Works Approval

Works Approval Number	W6086/2017/1
Works Approval Holder	Aquasol Pty Ltd
ACN	157 831 411
Registered business address	84 Beringarra Avenue , MALAGA WA 6090
File Number	DER2017/001449
Duration	11/01/2018 to 10/01/2021
Date of issue	11/01/2018
Prescribed Premises	Category 54: Sewage facility
Premises	Moore River South Waste Water Treatment Plant and Recycling Scheme Part of Lot 2914 on Plan 202250 as defined by the co-ordinates below

Easting	Northing
360282.123	6528355.422
360382.430	6528356.486
360382.981	6528304.551
360282.674	6528303.487

This Works Approval is granted to the Works Approval Holder, subject to the following conditions, on 11 January 2018 by:

Date signed: 11 January 2018
Caron Goodbourn
A/Manager Licensing (Process Industries)

an officer delegated under section 20 of the Environmental Protection Act 1986 (WA)

Explanatory notes

These explanatory notes do not form part of this Works Approval.

Defined terms

Definition of terms used in this Works Approval can be found at the start of this Works Approval. Terms which are defined have the first letter of each word capitalised throughout this Works Approval.

Department of Water and Environmental Regulation

The Department of Water and Environmental Regulation (DWER) is established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the *Environmental Protection Act 1986* (WA) (EP Act). The Department also monitors and audits compliance with licences and works approvals, takes enforcement action and develops and implements licensing and industry regulation policy.

Works Approval

Section 52 of the EP Act provides that an occupier of any premises commits an offence if any work is undertaken on, or in relation to, the premises which causes the premises to become, or to become capable of being, Prescribed Premises, except in accordance with a works approval.

Section 56 of the EP Act provides that an occupier of Prescribed Premises commits an offence if Emissions are caused or increased or permitted to be caused or increased, or Waste, noise, odour or electromagnetic radiation is altered or permitted to be altered from Prescribed Premises, except in accordance with a works approval or licence.

Categories of Prescribed Premises are defined in Schedule 1 of the *Environment Protection Regulations 1987* (WA) (EP Regulations).

This Works Approval does not authorise any activity which may be a breach of the requirements of another statutory authority including, but not limited to, the following:

- conditions imposed by the Minister for Environment under Part IV of the EP Act;
- conditions imposed by DWER for the clearing of native vegetation under Part V, Division 2 of the EP Act;
- any requirements under the Waste Avoidance and Resource Recovery Act 2007;
- any requirements under the Environmental Protection (Controlled Waste) Regulations 2004; and
- any other requirements specified through State legislation.

It is the responsibility of the Works Approval Holder to ensure that any action or activity referred to in this Works Approval is permitted by, and is carried out in compliance with, statutory requirements.

The Works Approval Holder must comply with the Works Approval. Contravening a Works Approval Condition is an offence under s.55 of the EP Act.

Responsibilities of Works Approval Holder

Separate to the requirements of this Works Approval, general obligations of Works Approval Holders are set out in the EP Act and the regulations made under the EP Act. For example, the Works Approval Holder must comply with the following provisions of the EP Act:

- the duties of an occupier under s.61; and
- restrictions on making certain changes to Prescribed Premises unless the changes are in accordance with a Works Approval, Licence, closure notice or environmental protection notice (s.53).

Strict penalties apply for offences under the EP Act.

Reporting of incidents

The Works Approval Holder has a duty to report to the Department all Discharges of Waste that have caused or are likely to cause Pollution, Material Environmental Harm or Serious Environmental Harm, in accordance with s.72 of the EP Act.

Offences and defences

The EP Act and its regulations set out a number of offences including:

- Offence of emitting an Unreasonable Emission from any Premises under s.49.
- Offence of causing Pollution under s.49.
- Offence of dumping Waste under s.49A.
- Offence of discharging Waste in circumstances likely to cause Pollution under s.50.
- Offence of causing Serious Environmental Harm (s.50A) or Material Environmental Harm (s.50B).
- Offence of causing Emissions which do not comply with prescribed standards (s.51).
- Offences relating to Emissions or Discharges under regulations prescribed under the EP Act, including materials discharged under the Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA).
- Offences relating to noise under the Environmental Protection (Noise) Regulations 1997 (WA).

Section 53 of the EP Act provides that a Works Approval Holder commits an offence if Emissions are caused, or altered, from a Prescribed Premises unless done in accordance with a Works Approval, Licence or the requirements of a closure notice or an environmental protection notice.

Defences to certain offences may be available to a Works Approval Holder and these are set out in the EP Act. Section 74A(b)(iii) provides that it is a defence to an offence for causing Pollution, in respect of an Emission, or for causing Serious Environmental Harm or Material Environmental Harm, or for discharging or abandoning Waste in water to which the public has access, if the Works Approval Holder can prove that an Emission or Discharge occurred in accordance with a Works Approval.

This Works Approval specifies the Emissions and Discharges, and the limits and Conditions which must be satisfied in respect of specified Emissions and Discharges, in order for the defence to offence provision to be available.

Authorised Emissions and Discharges

The specified and general Emissions and Discharges from the Works authorised through this Works Approval are authorised to be conducted in accordance with the Conditions of this Works Approval.

Amendment of Works Approval

The Works Approval Holder can apply to amend the Conditions of this Works Approval under s.59 of the EP Act. An application form for this purpose is available from DWER.

The CEO may also amend the Conditions of this Works Approval at any time on the initiative of the CEO without an application being made.

Duration of Works Approval

The Works Approval will remain in force for the duration set out on the first page of this Works Approval or until it is surrendered, suspended or revoked in accordance with s.59A of the EP Act.

Suspension or revocation

The CEO may suspend or revoke this Works Approval in accordance with s.59A of the EP Act.

Definitions and interpretation

Definitions

In this Works Approval, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
AS 2700S-2011	Australian Standard - Colour standards for general purposes
AS/NZS 3500	Australian/New Zealand Standard - Plumbing and Drainage Set
Books	has the same meaning given to that term under the EP Act.
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department Administering the *Environmental Protection Act 1986* Locked Bag 33 Cloisters Square PERTH WA 6850 info-der@dwer.wa.gov.au
Condition	means a condition to which this Works Approval is subject under s.62 of the EP Act.
CIP	Clean in Place
Compliance Report	means a report in a format approved by the CEO as presented by the Licence Holder or as specified by the CEO (guidelines and templates may be available on the Department's website).
Department	means the department established under s.35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
Department Request	means a request for Books or other sources of information to be produced, made by an Inspector or the CEO to the Works Approval Holder in writing and sent to the Works Approval's address for notifications, as described at the front of this Works Approval, in relation to: (a) compliance with the EP Act or this Licence; (b) the Books or other sources of information maintained in accordance with this Licence; or (c) the Books or other sources of information relating to Emissions from the Premises.
Discharge	has the same meaning given to that term under the EP Act.
DoH	Department of Health
DWER	Department of Water and Environmental Regulation
Emission	has the same meaning given to that term under the EP Act.

Environmental Harm	has the same meaning given to that term under the EP Act.
EP Act	means the *Environmental Protection Act 1986* (WA).
EP Regulations	means the *Environmental Protection Regulations 1987* (WA).
Hardstand	means a hard surface with a permeability of at least $1x10^{-9}$ m/s.
Implementation Agreement or Decision	has the same meaning given to that term under the EP Act.
Inspector	means an inspector appointed by the CEO in accordance with s.88 of the EP Act.
Material Environmental Harm	has the same meaning given to that term under the EP Act.
Noise Regulations	the *Environmental Protection (Noise) Regulations 1997*
Pollution	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Licence applies, as specified at the front of this Licence and as shown on the map in Schedule 1 to this Licence.
Prescribed Premises	has the same meaning given to that term under the EP Act.
PVC	Polyvinyl Chloride
Serious Environmental Harm	has the same meaning given to that term under the EP Act.
Specified Emission	means authorised emissions and discharges
UV	means ultra violet.
Unreasonable Emission	has the same meaning given to that term under the EP Act.
Waste	has the same meaning given to that term under the EP Act.
Works	refers to the Works described in Schedule 2, at the locations shown in Schedule 1 of this Works Approval to be carried out at the Premises, subject to the Conditions.
Works Approval	refers to this document, which evidences the grant of the works approval by the CEO under s.54 of the EP Act, subject to the Conditions.
Works Approval Holder	refers to the occupier of the Premises being the person to whom this Works Approval has been granted, as specified at the front of this Works Approval.

Interpretation

In this Works Approval:

a) the words ‘including’, ‘includes’ and ‘include’ will be read as if followed by the words ‘without limitation’;

b) where any word or phrase is given a defined meaning, any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;

c) where tables are used in a Condition, each row in a table constitutes a separate Condition;

d) any reference to an Australian or other standard, guideline or code of practice in this Works Approval means the version of the standard, guideline or code of practice in force at the time of granting of this Works Approval and includes any amendments to the standard, guideline or code of practice which may occur from time to time during the course of the Works Approval; and

e) unless specified otherwise, any reference to a section of an Act refers to that section of the EP Act.

Conditions

Works

1. The Works Approval Holder must carry out the Works within the Premises in accordance with Table 4 in Schedule 2.

2. The Works Approval Holder must locate the Works generally in accordance with the Site Plans and Maps in Schedule 1.

Infrastructure and equipment

3. The Works Approval Holder must install and undertake the Works for the infrastructure and equipment:

(a) specified in Column 1; and
(b) to the requirements specified in Column 2;

of Table 2 below.

4. The Works Approval Holder must not depart from the requirements specified in Column 2 of Table 2 except:

(a) where such departure does not increase risks to public health, public amenity or the environment; and
(b) all other Conditions in this Works Approval are still satisfied.

5. Subject to Condition 1, within 30 days of the completion of the Works specified in Column 1 of Table 2, the Works Approval Holder must provide to the CEO a report/certification from a suitably qualified professional confirming each item of infrastructure or component of infrastructure specified in Column 1 of Table 2 below has been constructed with no material defects and to the requirements specified in Column 2 of Table 2.

6. Where a departure from the requirements specified in Column 2 of Table 2 occurs and is of a type allowed by Condition 4 the Works Approval Holder must provide to the CEO a description of, and explanation for the departure along with the certification required by Condition 5.

Table 2: Infrastructure and equipment requirements table

Column 1	Column 2
Infrastructure / Equipment	**Requirements (design and construction)**
Wastewater treatment system	The sewage treatment system must be designed and constructed to be able to achieve the following specifications: • Capable of treating sewage to the following emission standards when operational: (a) biochemical oxygen demand <30mg/L; *(b) Escherichia coli* <10 cfu/100 mL; (c) total suspended solids < 30mg/L (d) total nitrogen <10mg/L (e) total Phosphorous <0.5mg/L; and (f) pH 6.5 – 8.5 • All above ground treatment and storage infrastructure located on a hardstand. • Able to receive and treat a sewage inflow of up to 450kL per day. • Ensure that all sewage inflow passes through two rotating screens positioned at the start of the WWTP. • Aerobic, anaerobic, polish, sequential batch reactor and irrigation reuse tanks fitted with the following: (a) Heavy built galvanised bolt up tanks with: (i) 3mm base panels and 2mm top panels; (ii) top exit for aeration; (iii) sealed manholes; and (iv) reinforced with a 0.9mm PVC liner. (b) Fitted with automatic alarm systems to detect blockage and/or low flow of pumps and level sensors. (c) Covered and ventilated • Sludge tank designed as a one-piece construction is UV stabilised and covered. • Sodium hypochlorite tank connected to irrigation reuse, polishing tanks and automatically controlled dosing system. • Air compressor to be housed in a sealed sea container. • Flow meters located at inlet and outlet. • Chemical injection plant consisting of: (g) flocculent holding tank/s; (h) dosing pump/s; and (i) automatic dosing system/s • Ultra-Filtration Plant connect to an automatic CIP system for cleaning. • Wet odour scrubber unit which service all venting from the collection, aeration, SBR and the polish tanks. To be vented through a 5m above ground level stack. • Four media filters fitted after the polishing tank to further clarify the treated wastewater prior to being sent to the irrigation reuse tank.

Column 1	Column 2
Infrastructure / Equipment	**Requirements (design and construction)**
Solids storage bins	Sealed to prevent: (i) odour emissions (ii) stormwater intrusion (iii) leakage of raw sewage (iv) attraction to vermin and flies.
Irrigation system and irrigation area	• The surface level of the irrigation area must be at least 2m above the highest seasonal groundwater level • Sprinklers fitted with control valves, solenoids and latching relays to ensure wastewater can be evenly distributed • All pipe work conveying wastewater to be in accordance with AS 2700S:2011(P12) and AS/NZS3500 • Consist of >22.499 hectares • Meters/monitoring points at the outlet of the irrigation reuse tank.
Chemical storage	Ensure chemical storage area is an impervious, above ground vessel enclosed by bunds with a holding capacity of 110% of the total vessel contents.

Emissions

7. The Works Approval Holder must not cause any Emissions from the Works authorised through this Works Approval except for specified Emissions and general Emissions described in Column 1 of Table 3, subject to the exclusions, limitations or requirements specified in Column 2, of Table 3.

Table 3: Authorised Emissions table

Column 1	Column 2
General Emissions (excluding Specified Emissions)	
Emissions which arise from undertaking the Works set out in Schedule 2	Emissions excluded from General Emissions are: • Unreasonable Emissions; or • Emissions that result in, or are likely to result in, Pollution, Material Environmental Harm or Serious Environmental Harm; or • Discharges of Waste in circumstances likely to cause Pollution; or • Emissions that result, or are likely to result in, the Discharge or abandonment of Waste in water to which the public has access; or • Emissions or Discharges which do not comply with an Approved Policy; or • Emissions or Discharges which do not comply with prescribed standard; or • Emissions or Discharges which do not comply with the conditions in an Implementation Agreement or Decision; or • Emissions or Discharges the subject of offences under regulations prescribed under the EP Act, including materials discharged under the *Environmental Protection (Unauthorised Discharges) Regulations 2004*.

Record-keeping

8. The Works Approval Holder must maintain accurate Books including information, reports and data in relation to the Works and the Books must:

(a) be legible;

(b) if amended, be amended in such a ways that the original and subsequent amendments remain legible or are capable of retrieval;

(c) be retained for at least 3 years from the date the Books were made; and

(d) be available to be produced to an Inspector or the CEO.

9. The Works Approval Holder must comply with a Department Request within 14 days from the date of the Department Request or such other period as agreed to by the Inspector or the CEO.

Schedule 2: Works

At the time of assessment, Emissions and Discharges from the Works listed in Table 4 were considered in the determination of the risk and related Conditions for the Works Approval.

Table 4: Authorised Works

Works	Site Plan Reference
WWTP holding tanks and infrastructure positioned on a hardstand	See Schedule 1 Maps
Scrubber installed and connected to odour emitting tanks/vessels	
Treated wastewater irrigation infrastructure installed in accordance with DoH criteria	

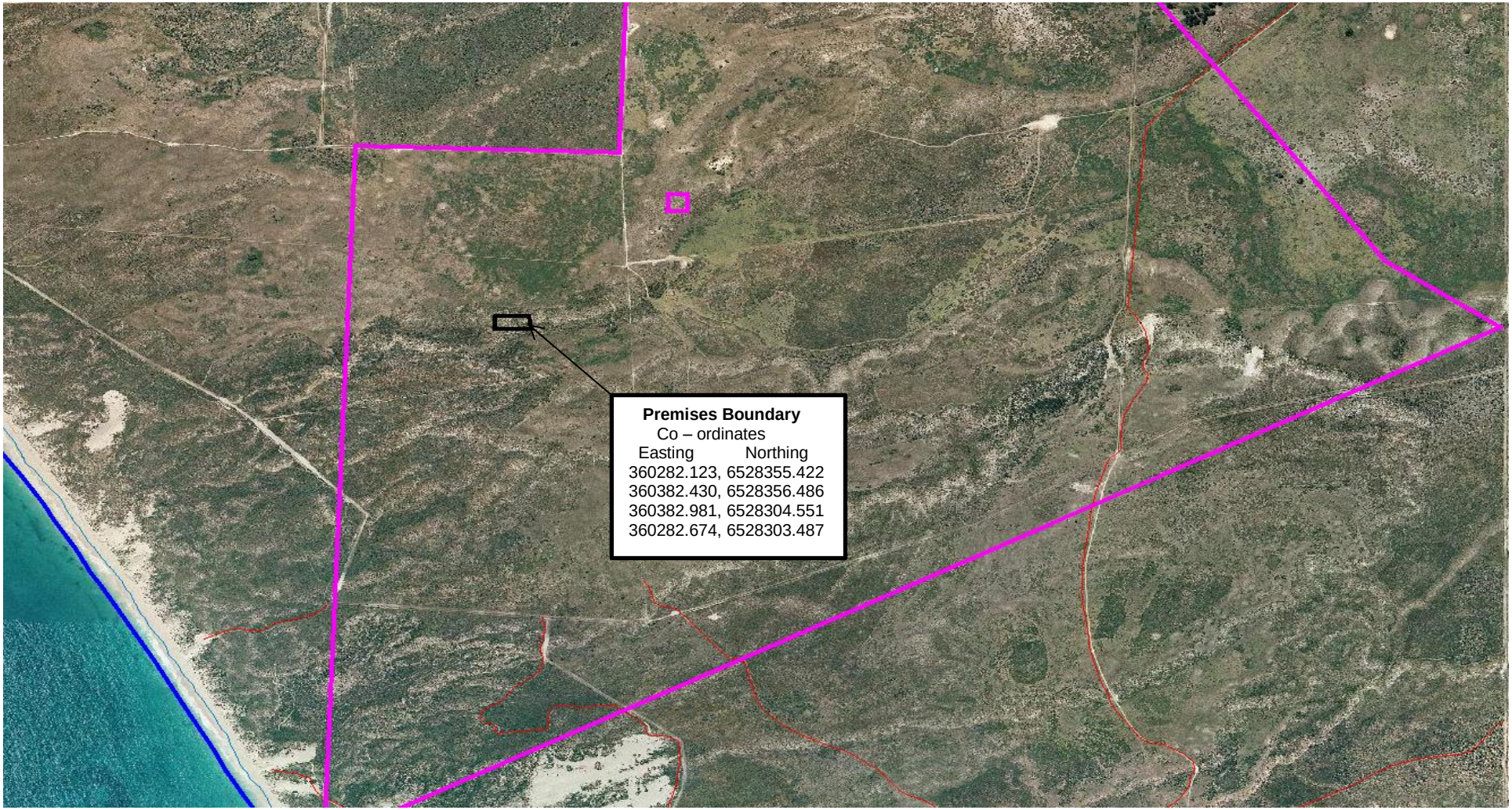
Site layout

The infrastructure and equipment are set out on the Premises in accordance with the site layout specified on the Premises map in Schedule 1.

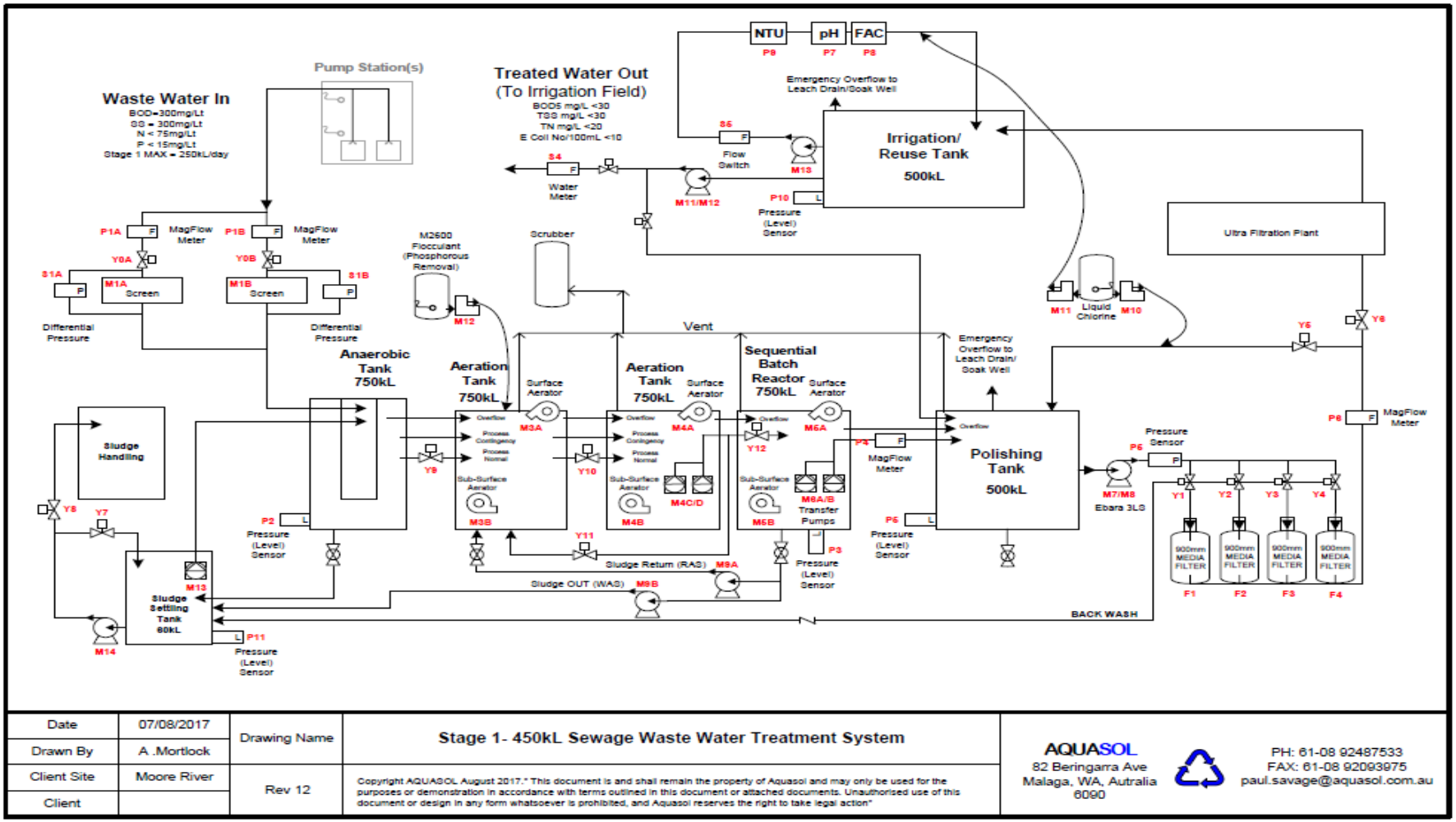
Schedule 1: Maps

Premises Boundary Map

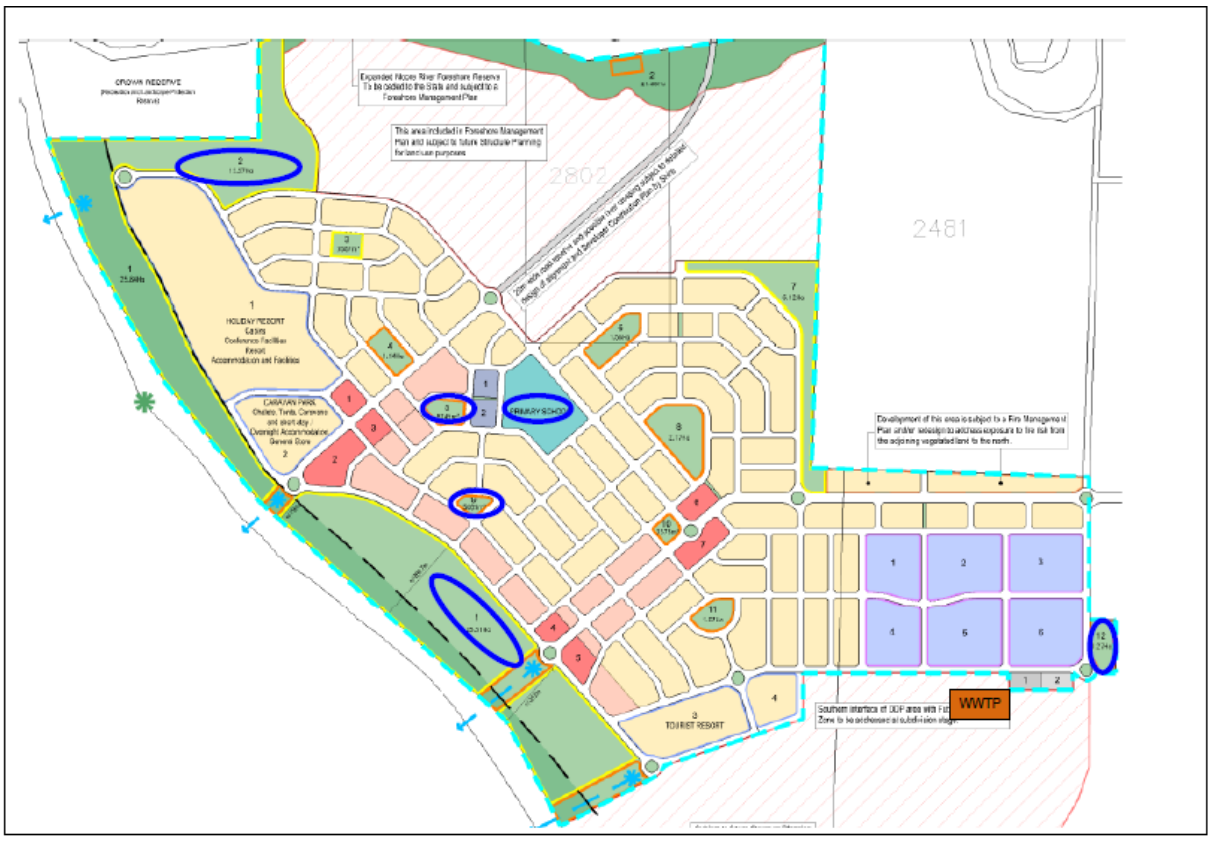
The black rectangle depicts the Prescribed Premises boundary. The pink line depicts Swan location 2914 which is part of the residential development to be serviced by the WWTP.

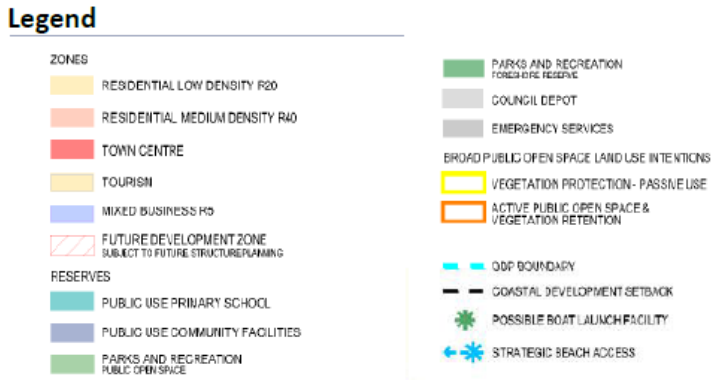


General site flow diagram of WWTP infrastructure

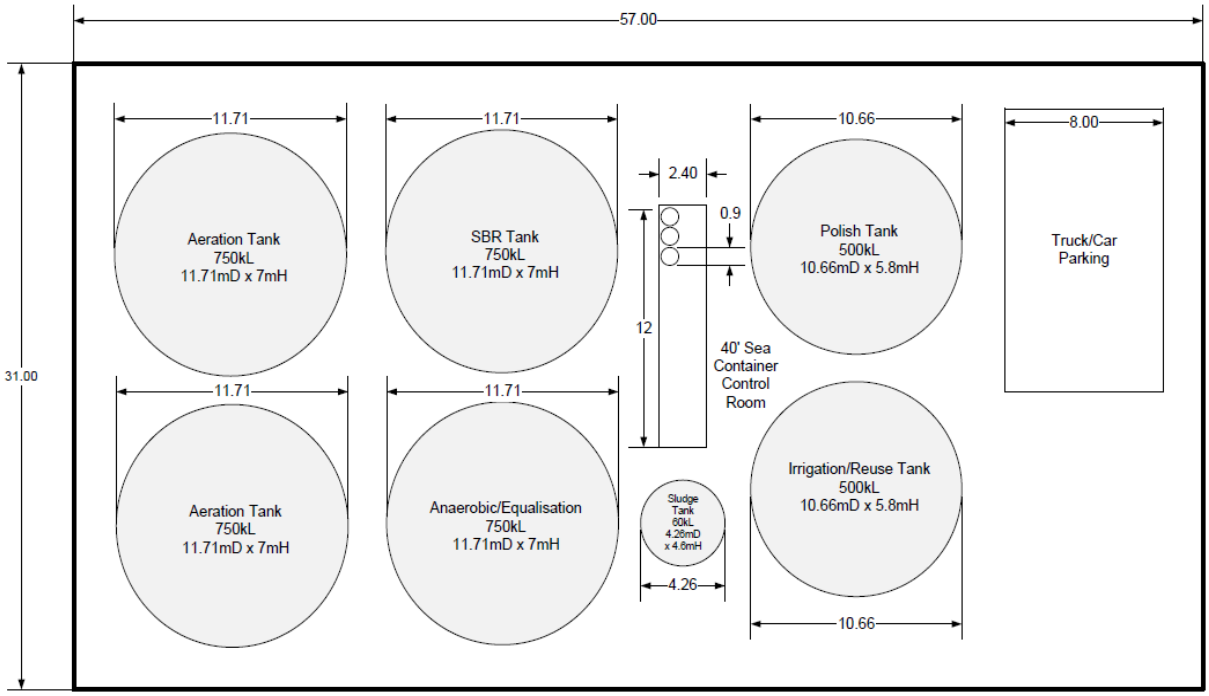


Map of irrigation area. The blue ovals below indicates the locations of the irrigation areas (POS and primary school open space)





Site layout plan



Decision Report

Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number	W6086/2017/1
Applicant	Aquasol Pty Ltd
ACN	157 831 411
File Number	DER2017/001449
Premises	Moore River South Waste Water Treatment Plant and Recycling Scheme Part of Lot 2914 on Plan 202250 and as defined by the co-ordinates below

Easting	Northing
360282.123	6528355.422
360382.430	6528356.486
360382.981	6528304.551
360282.674	6528303.487

Date of Report	11 January 2018
Status of Report	Final

Table of Contents

1. Definitions of terms and acronyms

In this Decision Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
Applicant	Aquasol Pty Ltd
Application	The application for works approval lodged by the Applicant on 16 August 2017.
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
Decision Report	refers to this document.
Delegated Officer	an officer under section 20 of the EP Act.
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DOH	Department of Health
DWER	Department of Water and Environmental Regulation As of 1 July 2017, the Department of Environment Regulation (DER), the Office of the Environmental Protection Authority (OEPA) and the Department of Water (DoW) amalgamated to form the Department of Water and Environmental Regulation (DWER). DWER was established under section 35 of the *Public Sector Management Act 1994* and is responsible for the administration of the *Environmental Protection Act 1986* along with other legislation.
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
ha	hectare
kL/d	kilolitres per day
Licence	the future Licence that can be applied for to operate the Premises following the submission of the Works Approval compliance certificate
m^3	cubic metres
Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)

Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Risk Event	as described in *Guidance Statement: Risk Assessment*
UDR	*Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA)
WQPN 22	Department of Water - *Water Quality Protection Note 22 July 2008- Irrigation with nutrient-rich wastewater*

2. Purpose and scope of assessment

Aquasol Pty Ltd (the Applicant) lodged a works approval application (the Application) on 16 August 2017, for the Moore River South Waste Water Treatment Plant (WWTP) with associated infrastructure to be located on Part of Lot 2914 on Plan 202250.

The assessment of the application has been undertaken in accordance with the Department of Water and Environment Regulation's (DWER) published Regulatory Framework. The scope of assessment includes:

- the design of the proposed works (refer to section 4)
- a risk-based assessment of the emissions and discharges to the environment that may occur at the construction stage; and
- a risk-based assessment of the emissions and discharges associated with the operation of the WWTP and irrigation of treated wastewater.

Commissioning testing under this works approval is not proposed or authorised. The operational phase will be assessed in more detail under the subsequent licence application.

This Application relates to constructing a wastewater treatment plant to service stage 1 of the proposed Moore River South (MRS) subdivision. The subdivision (6 stages over approximately 25 years) will consist of residential dwellings, mixed business, a town centre, public primary school, public use community facilities and residual lots.

This Decision Report presents an assessment of environmental and public health risks and makes recommendations to grant the works approval subject to conditions.

2.1 Application details

The Applicant applied for a works approval. Table 2 lists the documents submitted during the assessment process.

Table 2: Documents and information submitted during the assessment process

Document/information description	Date received
• Application Form • Attachment 1A - Certificates of Title • Attachment 1B - MRC ASIC • Attachment 1C - Aquasol Pty Ltd – ASIC • Attachment 2A - Map of Premises • Attachment 2B - Aerial View • Attachment 2C - Moore River South ODP • Attachment 2D - Irrigation Areas POS (discharge points) • Attachment 3A - Proposed Activities • Attachment 4A - DoW Approval • Attachment 4B - ODP Endorsement Letter - Shire of Gingin - 7.11.13 • Attachment 4C - Subdivision Approval • Attachment 4D - Consultation Summary • Attachment 4E - Shire Approval • Attachment 5A - AQ Experience in WWTP	15 August 2017

• Attachment 5B - Works Approval Oasis DER	
• Attachment 5C - Works Approval Beaufort River Meats	
• Attachment 5D - Works Approval WA Sewage	
• Attachment 5E - Sewer Service Provider	
• Attachment 6A - Public Health and Environmental Risks	
• Attachment 6B - Odour Management Plan	
• Attachment 6C - NIMP2	
• Attachment 7 - Sitting and Location	
• Attachment 8A - Monitoring Bores	
• Attachment 8B - Site Topography	
• Attachment 8C - Vegetation Report	
• Attachment 8D - Staging Plan	
• Attachment 8E - Reticulation plan	
• Attachment 8F - Water Projection	
• Attachment 8G - Routine Maintenance Plan	
• Attachment 8H - Vegetation Map	
• Attachment 8I - Surface Runoff Catchment	
• Attachment 8J - Site Contours	
• Attachment 8K - Soil Type	
• Attachment 8L - Water Balance Moore River	
• Attachment 8M- Preliminary Estimate - MRS Option	
• Attachment 8N - Proposed fee for licence	
• E-mail –from Aquasol: Moore River WWTP flow diagram updated with wet scrubber	3/10/2017
• E-mail – Aquasol – DoH and Shire approval confirmation	4/10/2017
• E-mail – Aquasol – Moore River South WWTP clarification about Premises boundary	6/11/2017
• E-mail – Aquasol – Moore River South WWTP Info Supplied about commissioning	9/11/2017
• E-Mail – Aquasol – No leach drain to be built	30/11/2017

3. Background

The Applicant is a privately-owned company that designs, builds, installs and maintains wastewater treatment facilities using generic systems and parts. The Applicant submitted the Application on 15 August 2017 for the construction of a WWTP for the treatment of sewage along with related infrastructure, designed to enable reuse of the treated wastewater on the Public Open Spaces (POS) and primary school on the proposed development subdivision.

Moore River Company Pty Ltd (MRC) is the current owner of the Moore River South development. The Applicant has a provisional Memorandum of Understanding (MOU) with MRC to construct and operate the WWTP.

Identical 450kL/d plants are proposed to be added to the proposed WWTP in modular units as required in-line with the growth of the MRC development. It is intended that expansion of the WWTP system will occur when each plant reaches 90% of its capacity (400kL/d). This expansion has not been included or assessed under this works approval, further works approval applications are required for these future works.

This assessment considers the servicing of Stage 1 of the development only.

Table 3 lists the prescribed premises Categories that have been applied for.

Table 3: Prescribed Premises Categories

Classification of Premises	Description	Production or design capacity (as per application)
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.	<450 m^3 per day

4. Overview of Premises

4.1 Construction & Operational aspects

4.1.1 Construction

The Applicant proposes to construct the WWTP to accept sewage from the proposed MRS subdivision and treat the wastewater to a standard suitable for irrigating the POS and primary school open space which are situated outside the Prescribed Premises boundary.

The WWTP will consist of an array of pre-fabricated water/sewage tanks and associated equipment which will be assembled on-site. The tanks will be housed in a fully bunded compound with a permeability of at least $1x10^{-9}$ m/s.

The irrigation areas will consist of a system of pumps, piping and sprinklers.

4.1.2 Operation

The WWTP has a capacity to treat of up to 450m^3 of sewage per day. The process incorporates anaerobic and aerobic treatment along with filtration and disinfection to facilitate biological wastewater treatment to appropriate effluent standards for above ground irrigation. Waste water will initially be collected in a pump station where it will be pumped to the first stage of the treatment (Anaerobic Tank), passing through rotating screens to remove larger solids that could potentially damage equipment in the plant.

The Anaerobic/Equalization Tank serves as an Anaerobic Digester and as an Equalization Tank buffering peak and ebb flows throughout the day. From there the wastewater is pumped into the 2x Aeration Tanks for secondary treatment.

Settled sludge at the bottom of the Anaerobic Tank will be sent to the Sludge Settling Tank. Once the Sludge Settling Tank is full, excess water will be sent back to the Anaerobic Tank for re-retreatment, and solids removed as needed to an approved disposal site.

The Aeration Tanks have been sized to accommodate the requisite volume required to treat the incoming organic load. A submersible aerator will supply a high volume of oxygen for the biological process. The wastewater will then be transferred into the Sequential Batch Reactor (SBR) tank.

The SBR will batch three to four times daily, or as required. Aeration is stopped for one hour to allow for solids to settle in the tank. Phosphorous removing flocculent in the tank will aid in the settling process. Once the sludge has settled clear water from the top of the tank will be pumped into the Polishing Tank.

Wastewater from Polishing Tank will then be pumped through a deep bed media filter system fitted with automatic backwash valves, through a bank of UF to the Irrigation Reuse Tank after chlorination. The treated effluent will be used to irrigate POS and primary school open (approximately 22.499 ha). There is an emergency overflow from the Irrigation Reuse Tank to a leach drain / soak well.

All possible air susceptible to odour contamination will be processed through a liquid chlorine scrubber before release into the atmosphere.

The WWTP is designed to operate automatically requiring monthly routine maintenance, chemical refill and sampling. Removal of sludge from the sludge tanks will happen bi-annually.

4.1.3 Irrigation

The area of the POS, primary school open space and tourist centre gardens to be irrigated totals approximately 22.499 ha. The irrigation areas will be watered at night time using sprinklers fitted with control valves, solenoids and latching relays to provide equal flows and limit ponding.

There are ten groundwater monitoring bores located within the irrigation area to monitor the impacts of irrigation with treated sewage on the environment.

4.2 Infrastructure

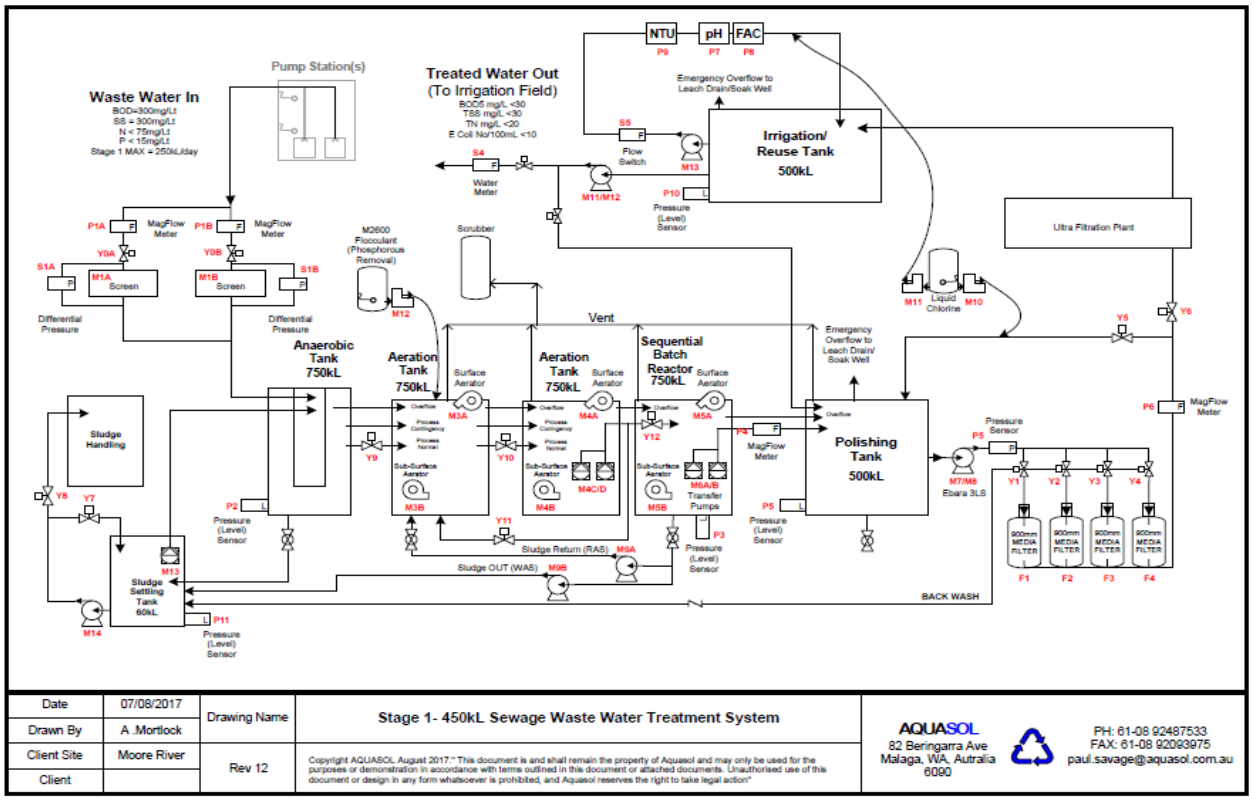
The proposed infrastructure, as it relates to Category 54 activities, is detailed in Table 4 and with reference to the Site Plan (attached in the Issued Works Approval).

Table 4: Moore River South Waste Water Treatment plant and Recycling Scheme facility - Category 54 infrastructure

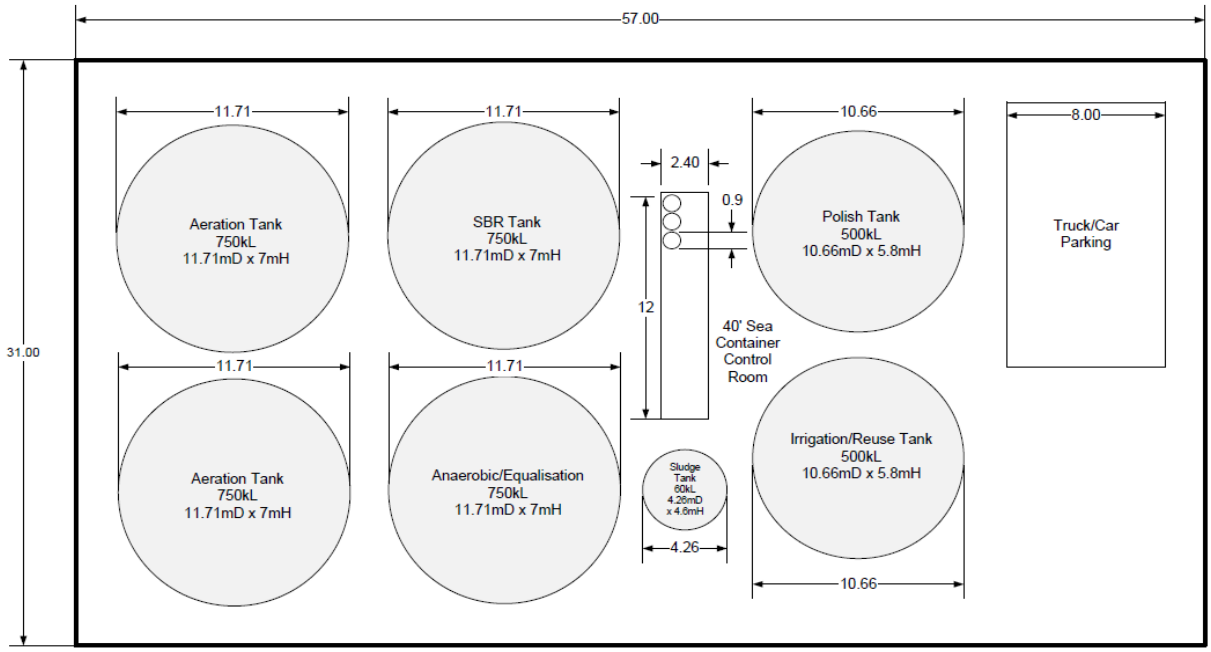
	Infrastructure	**Site Plan Reference**
	Prescribed Activity Category 54	
The applicant will install a waste water treatment plant with a 450m^3 per day design capacity for the collection, processing and irrigation of wastewater from the proposed MRS subdivision. Wastewater treatment plant consists of the following:		
1	Two rotating screens located at the start of the WWTP	See Figures 1 and 2 - WWTP Flow Diagram and General arrangement of infrastructure respectively
2	Sealed bins for solids storage	
3	Scrubber with air emission stack 5m (above ground level) for the treatment and removal of noxious odours from the Collection tank 1, Aeration tank 2, SBR tank 3 and the Polish Tank 4	
4	Collection/Anaerobic tank 1 (750kL) fitted with a level sensor for lowering the tank level prior to peak flow periods.	
5	Aerobic tank 2 & 3 (750kL each) fitted with submersible aerator to supply a high volume of oxygen for the biological process and to facilitate recirculation of the wastewater undergoing treatment.	
6	Sequential Batch Reactor (SBR) tank 4 (750kL)	
7	Polish tank 5 (500kL)	
8	Media Filters- Four media filters to further clarify treated wastewater prior to being sent to the irrigation tank.	
9	Ultra-Filtration Plant - Connect to an automatic 'Clean in Place' system for cleaning	
10	Treated Wastewater Storage tank 6 (500kL)	
11	Sludge tank 7 (50kL)	
12	Disinfection system • Chlorine tank/s containing Sodium hypochlorite • Dosing pumps • 4 x 900mm Media Filters	

15	In flow and outflow meters	
16	Irrigation infrastructure • sprinklers fitted with control valves, solenoids and latching relays • conveyance pipe work • 22.499ha vegetated above ground irrigation area	
17	Pumps and compressor	
18	Chemical Storage (Phosphorous removing polyelectrolyte)	

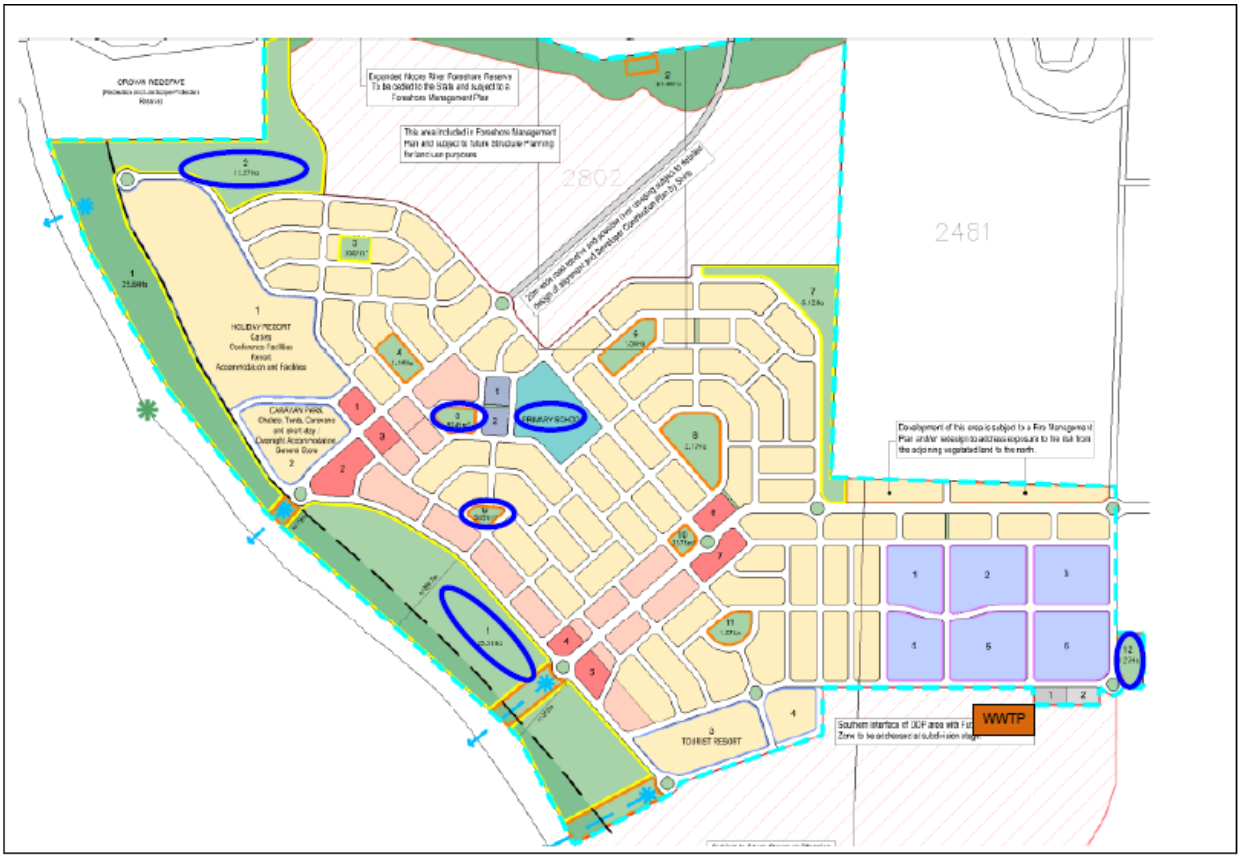
WWTP Flow Diagram



General arrangement of infrastructure



Irrigation area: The blue ovals above indicates the locations of the irrigation areas (POS and primary school open space)



Legend

ZONES
- RESIDENTIAL LOW DENSITY R20
- RESIDENTIAL MEDIUM DENSITY R40
- TOWN CENTRE
- TOURISM
- MIXED BUSINESS R5
- FUTURE DEVELOPMENT ZONE SUBJECT TO FUTURE STRUCTURE PLANNING

RESERVES
- PUBLIC USE PRIMARY SCHOOL
- PUBLIC USE COMMUNITY FACILITIES
- PARKS AND RECREATION PUBLIC OPEN SPACE
- PARKS AND RECREATION FORESHORE RESERVE
- COUNCIL DEPOT
- EMERGENCY SERVICES

BROAD PUBLIC OPEN SPACE LAND USE INTENTIONS
- VEGETATION PROTECTION - PASSIVE USE
- ACTIVE PUBLIC OPEN SPACE & VEGETATION RETENTION

- ODP BOUNDARY
- COASTAL DEVELOPMENT SETBACK
- POSSIBLE BOAT LAUNCH FACILITY
- STRATEGIC BEACH ACCESS

5. Legislative context

Table 5 summarises approvals relevant to the assessment.

Table 5: Relevant approvals

Legislation	Number	Subsidiary	Approval
Planning and Development Act 2005	Application number 150242	Western Australian Planning Commission	Subdivision approval
Health (Treatment of sewage and disposal of effluent and liquid waste) Regulations 1974.	Ref No. F-AA-53521	Department of Health Western Australia	'Approved in principle' subject to conditions granted on 28 September 2017.

5.1 Part IV of the EP Act

5.1.1 Background

The Applicant has stated that the Premises have not been referred for Part IV assessment. The Premises was not considered to have a significant impact on the environment.

5.2 Contaminated sites

There are no registered contaminated sites over the whole development.

5.3 Part V of the EP Act

5.3.1 Applicable regulations, standards and guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations.

The guidance statements which inform this assessment are*:*

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Decision Making (November 2016)*
- *Guidance Statement: Risk Assessments (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*

EP Act subsidiary legislation relevant to this assessment includes:

- *Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA)*
- *Environmental Protection (Noise) Regulations 1997 (WA)*

5.3.2 Clearing

Clearing of native vegetation is not approved under the Issued works approval.

6. Consultation

The Application was advertised in the West Australian newspaper and on the DWER website on 11 September 2017. No comments were received.

7. Location and siting

7.1 Siting context

The WWTP is located on Part of Lot 2914 on Plan 202250 defined by the coordinates on page (i). The irrigation areas are located within Lot 2424 on Plan 231402, Lot 2914 on Plan 202250 and Lot 2802 on Plan 90108. The proposed development is bound by the Indian Ocean to the west, Moore River to the north and pastoral and uncleared land to the east and south. The WWTP will be located within the proposed Light Industrial Area, fenced with restricted access to general public.

7.2 Residential and sensitive Premises

The distances to residential and sensitive receptors are detailed in Table 6.

Table 6: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Activity
Residential Premises	WWTP Located ≤350m Irrigation areas located < 100m
Guilderton Townsite – situated north west of the WWTP	WWTP Located >2km Irrigation areas located < 250m
Visitors to the Moore River National Park	WWTP Located < 250m from Visitor Centre

7.3 Specified ecosystems

Specified ecosystems are areas of high conservation value and special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises. The distances to specified ecosystems are shown in Table 7. Table 7 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem.

The table has also been modified to align with the *Guidance Statement: Environmental Siting.*

Table 7: Environmental values

Specified ecosystems	Distance from Activity
Environmentally Sensitive Area (Riparian zone)	>1 km north of the WWTP Irrigation area approximately 100m of the riparian zone

7.4 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 8.

Table 8: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental value
Major watercourses/waterbodies (Moore River)	>1 km to the north of WWTP Irrigation area approximately 100m from Moore River	Environmentally Sensitive Area (Moore River)
Groundwater	Depth to groundwater >20m at the WWTP At some of the irrigation areas depth to groundwater can vary from approximately 5m - >20m	Water is not used for potable or industrial use
Groundwater abstraction bore	Approximately 5Km from WWTP and irrigation area	Potable water supply Bore depth 2000m

7.5 Soil type

Table 9 details soil types and characteristics relevant to the assessment. (Sourced from Application)

Table 9: Soil and sub-soil characteristics

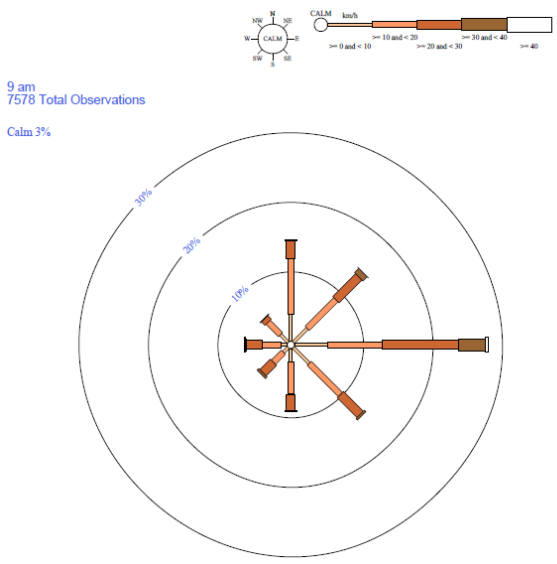
Soil category	Typical soil type in the irrigation area (see Figure 3)
Quindalup Dunes	• Karrakatta Sand Yellow Phase • Quindalup South deep sand flat Phase • Quindalup South third dune Phase • Quindalup South second dune Phase • Karrakatta shallow soils Phase

7.6 Meteorology

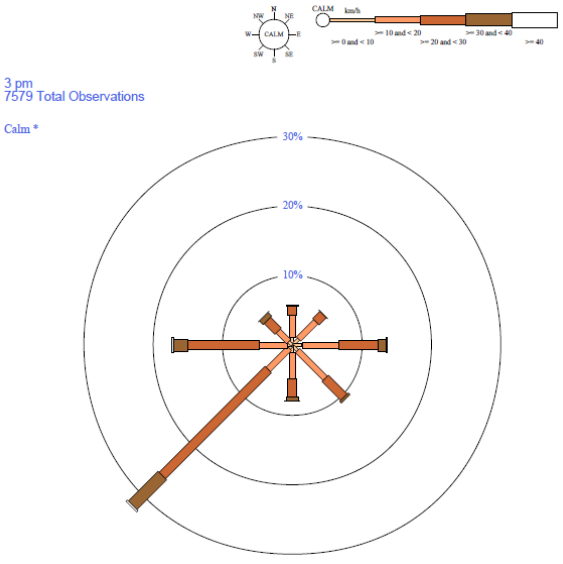
Meteorological data has been sourced from the Bureau of Meteorology (BOM) with averages for Gingin Aero WA.

7.6.1 Wind direction and strength

Wind speed measured at 9am (or 3pm) local time during a calendar month or year and averaged over the period of record. The wind speed is generally measured at a height of 10 m above the surface. The wind roses below summarise the occurrence of winds at Gingin Aero, showing their strength, direction and frequency.



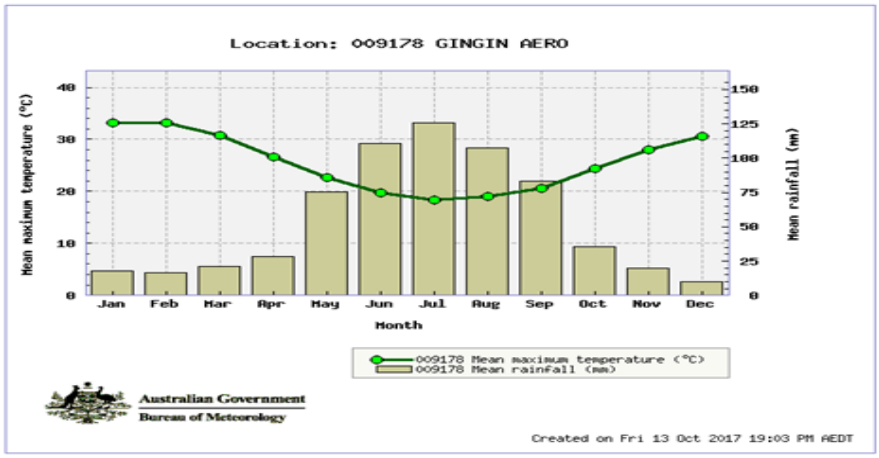
Annual 9am wind rose for Gingin Aero (BOM)



Annual 3pm wind rose for Gingin Aero (BOM)

7.6.2 Regional Rainfall and temperature

Gingin's climate is classified as warm and temperate. The winter months are much rainier than the summer months. The average temperature in Gingin is 18.3 °C and the annual rainfall averages 694 mm.



8. Risk assessment

8.1 Determination of emission, pathway and receptor

In undertaking its risk assessment, DWER will identify all potential emissions pathways and potential receptors to establish whether there is a Risk Event which requires detailed risk assessment.

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. Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a Risk Event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission will not be risk assessed further and will be screened out through Table 11.

The identification of the sources, pathways and receptors to determine Risk Events are set out in Tables 10 and 11 below.

Table 10. Identification of emissions, pathway and receptors during construction

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
Construction, mobilisation and positioning of infrastructure	Construction / installation of WWTP infrastructure	Noise	No residences or other sensitive receptors in proximity during construction. Residential premises located >2km away from the WWTP construction site	Air / wind dispersion	Public health and amenity impacts	No	The Delegated Officer considers there is adequate separation distance to sensitive receptors
		Dust					

Table 11: Identification of emissions, pathway and receptors during operation

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
	Storage and conveyance of untreated and treated sewage , solids and sludges	overtopping of holding tanks resulting in sewage (nutrient rich) discharge to land	Groundwater depth 20m Closet dwelling approximately 350m away	Direct discharge	Groundwater and/or native vegetation can be impacted by raw sewage Public Health and amenity impacts	Yes	See section 8.4
		Gaseous odour emissions (from decomposition of putrescible waste)	Sensitive receptors in proximity approximately 350m away	Air / wind dispersion	Amenity and health impacts	Yes	See section 8.5.
	Irrigation of treated sewage effluent	Treated sewage (nutrient rich effluent) to land	Public in the POS and students at school, <100m away Groundwater	Direct discharge	Amenity and health impacts	Yes	See section 8.4
		odour	Public in the POS and students at school, <100m away	Air / wind dispersion			See section 8.5

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
	Pumps and compressor	Noise	sensitive receptors in proximity approximately 350m away	Air / wind dispersion	Amenity and health impacts	No	• Air compressor to be housed in a sealed sea container to minimise noise emissions • The Delegated Officer considers the provisions of the Noise Regulations sufficient to regulate noise from operations

8.2 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	• **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	• 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	• **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	• **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	• **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	• **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	• **onsite impacts**: low level • **offsite impacts local scale**: minimal • **offsite impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• 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	• **onsite impact**: minimal • Specific Consequence Criteria (for environment) met	• **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 *Guidance Statement: 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.

8.3 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.

8.4 Risk Assessment – Nutrient rich wastewater (sewage) discharged to land

8.4.1 Description of nutrient rich wastewater discharge to land

Operational emissions of treated and untreated sewage discharged from the WWTP through irrigation to land and accidental discharges through spills, tank overtopping or pipeline fractures causing human health impacts on receptors outside the Premises and soil and groundwater contamination.

8.4.2 Identification and general characterisation of emission

Irrigation of treated wastewater
The proposed system is designed to treat up to 450kL/day of waste water to such a quality that it can be safely irrigated above ground in future POS within the Development.

Table 15 below details the expected water quality after treatment.

Table 15: Treated effluent quality table (from Application)

Parameter	Units	Expected value
Biochemical Oxygen Demand (BOD)	mg/l	<30
Escherichia coli (E Coli)	cfu/100 mL	<10
Total suspended solids (TSS)	mg/l	<30
pH	pH units	6.5 – 8.5
Disinfection (Residual chlorine)	mg/L	0.2 - 2.0
Total nitrogen (TN)	mg/L	<10
Total Phosphorous (TP)	mg/L	0~0.5
Turbidity	NTU	<5

According to the DOH *'Guidelines for the Non-potable Uses of Recycled Water in Western Australia'* the grey and black water from Stage 1 of the Development will be treated to a

“Medium” exposure risk. This allows for urban surface irrigation with some restricted access and application such as:

- Fountains and water features
- Stock watering, dairy cattle, grazing
- Industrial use with potential human exposure
- Dust suppression
- Wash down water
- Cooling towers
- Commercial food crops

Overtopping/spillages of treated and untreated sewage
Overtopping or spillages can occur when:

- Rainfall exceeds evaporation and the buffer capacity of 2.9 days has been utilised
- Pumps and/or pipes block up
- Pump station failures
- Rupture of delivery pipes
- Power failure

8.4.3 Description of potential adverse impact from the emission

Public Health
Treated sewage contains organic matter, nutrients, chemical contaminants, salts and pathogens that are potentially detrimental to soils and/or pose a risk to the wider environment or public health.

Untreated or improperly treated sewage may have high BOD, which can affect natural soil microbial activity, contain dangerous pathogens, excessive nutrients which promote growth of weeds on land or algal blooms in water, or suspended solids which contain toxic organic or inorganic.

The major risk associated with human or animal contact with sewage are from infection by microorganisms, such as bacteria (e.g. Salmonellae), viruses (e.g. Hepatitis sp.), protozoa (e.g. Giardia and Crytosporidium) or helminths (tape worms). The risks to humans and the risk to animals are greatest when the effluent contains pathogens derived from the same species of animals. However, some pathogens (e.g. Cryptosporidium parvum and the helminth Taenia saginata) can infect both humans and animals - (*Department of Environment and Conservation (NSW) – Use of Effluent by Irrigation*).

Potential health effects include:
(a) Eye and/or skin contact - may cause irritation and/or infection.
(b) Inhalation of spray drift - may cause upper respiratory problems
(c) Ingestion - may cause health problems

The pathway for ingestion, inhalation, absorption of irrigated treated sewage to a receptor can be via pipeline rupture, spillage, spray drift and/or ponding.

Environment
The risks to the natural environment due to irrigating the POS with treated sewage effluent are listed below.

- nutrient loading to the environment
- ponding (odour and health impacts)
- groundwater contamination from nutrient
- nutrient wash into nearby waterways (Moore River approximately 100m away and ocean)

Irrigation
The Applicant has prepared the NIMP and Application in accordance with the Department of Water document WQPN 22, even though the document specifies that it does not apply to treated municipal wastewater (sewage) which requires specific approval under the *Heath Act 1911.*However for this assessment it is considered useful for risk assessing nutrient application rates to control eutrophication risk.

- the area to be irrigated is not less than 22.499 ha
- maximum volume of wastewater to be irrigated is 450kL per day
- irrigated area will be planted with grass and plants to assist in nutrient uptake

$$\text{Expected Nitrogen loading} = \frac{10\text{mg/l X } 450\text{kl x } 365}{1000 \text{ x } 22.5\text{(ha)}} = 73\text{kg/ha/yr}$$

$$\text{Expected Phosphorous Loading} = \frac{0.5\text{mg/l X } 450\text{kl x } 365}{1000 \text{ x } 22.5\text{(ha)}} = 3.6\text{kg/ha/yr}$$

The proposed site falls within the Swan Coastal Plain with the soils being generally course grained sands with expected PRI levels between 0 and 0.5. (supplied by Applicant). The vulnerability to eutrophication of downstream surfaces waters, being the Moore River, located approximately 100m away is considered as a B Vulnerability Category (as per Table 1 of WQPN 22)

These vulnerability categories are applied to nutrient application rate recommendations in Table 2 of WQPN 22.

Table16 below compares the expected nutrient loading with WPQN22 recommended maximum nutrient application criteria.

Table 16: Expected nutrient loading (from WQPN 22 Table 2)

Risk Category	WPQN requirement		Expected nutrient loading	
	Max Nitrogen application rate (kg/ha/yr)	Max Phosphorous application rate (kg/ha/yr)	Nitrogen application rate (kg/ha/yr)	Phosphorous application rate (kg/ha/yr)
B	180	20	73	3.6

Application rates are based on quantities of plant available N and P (N as ammonia &nitrate, and P as ortho-phosphate) to promote healthy vegetation growth that are matched to the growth cycle of the irrigated plant species.

Irrigation of the POS with the forecasted treated sewage nutrient levels will be well below those recommended by WPQN22.

The Delegated Officer considers the minimum criteria for nutrient uptake by vegetated area and the organic loading to soil is as follows:

$$A = \frac{C \times Q}{L_x}$$

A = Land area (m^2)
C = concentration of nutrient or BOD (mg/l)
Q = treated sewage flow rate (L/d)
L_x = critical loading rate of nutrients (N, P) or BOD ($mg/m^2/d$)

The default critical loading rates used for N, P and BOD are:
$L_N = 25mg/m^2/day$
$L_P = 3mg/m^2/day$

L_{BOD} = 3000mg/m^2/day

Minimum vegetated area required for 10 mg/l Nitrogen is:

$$A = \frac{C \times Q}{L_N} = \frac{10 \times 450{,}000}{25} = 180{,}000\ m^2 = 18ha$$

Minimum vegetated area required for 0.5mg/l Phosphorous is:

$$A = \frac{C \times Q}{L_P} = \frac{0.5 \times 450{,}000}{3} = 75{,}000\ m^2 = 7.5ha$$

Minimum area required for organic loading of soil with a BOD of 30mg/l is:

$$A = \frac{C \times Q}{L_{BOD}} = \frac{30 \times 450{,}000}{3000} = 4500m^2 = 0.45ha$$

The Delegated Officer has determined that based on the above Nitrogen and Phosphorous calculations and the criteria required for nutrient uptake by a vegetated area, 22.5ha is sufficient for the irrigation of up to 450kL/day of treated effluent.

The Delegated Officer has also determined that the BOD value indicates that the treated sewage will not lead to the growth of bacterial slimes or clog the soil pores.

The Delegated Officer considers the criteria required for hydraulic loading as follows:

For an effective effluent irrigation system, it is essential that the correct amount of effluent is applied at the right times to ensure excessive nutrient loading, spray drift and/or ponding does not occur. Criteria to consider are the following:

- precipitation
- volume of effluent applied
- percolation
- runoff

Based on the hydraulic loading calculation in Figure 4 below using the 90th percentile monthly rainfall figures (BOM monthly averages for Gingin Aero WA) and monthly pan evaporation rates (Department of Agriculture and Food – Evaporation data for Western Australia 1-1-1987), additional storage is needed during the months June – October when rainfall exceeds evaporation.

The Applicant's contingency plan to manage excess hydraulic loading at the WWTP is that should the 2.9 days of buffer capacity of the WWTP system be exhausted the excess treated waste water will be removed by a waste contractor.

Hydraulic loading calculation

Design wastewater flow	Q	l/day	450000	
Design Percolation rate	R	mm/week	5	(removal of salt in root zone)
Land area	L	m2	2.25E+05	

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days in month	D		days	31	28	31	30	31	30	31	31	30	31	30	31
Precipitation	P		mm/month	69.2	43.8	51.5	47.7	126.1	175.3	191.6	141.2	118.1	68.8	41.4	18
Evaporation	E		mm/month	330	296	259	149	96	66	63	91	114	173	239	321
Crop factor	C			0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Inputs															
Precipitation	P		mm/month	69.2	43.8	51.5	47.7	126.1	175.3	191.6	141.2	118.1	68.8	41.4	18
Effluent irrigation	W	(QxD)/L	mm/month	62	56	62	60	62	60	62	62	60	62	60	62
Total input		(P+W)	mm/month	131	100	114	108	188	235	254	203	178	131	101	80
Outputs															
Evapotranspiration	ET	(E*C)	mm/month	231	207	181	104	67	46	44	64	80	121	167	225
Percolation to remove salt	B	(R/7) x D	mm/month	22	20	22	21	22	21	22	22	21	22	21	22
Total output		(ET+B)	mm/month	253	227	203	126	89	68	66	86	101	143	189	247
Storage (i.e. excess water)	S	(P+W)-(ET+B)	mm/month	-122	-127	-90	-18	99	168	187	117	77	-12	-87	-167
Cumulative storage			mm/month	0	0	0	0	99	266	454	571	648	636	0	0
Monthy storage volume required	V		m3					22275	59850	102150	128475	145803	143100		
Daily storage volume required	V		m3					718	1995	3295	4144	4860	4616		
Proponent supplied - on site total buffer capacity 1300m3 (2.9 days)															
Excess daily volume required for storage less buffer capacity			m3						695	1995	2844	3560	3316		

8.4.4 Applicant controls (from Application)

This assessment has reviewed the Applicant's proposed controls for the irrigation and spillage/overtopping of treated sewage as set out below.

- Monitoring and recording of system flow rates using an automatic flow meter;
- Monthly system field checks to ensure problems are addressed in a timely manner;
- Monthly water samples to confirm water quality;
- Management of pump stations and conduct pump/motor maintenance to ensure adequate distribution of irrigation;
- If irrigation water quality is not reached, water will be stored in tanks using the buffer capacity of 2.9 days until the issue is rectified;
- Aquasol staff in charge will be correctly trained;
- Conduct routine maintenance of the irrigation system for optimum performance;
- Monitor the ten groundwater installed bores;
- The irrigation areas will be watered at night time;
- Each sprinkler used for irrigation will be fitted with a control valve, solenoid, and latching relay to provide equal flow and limit ponding;
- Direct stormwater to vegetated (with native wetland species) treatment areas including swales, bio-pockets and vegetation retention areas;
- Minimise the use of fertilisers;
- Good quality of the treated sewage from the WWTP to be irrigated;
- Use roll-on turf within the POS areas and road verges, to prevent adding chemical fertilisers to establish growing turf;
- Blockages will activate an alarm system which will start standby pumps automatically; and
- Alarm systems in place to prevent overtopping/spillages.

The Delegated Officer has reviewed the information regarding the irrigation of treated sewage and has found:

1. *The irrigation of POS and primary school open space will be regulated by DOH.*
2. *Excess treated sewage may be needed to be disposed of off-site during the months June to October when irrigation cannot occur due to saturated ground conditions.*

8.4.5 Consequence

Irrigation
The Delegated Officer has had regard to the management of treated wastewater from the WWTP and the controls proposed and have determined that there will be no health or amenity impacts to residential receptors or dwellings from the irrigation scheme. Relevant ambient criteria noted above are expected to be met. Therefore the Delegated Officer considers the consequence to be ***Minor.***

Spillages/overtopping
The Delegated Officer has had regard to the management of treated wastewater from the WWTP and the controls proposed and have determined that there will be no health or amenity impacts to residential receptors or dwellings from overtopping/spillages. Relevant ambient criteria noted above are expected to be met. Therefore the Delegated Officer considers the consequence to be ***Minor.***

8.4.6 Likelihood of Risk Event

Irrigation
The Delegated Officer has determined that the impacts from irrigation of treated sewage effluent will probably not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood to be ***Rare.***

Spillages/overtopping
The Delegated Officer has determined that the impacts from spillages/overtopping of treated sewage effluent or untreated sewage will probably not occur in most circumstances due to the proposed Applicant's controls. Therefore, the Delegated Officer considers the likelihood to be ***Rare.***

8.4.7 Overall rating of Description of treated sewage effluent discharge to land during operation

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 12) and determined that the overall rating for the risk of irrigating the POS with treated sewage effluent or the overtopping/spillage of sewage is ***Low*** if the Applicants controls are implemented and additional regulatory controls imposed in the proposed licence.

8.5 Risk Assessment – Odour due to irrigation, overtopping/spillages or operation of WWTP

8.5.1 General risk characterisation and impact

Odour may be generated from general operations at the Premises including;

- Fugitive emissions from the receipt, treatment and storage of wastewater;
- Spillage of raw/treated sewage
- From the solids bins
- Irrigation of treated wastewater; and
- De-sludging activities

Most odour is generated due to hydrogen sulfide gas which is formed by the anaerobic microbial breakdown of organic matter in a process called anaerobic digestion. Odour generated during the general operation of the WWTP may cause impacts to public amenity and/or health.

The nearest sensitive residential receptors are located approximately <350m north west of the WWTP. Other receptors include workers in the adjacent light industrial area and tourist centre north and west of the Premises respectively.

8.5.2 Criteria for assessment

There are no set threshold or concentration criteria for odour assessment. The general provisions of the EP Act make it an offence to cause or allow unreasonable emissions which include emissions of odour that unreasonably interfere with the health, welfare, convenience comfort or amenity of any person.

In addition the DoH guidelines for non-potable uses of recycled water in Western Australia have been used to discern risks associated to the proposal.

8.5.3 Applicant controls

The Applicant's controls to reduce and manage odour emissions are set out in Table 17.

Table 17: Applicant's odour controls

Control	Description
Scrubber	• All contaminated air from the treatment tanks will be conducted through a scrubbing system before release into the atmosphere. A wet scrubber will be utilised to bind gas molecules (odorant) to liquid (solution of water and liquid chlorine). The flume height will be 5m. • Have well trained operators operating the scrubber
Covers	All treatment tanks on site will be covered and ventilated through the scrubber. This is to prevent fugitive emissions of odorous gases. The tank covers are designed to minimise odour leakage during normal operation.
Solids holding bins	Bins to be covered, sealed and placed within a bunded area
Management to prevent odour problems	• When an odour complaint is received, the source of the odour will be identified and rectified according the 'odour complaint' form in the Odour Management Plan; • The Monitoring Protocol in the supplied 'Odour Management Plan' will be used to monitor key components of the WWTP to identify system failures that may cause an odour release; • Irrigation with chlorinated treated wastewater will be limited to evenings using sprinklers fitted with a control valve, solenoid, and latching relay to provide equal flow and limit ponding. • Any overflow at the WWTP will be cleaned up immediately to avoid any odour releases; • Have well trained WWTP operators

8.5.4 Consequence

Based on the information detailed above the Delegated Officer has determined that the consequence of odour being emitted will be mitigated due to the scrubber, design of the tank covers and response due using the odour management plan. Therefore the delegated officer considers the consequence to be ***Minor.***

8.5.5 Likelihood of consequence

Based upon the proposed Applicant controls and management, the Delegated Officer has determined that the likelihood of odour to the environment from the WWTP and/or irrigation of treated sewage effluent are not likely to occur. However due to the distance of the nearest sensitive receptor being <350m, the Delegated Officer considers the likelihood to be ***Possible***.

8.5.6 Overall rating

The Delegated officer has compared the consequence and likelihood ratings described above for the Risk Criteria and determined that the overall rating for the risk of odour from the Premises and impacts to receptors is ***Medium***.

8.6 Summary of acceptability and treatment of Risk Events

A summary of the risk assessment and the acceptability or unacceptability of the risk events set out above, with the appropriate treatment and control, are set out in Table 16 below.

Table 18: Risk assessment summary

Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)
Emission	**Source**	**Pathway/ Receptor (Impact)**			
Discharge of treated sewage effluent (irrigation)	Irrigation of POS and primary school open space with sprinklers and spillages/overtopping of sewage	Direct discharge to land or surface water Contamination of soil and infiltration to groundwater	Infrastructure and management controls	Minor consequence Rare likelihood **Low risk**	Acceptable subject to Applicant controls conditioned and required by DoH and DWER
Fugitive odour	WWTP, overflow of raw sewage, sludge handling and/or the irrigation of POS	Air and wind dispersion causing health impacts or unreasonable amenity impacts	Infrastructure (scrubber) and management controls (regular maintenance and inspections)	Minor consequence Possible likelihood **Medium risk**	Acceptable subject to Applicant controls conditioned

9. Determination of Works Approval conditions

The conditions in the issued Works Approval in Attachment 1 have been determined in accordance with the *Guidance Statement: Setting Conditions*. Table 19 provides a summary of the conditions to be applied to this Works Approval.

Table 19: Summary of conditions to be applied in the Works Approval

Condition Ref	Grounds
Infrastructure and Equipment conditions 1,2,3,4, 5and 6	These conditions are risk-based and contain appropriate controls.
Record keeping 8 and 9	These conditions are valid and are necessary administration and reporting requirements to ensure compliance.

The Delegated Officer notes that it may review the appropriateness and adequacy of controls at any time and that, following a review, DWER may initiate amendments to the Works Approval under the EP Act.

10. Determination of Licence conditions

The final conditions of a Licence are subject to review of any new or additional sources of information at the completion of works, such as information submitted as a requirement of the Works Approval, inspection and potential changes to the design of infrastructure by the Applicant

Table 20: Summary of conditions to be applied in the draft Licence

Condition Ref	Grounds
Emissions and emission limits	These conditions are risk-based and contain appropriate controls.
Monitoring	These conditions are valid, risk-based and consistent with the EP Act.
Infrastructure and equipment	These conditions are risk-based and contain appropriate controls.
Reporting and recording keeping	These conditions are valid and are necessary administration and reporting requirements to ensure compliance.

11. Applicant's comments

The Applicant was provided with the draft Decision Report and draft Works Approval on 15 December 2017. The Applicant provided comments on 9 January 2018. Which are outlined in Appendix 2.

12. Conclusion

This assessment of the risks of activities on the Premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this Decision Report (summarised in Appendix 1).

Based on this assessment, it has been determined that the Works Approval will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements. The assessment of the Licence will be finalised after the completion of the works and review of any new or additional information provided the Licence Application and requirements of the Works Approval.

Works Approval will be granted for a duration of 3 years.

Caron Goodbourn
A/Manager Licensing (Process Industries)
Delegated Officer under section 20 of the Environmental Protection Act 1986

Appendix 1: Key documents

	Document title	In text ref	Availability
1.	DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.		accessed at www.dwer.wa.gov.au
2.	DER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.		
3.	DER, November 2016. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.		
4.	DER, November 2016. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.		
5.	DOH 'Guidelines for the Non-potable Uses of Recycled Water in Western Australia'	DoH guidelines	
6.	Department of Agriculture - Evaporation data for Western Australia 1987		
7.	Department of Water - Water Quality Protection Note 22 July 2008- Irrigation with nutrient-rich wastewater	WQPN 22	

Appendix 2: Summary of Applicant's comments on risk assessment and draft conditions

Condition	Summary of Works Approval Holder comment	DWER response
Decision Document		
Table 15: Treated effluent quality table.	Applicant requests to increase emission concentrations to: TN = 25mg/l and TP = 3mg/l.	The emission concentrations outlined in Table 15 were taken from the Application, being the Applicants proposed treatment quality that the proposed WWTP will achieve and are not limits. Limits will be determined and set when the operating Licence is applied for. The Delegated Officer notes that if TN and TP concentrations are increased to 25mg/l and 3mg/l respectively the effluent will not comply with the recommendations of WQPN 22 for Risk Category B. The Delegated Officer does not agree to change the anticipated treatment concentrations in this decision report as they were provided in the application and the basis of the assessment.
Page 9	Sludge tank is not connected to the scrubber, but to the Aerobic tank	Changed as requested.
Page 9, Table 4: number 3 and Table 17 (Scrubber)	Scrubber to be vented through a 5m agl stack, not a 6m stack	Changed as requested
Page 9, Table 4: number 8 and Page 25	Micro Media Filters to be changed to Media Filters	Changed wording from Micro Media Filter to Media Filters
Page 20	Applicant wants to amend the emission concentrations to The default critical loading rates used for N, P : LN = 25mg/m^2/day LP = 3mg/m^2/day	The default critical loading rates on page 20 are used to determine the minimum criteria for nutrient (TN and TP) uptake by a vegetated area and not for emission.

Condition	Summary of Works Approval Holder comment	DWER response
Decision Document		
Works Approval		
Table 2: Infrastructure and equipment requirements table points 6, 12 and 13	Sludge tank is not connected to the scrubber. Scrubber to be vented through a 5m stack. Micro Media Filter to be changed to Media Filters	Changed condition in Table 2 accordingly

Appendix 3: Issued Works Approval W6086/2017/1