Officer shall enforce these controls via construction, operational and maintenance conditions on the Works Approval, and subsequent Licence.</p>
	Overtopping of plant	Overland flow Impacts to the Fortescue River	Fortescue River	Refer to Section 5.3	C = Major L = Unlikely Medium Risk		Condition 1	<p>The upgraded WWTP is designed with sealed tanks and has alarms to notify when tanks are nearing full capacity and for malfunctions to prevent overtopping of the WWTP.</p> <p>The Delegated Officer considers the controls proposed by the Applicant are sufficient to prevent an emission occurring under most circumstances.</p> <p>As this risk is mitigated by adequate implementation of these Applicant controls, the Delegated Officer shall enforce these</p>

Risk events					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient ²	Conditions of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
								controls via construction, operational and maintenance conditions on the Works Approval, and subsequent Licence. Any discharges may be subject to the provisions of the <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> .
	Contamination of stormwater	Overland flow Subsurface seepage Impacts to the Fortescue River and the P1 and P3 PDWSA	Fortescue River P1 and P3 PDWSA	Refer to Section 5.3	C = Moderate L = Unlikely Medium Risk	Yes	Condition 1	The upgraded WWTP is designed with sealed tanks, which will prevent stormwater entering the system. Contouring of the premises will ensure overland flow of stormwater is directed away from the WWTP, thereby preventing contamination. The Delegated Officer considers the controls proposed by the Applicant are sufficient to prevent an emission occurring under most circumstances. As this risk is mitigated by adequate implementation of these Applicant controls, the Delegated Officer shall enforce these controls via construction and maintenance conditions on the Works Approval, and subsequent Licence.

Risk events					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient ²	Conditions of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
	Spills of hydrocarbons and other chemicals	Overland flow	Fortescue River P1 and P3 PDWSA	Refer to Section 5.3	C = Moderate L = Possible Medium Risk	Yes	Condition 6	<p>The storage and handling of all chemicals at the Premises is regulated by the <i>Dangerous Goods and Safety Act 2004</i>. This regulates the packaging, the method of storage to prevent spills, cross contamination and adverse chemical reactions.</p> <p>Power is created by existing onsite generators that supply electricity to the entire village.</p> <p>As this risk is mitigated by adequate implementation of these Applicant controls, the Delegated Officer shall enforce these controls via operational conditions on the Works Approval, and subsequent Licence.</p> <p>Any discharges of hydrocarbons or other chemicals may be subject to the provisions of the <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i>.</p>
Irrigation of treated wastewater to lawns and gardens	Treated wastewater containing pathogens at concentrations not fit for purpose	Direct contact with irrigation water Impacts to human health	Visitors to the accommodation village Adjacent neighbouring premises located 130 m from the WWTP	Refer to Section 5.3	See Section 5.7			

Risk events					Risk rating ¹ C = consequence L = likelihood	Applicant controls sufficient ²	Conditions of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
	Treated wastewater containing nutrients at concentrations not fit for purpose	Overland flow and runoff Subsurface seepage Impacts to the Fortescue River and the P1 and P3 PDWSA	Groundwater bore P3 & P1 Newman PDWSA Groundwater bore	Refer to Section 5.3				

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk Assessments* (DWER 2020).

Note 2: Proposed Applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

5.5 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in Table 12 below.

Table 12: Risk rating matrix

Likelihood	Consequence				
	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

DWER will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with Table 13 below.

Table 13: Risk criteria table

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		The following criteria has been used to determine the consequences of a Risk Event occurring:		
			Environment	Public health* and amenity (such as air and water quality, noise, and odour)
Almost Certain	The risk event is expected to occur in most circumstances	Severe	<ul style="list-style-type: none"> onsite impacts: catastrophic offsite impacts local scale: high level or above offsite impacts wider scale: mid-level or above Mid to long-term or permanent impact to an area of high conservation value or special significance[^] Specific Consequence Criteria (for environment) are significantly exceeded 	<ul style="list-style-type: none"> Loss of life Adverse health effects: high level or ongoing medical treatment Specific Consequence Criteria (for public health) are significantly exceeded Local scale impacts: permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	<ul style="list-style-type: none"> onsite impacts: high level offsite impacts local scale: mid-level offsite impacts wider scale: low level Short-term impact to an area of high conservation value or special significance[^] Specific Consequence Criteria (for environment) are exceeded 	<ul style="list-style-type: none"> Adverse health effects: mid-level or frequent medical treatment Specific Consequence Criteria (for public health) are exceeded Local scale impacts: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	<ul style="list-style-type: none"> onsite impacts: mid-level offsite impacts local scale: low level offsite impacts wider scale: minimal Specific Consequence Criteria (for environment) are at risk of not being met 	<ul style="list-style-type: none"> Adverse health effects: low level or occasional medical treatment Specific Consequence Criteria (for public health) are at risk of not being met Local scale impacts: mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	<ul style="list-style-type: none"> onsite impacts: low level offsite impacts local scale: minimal offsite impacts wider scale: not detectable Specific Consequence Criteria (for environment) likely to be met 	<ul style="list-style-type: none"> Specific Consequence Criteria (for public health) are likely to be met Local scale impacts: low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	<ul style="list-style-type: none"> onsite impact: minimal Specific Consequence Criteria (for environment) met 	<ul style="list-style-type: none"> Local scale: minimal to amenity Specific Consequence Criteria (for public health) met

[^] Determination of areas of high conservation value or special significance should be informed by the *Guideline: Environmental Siting*.

* In applying public health criteria, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines*.

"onsite" means within the Prescribed Premises boundary.

5.6 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment Table 14 below:

Table 14: Risk treatment table

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk Event will not be tolerated. DWER may refuse application.
High	May be acceptable. Subject to multiple regulatory controls.	Risk Event may be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk Event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled.	Risk Event is acceptable and will generally not be subject to regulatory controls.

5.7 Detailed risk assessment: Irrigation of treated wastewater

5.7.1 Description of risk event

Untreated sewage from the Oasis @ Newman accommodation village is received at the WWTP for treatment, following which treated wastewater will be blended with RO brines and piped to irrigate the gardens and lawns surrounding the accommodation village.

Untreated or incorrectly treated wastewater may contain pathogens (including bacteria, viruses and protozoa), helminths (intestinal worms and worm-like parasites), elevated concentrations of nitrogen and phosphorus as well as metals, metalloids and persistent organic pollutants. During discharge of treated wastewater (source) the release of pathogens and contaminants in elevated concentrations (emission) by direct discharge to land via irrigation (pathway) may cause detrimental impacts to groundwater sources and humans (receptors) suffering public health concerns including gastroenteritis and other diseases (adverse impact).

Wastewater, if treated sufficiently, should contain very low levels of pathogens, helminths and contaminants at levels adequate for the receiving environment to appropriately buffer, thereby preventing or minimising adverse impacts to humans and the environment.

5.7.2 Criteria for assessment

Relevant land and surface water quality criteria include:

- Department of Planning, Lands and Heritage (2019) Government Sewerage Policy.
- Department of Health (2011) Guidelines for Non-Potable Uses of Recycled Water in Western Australia.
- Department of Health (2015) Code of Practice for the Design, Manufacture, Installation and Operation of Aerobic Treatment Units.
- AS/NZS 1547:2012 On-site domestic wastewater management.
- ANZECC & ARMCANZ (2000) – criteria for fresh water
- ANZECC & ARMCANZ (2000) – heavy metals criteria for irrigation use

5.7.3 Applicant controls

- The WWTP is designed to treat wastewater to the AS/NZS 1547:2012 standards and to achieve specific processing limits.
- Treated wastewater sent through the irrigation system will be chlorinated and UV treated prior to release to manage concentrations of biological contaminants to levels acceptable for the irrigation scheme.
- Where non-compliance with discharge limits occurs, the Applicant has advised modifications will be made to the system within 24 hours for online alterations, 48 hours for onsite emergency alterations and 14 days for major system alterations, plus irrigation stopped if needed.
- Treated wastewater will be discharged from the irrigation system via subsurface drip pipelines and will control irrigation rates to prevent the generation of surface pooling and runoff, preventing unintentional contact by humans.
- The onsite groundwater extraction bore is 100m away from any irrigation pipelines.
- Signage to be used around the accommodation village advising the irrigation water is not fit for human use or drinking.
- The Department of Health regulates public health impacts from the wastewater reuse scheme. The Applicant obtained approval from the Department of Health on 1 March 2022 for construction of the WWTP which includes a reduced acceptance limit of 134 m³/day to the total volume of treated effluent that may be received by the WWTP, plus limits to discharge water quality parameters. The reduced acceptance limit is based on the estimated volume of wastewater to be generated by the actual number of serviced rooms available at the accommodation facility, and compared to modelled irrigation data to determine the ability of the soils at the Premises to adequately absorb the discharged treated wastewater. The Applicant is required to conduct site-specific soil investigations to determine the actual volume of treated blended effluent that is capable of infiltration at the premises, which will be reviewed by the Department of Health, and subsequently DWER, to justify any proposed increase in discharge via irrigation at the premises during full operation of the WWTP.

5.7.4 Key findings

The Delegated Officer has reviewed the information regarding discharges of treated wastewater to land via irrigation and has found:

1. The ability to chlorinate and UV treat irrigation water prior to discharging to land will ensure sufficient management of pathogenic contaminants.
2. Discharging treated wastewater via subsurface irrigation pipelines and the prevention of surface pooling and runoff will ensure adequate separation of humans from pathogenic contaminants. Department of Health approval is appropriate for the regulation of public health impacts associated with irrigation of the gardens and lawns surrounding the Oasis @ Newman accommodation village.
3. The Applicant has obtained approval from the Department of Health, which includes a reduced acceptance limit of 134 m³/day to the total volume of treated effluent that may be received by the WWTP, plus limits to discharge water quality parameters.
4. The Delegated Officer will require the WWTP to be designed and constructed to the AS/NZS 1547:2012 standard.
5. The ability of the WWTP to achieve treatment within the specific processing limits is crucial to ensure discharges to land contain very low levels of pathogens, helminths and contaminants to prevent or minimise adverse impacts to humans and groundwater

sources. The Delegated Officer will require:

- a) certification by an engineer that the WWTP has been designed to achieve AS/NZS 1547:2012 standards;
 - b) certification by an engineer that the WWTP has been constructed in accordance with the design requirements;
 - c) monitoring during commissioning and ongoing operational monitoring of discharges from the WWTP to confirm that the WWTP is accurately and consistently achieving the treatment process limits and nutrient removal limits.
6. The intention of the Applicant to not correct the treatment system for up to 14 days when discharges exceed specified limits poses a high risk of detrimental impacts to groundwater sources and humans. The intention to cease irrigation, albeit without timeframe indicated, will ensure a minor level of mitigation of risk. The Delegated Officer will require monitoring during commissioning to ensure the WWTP is not exceeding the specified treatment limits, and ongoing operational monitoring of discharges from the WWTP on a monthly basis to ensure any exceedances of specified limits are identified timely, discharges are immediately ceased, and the system rectified to return treatment to within acceptable limits.
7. The Delegated Officer will require the installation and regular ongoing monitoring of groundwater bores to identify any potential degradation or nutrient impacts to groundwater sources once the WWTP becomes operational.

5.7.5 Consequence

If treated wastewater containing pathogens and/or nutrients is released during irrigation of the gardens and lawns surrounding the accommodation village, the Delegated Officer has determined that impacts could result in specific consequence criteria for public health being exceeded, and health effects requiring mid-level or frequent medical treatment. Specific consequence criteria for the environment include high level on-site impacts, mid-level off-site impacts at the local scale. Therefore, the Delegated Officer considers the consequence of the release of pathogens and/or nutrients during irrigation to be **Major**.

5.7.6 Likelihood

The Delegated Officer has determined that with the proposed level of treatment meeting AS/NZS 1547:2012, the use of chlorination and UV treatment methods and adequate separation from the onsite groundwater bore, the likelihood of pathogens and/or nutrients being discharged in treated wastewater could occur at some time. Therefore, the Delegated Officer considers the likelihood of pathogens being released during irrigation to be **Possible**.

5.7.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix and determined that the overall rating for the risk of treated wastewater containing pathogens and/or nutrients being released during irrigation of the gardens and lawns surrounding the accommodation village is **High**.

5.7.8 Justification for additional regulatory controls

As a key control to prevent the discharge of excessive concentrations of pathogens and nutrients is to ensure construction of the WWTP meets the AS/NZS 1547:2012 standards,

The Delegated Officer notes the overall risk of the release of pathogens and contaminants in elevated concentrations is directly related to the effectiveness of the Applicant controls put into place during construction. Regulatory controls will include those that ensure adequate

construction, installation and commissioning of the WWTP system in order to require that it function as designed.

The Delegated Officer considers that the Department of Health is the authority responsible for the regulation of the on-site irrigation of the treated sewage in accordance with relevant Health Legislation. To ensure consistency with Department of Health approval, the Delegated Officer has imposed a reduced limit of 134 m³/day of the total volume of treated blended effluent that may be discharged via irrigation. The Department of Health requires the Applicant to conduct site-specific soil investigations to determine the actual ability of treated wastewater to infiltrate the soils via irrigation, which DWER will assess during licence application to determine suitability for any requested increase to the discharge limit.

To determine effectiveness of the WWTP system, the Delegated Officer shall apply commissioning conditions on the Works Approval that enable processing of sewage waste for an extended 180-day time period with associated monitoring of discharge parameters to ensure the processing limits are achieved. This commissioning period will condition regular monitoring of parameters within blended effluent to be discharged to land and will provide the Department with certainty surrounding the capability of the WWTP to treat effluent to the required specifications whilst accounting for seasonal variability at the premises. The 180-day commissioning period will be implemented in lieu of a time limited operational period and as such, to prevent any delay with premises operation, the works approval holder is advised to submit their subsequent licence application for assessment when at least 3 monitoring events worth of data has been collected and analysed in accordance with commissioning monitoring requirements specified on the works approval.

During construction, and to be completed prior to the submission of the licence application, the Delegated Officer will require the construction of at least three groundwater monitoring bores at the premises. One bore is to be installed up-hydraulic gradient to provide ongoing background parameter data and two bores are to be installed down-hydraulic gradient to provide comparison data to determine the impact of emissions and discharges upon the health of the groundwater source.

The requirement for one baseline groundwater monitoring event has been included into the works approval commissioning monitoring requirements, so as to provide the Department with data outlining baseline groundwater quality prior to long term operation of the WWTP commencing.

The Delegated Officer will require the reporting of all commissioning and monitoring data, and shall consult with the Department of Health on the results of the groundwater quality data to determine the risk to human health from the discharge of treated wastewater to land, during assessment of the future licence application.

6. Consultation

Table 15 provides a summary of the consultation undertaken by the department that is not otherwise summarised in Section 3 of this report.

Table 15: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website on 20 September 2021	Nil	N/A
Applicant was provided with draft documents on 10 February 2022.	See Appendix 1	See Appendix 1

7. Conclusion

Based on the assessment in this decision report, the Delegated Officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

The Works Approval Holder is responsible for ensuring all necessary approvals have been obtained prior to commencing construction and commissioning works.

References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
4. Department of Planning, Lands and Heritage 2019, *Government Sewerage Policy*, Perth, Western Australia
5. Department of Health 2015, *Code of Practice for the Design, Manufacture, Installation and Operation of Aerobic Treatment Units*, Perth, Western Australia
6. Department of Health 2011, *Guidelines for the Non-Potable Uses of Recycled Water in Western Australia*, Perth, Western Australia
7. Standards Australia (2012) Australian Standard AS/NZS 1547-2012 On-site domestic wastewater management.

Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of Applicant's comment	Department's response
Decision Report Key Finding 6 and 10	Aquasol confirm that WWTP will meet AS1547:2012 and be maintained on a regular basis both via online real time monitoring and regular maintenance visits.	Noted. Key Finding 6 and 10 updated accordingly.
Decision Report Key Finding 7	Aquasol recommends 3 x 4" monitoring bores 8m depth to find surface water set on near boundary area of Irrigation to triangulate area	Noted. No changes required.
Decision Report Key Finding 8	With all equipment located inside sea containers and noise emissions below 50db, those are well below EPNR2004 regulation requirements	Key Finding 8 remains unchanged. Noise modelling data has not been provided for assessment. Noise modelling has not been conditioned in the works approval.
Decision Report Key Finding 12	The WWTP will have online monitoring of flow, pH, TDS, Turbidity and operational alarms plus dial up monitoring and control, so has significant controls to assure high quality treatment	Key Finding 12 remains unchanged. The analytical suite of parameters as proposed by the Applicant to be tested during commissioning and future operation were lacking several key analytical parameters. DWER has included all the required parameters within Condition 13 of the Works Approval to ensure the full scope of parameters are sampled during commissioning.
Decision Report Key Finding 13	<p>This is a contractual 100 days between Aquasol and Oasis, in real response of WWTP it will be 24hrs online, 48 hrs to get to site in emergency, 14 days to get major changes made to better the system.</p> <p>We allow 100 days in case multiple changes are needed and monitoring over weeks after changes is needed. Example it took 4 weeks of changes and monitoring recently to reduce Total Nitrogen from 30mg/Lt to less than 10mg/Lt and conform.</p>	Noted. Section 4.4 updated accordingly and Key Finding 13 revised.

Condition	Summary of Applicant's comment	Department's response
Decision Report Key Finding 14	Soil residual nutrient analysis has been completed and submitted during application process, and its low indicating that land is not contaminated and suitable for purpose proposed	Soil nutrient analysis data was provided which measures the total nitrogen and total phosphorus present within the soils at the Premises, giving a base-line level for the nutrients. Key Finding 14 notes no information has been provided regarding soil nutrient retention capacity. This refers to the ability of the soils at the Premises to utilise the additional nitrogen and phosphorus provided via irrigation with the treated wastewater. This data was not provided for assessment.
Decision Report Key Finding 17	This will be a priority to install monitoring bores as quickly as possible to get baseline before and after install and monitor ongoing. Map provided of locations for future groundwater monitoring bores.	Noted. Section 4.5 updated accordingly, Figure 6 added and Key Finding 17 revised.
Decision Report Key Finding 18	Deep Bore that is drawn for potable water is tested regularly and has not shown microbiological activity or contamination, this indicates a healthy situation with low risk. Sample results have been submitted during application process	Key Finding 18 remains unchanged. The analytical suite of parameters sampled by the Applicant and lodged with the application were lacking several key analytical parameters. DWER has included all the required parameters within Condition 16 of the Works Approval to ensure the full scope of ambient groundwater parameters are sampled.
Decision Report 5.7.4 Key Finding 4	Agreed by Aquasol and Oasis.	Noted. Key Finding 4 updated accordingly.
Decision Report 5.7.4 Key Finding 6	Refer Item 4: Aquasol will correct the system within 24hrs for critical online changes needed, 48 hrs for critical onsite changes, 14 days for major infra-structure repair. The 100 days is a maximum contractual note between Oasis and Aquasol. This is linked to termination of Aquasol services based on results not being met. This is highly unlikely given the system is designed for 250m ³ / days and is most likely to operate at <100m ³ day	Noted. Section 5.7.3 updated accordingly and Key Finding 6 revised.

Condition	Summary of Applicant's comment	Department's response
Decision Report 5.7.4 Key Finding 7	Aquasol will enter into a Managed service contract with Oasis to maintain system operation and compile yearly reports back to DWER as required	Noted.
Limit to approved volume for disposal to land via irrigation	<p>The Applicant intends on installing 67,200 m² of pipeline at the premises for disposal of the treated wastewater via irrigation of the gardens. It is considered this length of pipeline will not be sufficient to adequately dispose of 250 m³ per day of blended effluent from the WWTP.</p> <p>As such, the Applicant has requested to limit disposal to a total volume of 134 m³ per day of blended effluent via irrigation, which will be sufficiently managed by the receiving soils at the premises and the 67,200 m² of pipeline intended to be installed.</p>	<p>The assessed design capacity of the WWTP will remain at 250 m³ per day.</p> <p>The volume of blended effluent approved to be disposed of to land via irrigation during environmental commissioning requirements will be limited to 134 m³ per day. Works Approval condition 6 and Table 3 (row 2 irrigation area and irrigation system) to be updated accordingly.</p> <p>Should the Applicant intend on requesting an increase to the approved volume of effluent, blended or otherwise, to be disposed of via irrigation to land for future operation of the WWTP, the Delegated Officer recommends the Applicant conduct a site-specific soil investigation to justify any proposed increase in volume.</p>
Decommissioning of reverse osmosis system	The Applicant has advised they intend to construct the WWTP and associated water filtration system, then decommission the reverse osmosis system.	As the Applicant intends to operate the reverse osmosis system during construction and environmental commissioning of the WWTP, conditions on the Works Approval relating to the reverse osmosis system will remain unchanged.
N/A	The Applicant provided the Department of Health approval granted 10 March 2022.	<p>The Delegated Officer has reviewed the Department of Health approval for consistency with Works Approval conditions.</p> <p>Minor amendments have been made to the Decision Report to reflect the Applicant has obtained Department of Health approval.</p>

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY	
Application type	
Works approval	<input checked="" type="checkbox"/>
Date application received	2 July 2021
Applicant and Premises details	
Applicant name/s (full legal name/s)	Oasis @ Newman Pty Ltd
Premises name	Oasis @ Newman
Premises location	44 Great Northern Highway, Newman
Local Government Authority	Shire of East Pilbara
Application documents	
HPCM file reference number:	DER20181/001042-5~81
Key application documents (additional to application form):	<ul style="list-style-type: none"> Aerial map ASIC company details Building permit Site plan Supporting document – Alarms, critical control points and critical limits Supporting document – Emissions and discharges v2 Supporting document – NIMP v2 Supporting document – Proposed Activities v2 Supporting document – Site classification report Supporting document – final landscape proposal Supporting document – calculation of irrigated areas Supporting document – laboratory reports WWTP plan
Scope of application/assessment	
Summary of proposed activities or changes to existing operations.	<p>Works approval (replacement of existing WWTP under Registration R2504/2020/1)</p> <p>Construction of wastewater treatment plant with design capacity of 91,250 kL/year</p>

Category number/s (activities that cause the premises to become prescribed premises)

Table 1: Prescribed premises categories

Prescribed premises category and description	Proposed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 54 Sewage facility: premises — (a) on which sewage is treated (excluding septic tanks); or (b) from which treated sewage is discharged onto land or into waters.	91, 250 kL/year (divide by 365 = 250 m3/day)	Current registered WWTP has a design capacity of 70 m3/day.

Legislative context and other approvals

Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Certificate of title <input checked="" type="checkbox"/>
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> <input checked="" type="checkbox"/> Unknown	Approval: Building permit 5878
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Licence/permit No: Not provided
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Licence/permit No: GWL 20404
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Name: Newman Water Reserve Type: Proclaimed Groundwater Area Has Regulatory Services (Water) been consulted? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> Regional office: North West

<p>Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>Name: Newman Water Reserve Priority: P3 Are the proposed activities/ landuse compatible with the PDWSA (refer to <u>WQPN 25</u>)? Yes <input checked="" type="checkbox"/>* No <input type="checkbox"/> N/A <input type="checkbox"/> *Compatible with conditions</p>
<p>Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx</i>)</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p><i>Public Health Act 2016</i> and associated subsidiary legislation</p>
<p>Is the Premises within an Environmental Protection Policy (EPP) Area?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	
<p>Is the Premises subject to any EPP requirements?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	
<p>Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i>?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	