



Application for Licence

Division 3, Part V *Environmental Protection Act 1986*

Licence Number	L9358/2022/1
Applicant	Aquasol Pty Ltd
ACN	157 831 411
File Number	DER2021/000510
Premises	Lakelands Golfview Estate Retirement Village Wastewater Treatment and Recycling Scheme 120 Clubhouse Lane GNANGARA WA 6077 Legal description - Part of Lot 5, 6 and 7 Clubhouse Lane Lot 116 on Survey Strata Plan 77035 Certificate of Title Volume 5992 Folio 747 Certificate of Title Volume 5992 Folio 813 Certificate of Title Volume 5992 Folio 159 As defined by the coordinates in Schedule 2 of the Licence
Date of Report	30/03/2023
Status of Report	Final

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1. Definitions of terms and acronyms

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

Table 1: Definitions

Term	Definition
Applicant	Aquasol Pty Ltd
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AER	Annual Environment Report
ANZECC 2000	Australian and New Zealand Guidelines for Fresh and Marine Quality. Paper No. 4, Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australian and New Zealand (ARMCANZ)
BOD	Biochemical Oxygen Demand
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CS Act	<i>Contaminated Sites Act 2003 (WA)</i>
Cfu	Colony forming units
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 <i>Public Sector Management Act 1994</i> and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DBCA	Department of Biodiversity, Conservation and Attractions
DoH	Department of Health
DoW	Department of Water
DPIRD	Department of Primary Industries and Regional Development
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 <i>Public Sector</i>

Term	Definition
	<i>Management Act 1994</i> and is responsible for the administration of the <i>Environmental Protection Act 1986</i> along with other legislation.
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986</i> (WA)
EP Regulations	<i>Environmental Protection Regulations 1987</i> (WA)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth)
Golf Course	Lakelands Country Club Golf Course
m ³	cubic metres
Minister	the Minister responsible for the EP Act and associated regulations
NEPM	National Environmental Protection Measure
NIMP	Nutrient Irrigation Management Plan
Noise Regulations	<i>Environmental Protection (Noise) Regulations 1997</i> (WA)
LTGV	Long Term Guideline Value
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
Primary Activities	as defined in Schedule 2 of the Licence
P&DC	Production and Design Capacity
Risk Event	As described in <i>Guideline: Risk Assessments</i>
TDS	Total Dissolved Solids
TP	Total Phosphorus
TN	Total Nitrogen
TSS	Total Suspended Solids
TWW	Treated Wastewater
UDR	<i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> (WA)

Term	Definition
Village	Lakelands Golfview Estate Retirement Village

2. Purpose and scope of assessment

The Applicant has constructed the Lakelands Wastewater Treatment Plant (WWTP) and associated infrastructure on 120 Clubhouse Lane, Gngara. The Applicant was granted a Works Approval W6034/2017/1 (W6034) on 1 March 2018 for the construction of the WWTP and infrastructure associated with the reuse of treated wastewater on the adjacent Golf Course.

The scope of assessment for this Decision Report relates to:

- Operations associated with the WWTP with a P&DC of 130m³/day;
- The risk of emissions to the environment and public health during operational phases of WWTP; and
- The risk of emissions to the environment and public health by irrigating parts of the Golf Course with TWW.

2.1 Application details

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	1 September 2021

3. Background

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

Table 3: Prescribed Premises Categories in the Licence

Classification of Premises	Description	Approved Premises production or design capacity or throughput
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.	130 m ³ per day

4. Overview of Premises

4.1 Operational aspects

The WWTP will service the Village which comprises 290 residential dwellings and is located on a 10ha section of land located to the east and north of Clubhouse Lane at the Golf Course.

According to the application, the location was previously used for agricultural purposes.

Wastewater is collected from each dwelling and plumbed to a package wastewater pump station which will pump wastewater to the packaged WWTP. Following treatment, TWW will be collected in a dedicated storage tank and used to irrigate part of the adjacent Golf Course.

The WWTP design includes five tanks and associated equipment, with processes including grinding and screening, anaerobic and aerobic treatment, vent and scrubber/odour control, clarification, media and micro filtration, disinfection and storage of TWW prior to irrigation on the Golf Course.

The WWTP will have a maximum P&DC of 130 m³/day (130 kL/d) and TWW will be pumped to the two Golf Course storage tanks (2 x 100kL capacity) to then be irrigated to 3.8ha of turf at a rate of 5 L/day/m² (Figure 1). These figures are the maximum potential irrigation rates, based on the P&DC.

The WWTP is designed to treat effluent to a pre-determined quality prior to use in irrigation. The maximum concentrations of key TWW contaminants from the WWTP is provided in Table 4.

Table 4: Maximum TWW criteria

Parameter	Maximum criteria
TN	10 mg/L
TP	0.5 mg/L
BOD	20 mg/L
TSS	<30 mg/L
pH	6.5-8.5
<i>E. coli</i>	<10 cfu/100 mL

The proposed irrigation area is a dedicated 3.8ha area within the Golf Course driving range which consists of sandy soil. The turf type is kikuyu and wild couch mix, a special turf with high wear tolerance. The proposed turf nutrient application rates and irrigation schedule from the Works Approval Application are detailed in Tables 5 and 6.

Table 5: Turf nutrient application rates at the proposed irrigation area

Category	Nitrogen	Phosphorus
Expected TWW concentration	10 mg/L	0.5 mg/L
High use activity turf and phosphorus retention index for established turf (Turf Guidelines ¹). Maximum allowed for irrigation.	100-200 kg/ha/year	5 kg/ha/year
Applicant's NIMP, detailed nitrogen and phosphorus limits for irrigation area	125.3 kg/ha/year	5 kg/ha/year

¹Based on "Western Australian environmental guidelines for the establishment and maintenance of turf grass areas" Swan River Trust updated 2014.

Table 6: Application rates at proposed irrigation area

Application rates	
Max effluent volume	130,000 L/d
Irrigation area	3.8 ha
Pumping capacity	20 L/s
Duration of irrigation all stations	2 hrs



Figure 1: Proposed Irrigation Area

4.2 Infrastructure

The sewage facility infrastructure, as it relates to Category 54, is detailed in Table 7 and Attachment 1 Site Plan. Figure 2 provides an overview of the WWTP process.

Table 7 lists infrastructure associated with each prescribed premises category.

Table 7: Sewage facility Category 54 infrastructure

	Infrastructure	Site Plan Reference
	Prescribed Activity Category 54	
Collection and processing of wastewater from the Village		
1	Pressure Main	Attachment 1 Site Plan
2	Pump Station	
3	Rotary screen	
4	Solids bin	
5	Scrubber with 6m high air emission stack <ul style="list-style-type: none"> ▪ This will facilitate the removal of noxious odours from the Collection tank 1, Aeration tank 2, SBR tank 3 and the Polish Tank 4 ▪ Referred to as a wet scrubber where gas molecules (odorant) are taken up by a liquid (solution of water and liquid chlorine). 	
6	Collection/Anaerobic tank 1 (200kL) <ul style="list-style-type: none"> ▪ Anaerobic digester equalisation tank buffering peak flows throughout the day. The tank is fitted with a level sensor for lowering the tank level prior to peak flow periods. 	
7	Aerobic tank 2 (200kL) <ul style="list-style-type: none"> ▪ Treatment of organic load. Fitted with submersible aerator to supply a high volume of oxygen for the biological process and to facilitate recirculation of the wastewater undergoing treatment. ▪ Flocculent will be added at this stage. Aquasol's Floc M2600 (Poly Aluminium Chloride) will be used to settle large particles and precipitate phosphates (AIP04). 	
8	Sequential Batch Reactor (SBR) tank 3 (200kL) <ul style="list-style-type: none"> ▪ Second aeration tank where nitrogen in wastewater will be removed after converting ammonium ions to nitrogen gas. Denitrification conversion will be carried out in the SBR tank when the aerator is off and in the following water tanks. ▪ In the SBR tank aeration is stopped for one hour to allow settling of solids in the tank. Flocculent in the tank will aid in the settling process. Once the tank has settled, a pump will clear water from the top of the tank to the polish tank. 	

9	<p>Polish tank 4 (200kL)</p> <ul style="list-style-type: none"> Where denitrification will continue, and the wastewater is treated with free chlorine. Following this the treated wastewater will be pumped through 5 deep bed media filters with automatic backwash valves. Backwash from the filters will be sent to the sludge tank. 	
10	<p>Sludge tank 5 (50kL)</p> <ul style="list-style-type: none"> Will receive sludge from the polish tank 4 as well as sludge settled at the bottom of tanks 1 to 3. Polymer will be added to tank 2 and 3 to aid generation of sludge for removal. Excess water will be sent back to the Anaerobic tank 1 for re-treatment. 	
11	<p>Disinfection system</p> <ul style="list-style-type: none"> Chlorinator. 5 x 750mm Media Filters. <p>Provides residual disinfection in distribution tank and throughout the distribution system (free chlorine). The chlorine will be dosed, monitored and controlled automatically.</p>	
12	<p>Treated wastewater conduit</p> <ul style="list-style-type: none"> Treated wastewater will be piped from the WWTP to the treated wastewater storage tank located at the golf course. 	
13	<p>Treated Wastewater Storage tanks (2 x 100kL)</p> <ul style="list-style-type: none"> The storage tanks will be located at the golf course as shown in Figure 1. 	
14	<p>Micro Filters</p> <ul style="list-style-type: none"> Three micro filters will be used to further clarify treated wastewater prior to being sent to the irrigation network. 	
15	<p>Flow meter</p> <ul style="list-style-type: none"> A flow meter will measure the quantity of treated wastewater sent to the irrigation network. 	

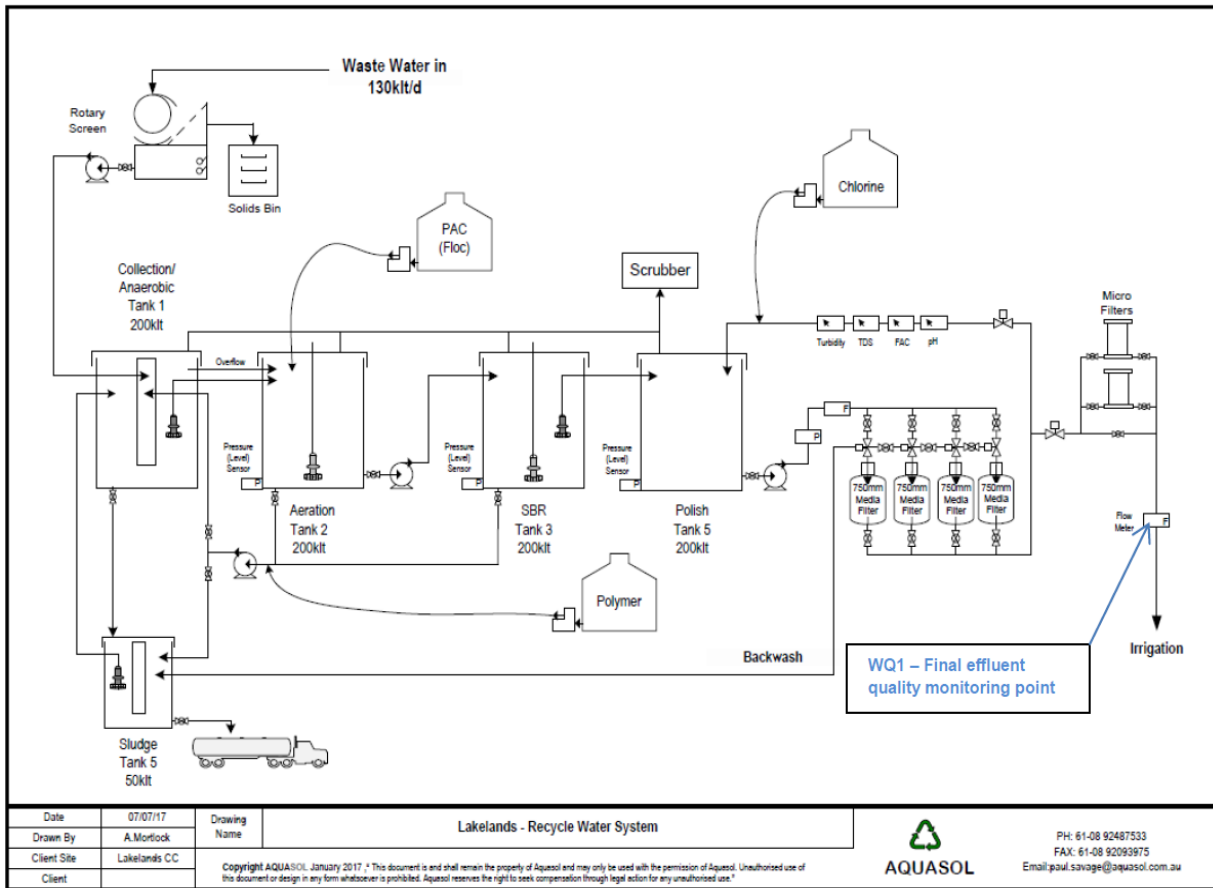


Figure 2 WWTP Flow Diagram.

5. Legislative context

5.1 Other relevant approvals

5.1.1 Planning approvals

Lakelands retirement village and related wastewater treatment plant was given planning approval with conditions on 26 October 2016 (DAP/15/00934). The planning approval is valid for a period of two years from the date of the approval.

The Applicant has also applied for planning approval from the Western Australian Planning Commission. The statutory committee approved the application on 18 July 2017 for subdivision of Lots 5, 6 and 7 Clubhouse Lane, Gnangara with the decision valid for three years.

5.1.2 Department of Health

The Department of Health (DoH) considers that the use of recycled water for surface irrigation of the Lakelands Country Club golf course represents a medium risk exposure level, based on the Guidelines for the Non-potable Uses of Recycled Water in Western Australia 2011 and has issued an approval in principle for the project with conditions relating to human exposure of pathogens. Monitoring of *E. coli*, total chlorine residual and irrigation times for Medium Exposure Risk Level to reduce human exposure to the treated wastewater have been set for the operation of the WWTP. DoH has granted a Recycled Water Scheme Approval

168/GC000 dated 15 August 2019.

Key Finding: *The Delegated Officer notes that:*

- 1) *Aquasol Pty Ltd has a Recycled Water Scheme Approval 168/GC000 for the Premises granted 15 August 2019.*
- 2) *Recycled Water Quality Plan (August 2019) has been submitted to DoH and accepted as satisfactory.*
- 3) *Commissioning validation and verification monitoring requirements were compliant with medium exposure risk level water quality objectives. Monthly testing occurs to confirm if water quality is maintained.*

5.2 Part V of the EP Act

5.2.1 Applicable regulations, standards and guidelines

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

The guidance documents which inform this assessment are:

- *Guidance Statement: Setting conditions (October 2015)*
- *Guidance Statement: Licence duration (August 2016)*
- *Guidance Statement: Publication of Annual Audit Compliance Reports (May 2016)*
- *Guideline: Decision making (December 2020)*
- *Guideline: Environmental siting (December 2020)*
- *Guideline: Regulatory principles (December 2020)*
- *Guideline: Risk assessments (December 2020)*

5.2.2 Works approval and licence history

Table 8 summarises the works approval and licence history for the premises.

Table 8: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
W6034/2017/1	1/03/2018	Construction of the WWTP
L9358/2022/1	30/03/2023	New Licence

5.2.3 Compliance inspections and compliance history

Works Approval W6304 was issued on 1 March 2018 and expired on 28 February 2021. W6034 required the submission of a Construction Report and Commissioning Report after respective works were completed but the Works Approval Holder did not submit these as required under W6034. W6034 also required TWW and Groundwater monitoring and again this was not compliant with the requirements of W6034 when initially submitted upon request from DWER.

DWER sent two “Compliance not Demonstrated” letters to the Applicant dated 7 November

2021 and 7 December 2021 requesting evidence of compliance for a range of works approval conditions relating to construction, commissioning and TWW and Groundwater monitoring requirements. In its third and final letter to the Applicant dated 27 March 2022, DWER indicated Compliance could not be demonstrated in relation to condition 9 being the requirement to monitor TWW during Commissioning.

The Applicant was issued a Letter of Warning on 7 September 2021 for operating the WWTP without a Licence.

6. Modelling and monitoring data

6.1 Monitoring of discharges to land

TWW will be discharged to the dedicated irrigation area at the Golf Course Driving Range (Figure 1). Proposed TWW quality is provided in Table 4 for a range of parameters.

Sampling of TWW was required under W6034 condition 9 Table 4 during Commissioning of the WWTP. The Applicant advised DWER that Commissioning occurred from 17 April 2019 to 31 May 2019. As described in section 5.2.3 above, DWER identified non-compliance with monitoring of TWW during Commissioning. However, in the letter to the Applicant dated 7 December DWER requested the Applicant immediately undertake further weekly TWW monitoring noting the lack of TWW monitoring which occurred under the Works Approval. The Applicant conducted an additional five TWW samples from December 2021 to 28 January 2022. The Applicant has also submitted some monitoring data from the WWTP from December 2019 to January 2022 for DoH purposes but in reviewing this data not all parameters as required under condition 9 of W6034 are sampled and there are many data gaps in the data (for example, extremely limited data for 2021) and this data has not been considered representative of TWW quality.

Table 9 provides a review of the TWW quality sampled under condition 9 of W6034 during Commissioning and the additional five samples as outlined above compared to maximum criteria from Table 4 for the WWTP.

Table 9: TWW quality

Date	Parameter									
	E. coli (cfu/100nL)	TN (mg/L)	TP (mg/L)	Ammonia as N (mg/L)	Nitrate + nitrite + nitrogen (mg/L)	BOD (mg/L)	TSS (mg/L)	TDS (mg/L)	pH	Volumetric flow (m ³ /day)
17/4/19	1	NS	NS	NS	NS	11	5	NS	7.9	NS
29/4/19	1	55	0.28	17	38	11	14	NS	7.1	NS
7/5/19	1	71	0.57	33	38	5	5	NS	7.8	NS
17/5/19	1	NS	NS	NS	NS	5	5	NS	7.8	NS
24/5/19	1	55	0.12	17	38	5	5	NS	7.9	NS
31/5/19	1	61	0.07	16	34	5	0	NS	7.4	NS
3/12/21	NS	15	0.18	0.03	14	<5	<5	840	6.9	NS
7/12/21	<1	7.2	1.4	<0.02	7.2	<5	<5	560	6.8	NS

17/12/21	<1	8.9	1.8	<0.02	8.9	<5	6.0	1400	7.8	NS
20/12/21	<1	6.2	1.4	0.49	5.6	<5	<5	1100	7.8	NS
31/12/21	<1	5.8	0.91	<0.02	5.8	NS	9.0	630	7.3	NS
Table 4 Maximum criteria										
	<10	10	0.5	-	-	<20	<5 NTU	-	6.5- 8.5	-

Footnote: NS means no sample was collected

Key Finding: *The Delegated Officer notes that:*

- 1) *The Applicant did not sample TWW as required under W6034 for Commissioning. Commissioning occurred in April and May 2019.*
- 2) *An additional five TWW samples were analysed in December 2021 and January 2022.*
- 3) *As highlighted in Table 9 the very limited sample date indicates the WWTP is not performing to expected design parameter criteria as outlined in Table 4; although it is noted that the December 21 and January 2022 sample results are improved over the 2019 results from Commissioning of the WWTP.*
- 4) *Very limited volumetric flow data has been provided for discharges to land at the GC considering the WWTP has been discharging TWW since April 2019.*
- 5) *Given the lack of quantifiable and representative data for discharges of TWW to the Premises, a precautionary approach has been applied to the Risk Assessment.*
- 6) *The detailed risk assessment for the emissions – pathway – receptors in section 9 will determine whether the WWTP operations represent an unacceptable risk to applicable human health and environmental receptors.*

6.2 Monitoring of Groundwater

Groundwater monitoring was required under W6034 condition 11 Table 5. Groundwater monitoring of three (3) bores (BH03, WTP01 and WTP02) was to occur monthly for at least three (3) months prior to Commissioning and for the duration of Commissioning of the WWTP which was five (5) weeks from 17 April 2019 to 31 May 2019. Five sample events occurred from January 2019 to May 2019. Groundwater quality results are provided in Table 10 while groundwater levels are provided in Table 11 while bore locations are provided in Figure 3 below.

Table 10: Groundwater results

Date	Bore	TN (mg/L)	TP (mg/L)	Chlorine (mg/L)	Ammonia – N (mg/L)	TDS (mg/L)	Turbidity (mg/L)	<i>E. coli</i> (cfu/100mL)	BoD (mg/L)
ANZECC LTGV Irrigation (2000)		5	0.05						
ANZECC Ecosystem (2000)		1.5	0.06		0.04		10-100		
31/1/2019	WTP01	6.3	0.91	0.01	0.36	520	3900	0	10
	WTP02	19	0.97	0.02	0.11	440	3300	0	<5
	BH03	5.4	0.65	0.07	0.54	380	500	0	<5
22/2/2019	WTP01	3.2	0.65	<0.01	0.13	960	2700	0	8
	WTP02	20	0.57	<0.01	0.2	510	2100	0	<5
	BH03	4.9	0.34	<0.01	0.57	410	370	0	<5
28/3/2019	WTP01	3.5	0.83	<0.01	0.42	750	1600	0	8
	WTP02	12	0.62	<0.01	0.3	550	700	0	<5
	BH03	4	0.65	<0.01	0.69	280	210	0	<5
23/4/2019	WTP01	3.8	0.39	<0.01	0.03	1200	500	0	42

	WTP02	3.9	0.5	<0.01	0.36	510	920	0	<5
	BH03	3.1	0.37	<0.01	0.59	350	160	0	<5
23/5/2019	WTP01	2.7	0.6	0.01	0.41	720	340	<1	11
	WTP02	2.5	0.65	<0.01	0.39	520	560	4	<5
	BH03	2.8	0.73	<0.01	0.92	340	160	<1	<5

Highlight orange are results exceeding ANZECC 2000 Ecosystem guidelines

Highlight green are results exceeding ANZECC LTGV 2000 guidelines

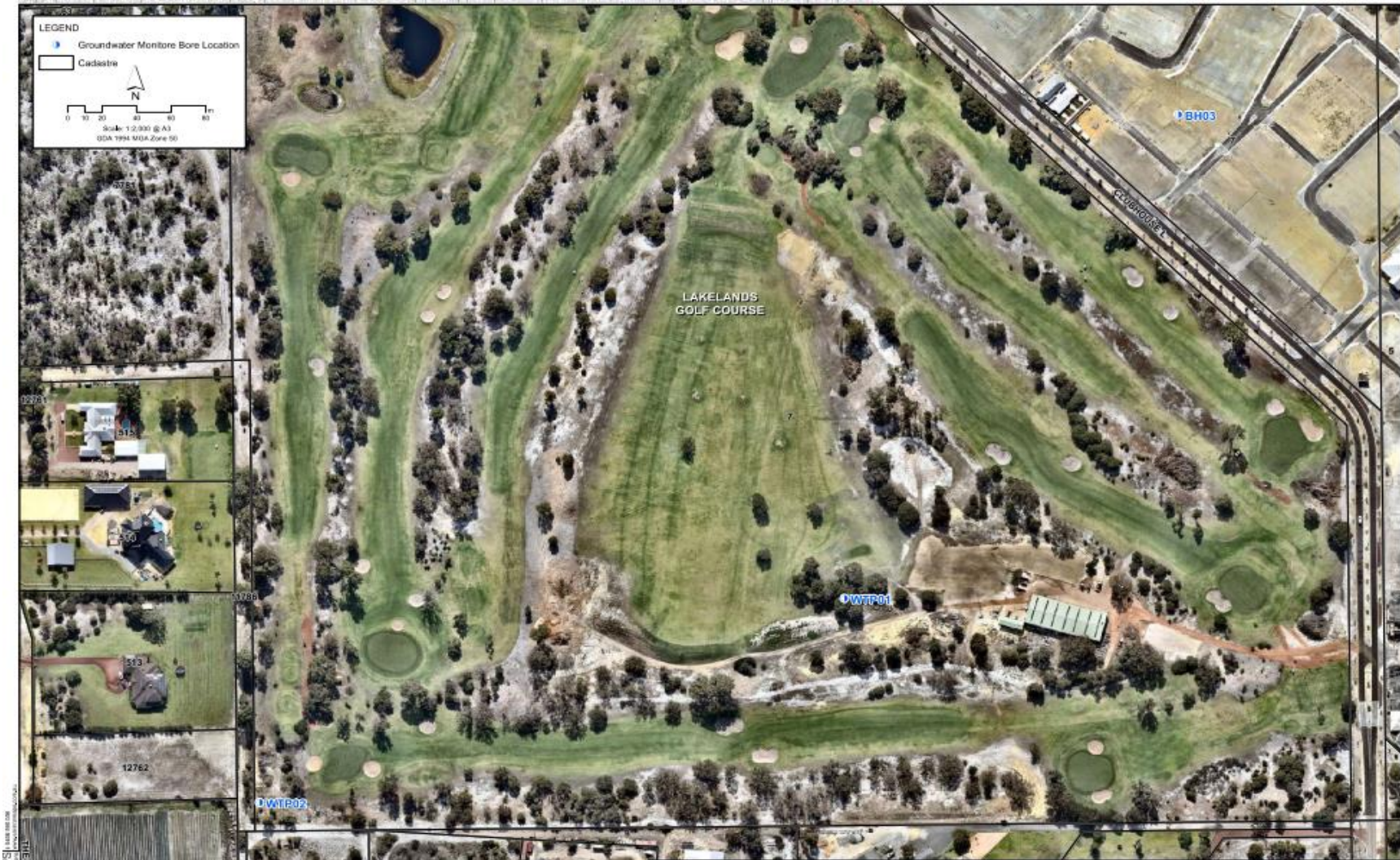


Figure 3: Monitoring bore locations

Table 11: Groundwater levels

Date	Bore		
	WTP01	WTP02	BH03
Groundwater level (mbgl)			
31 January 2019	2.084	8.646	3.505
22 February 2019	2.216	8.803	3.622
28 March 2019	2.367	8.96	3.742
23 April 2019	2.383	9.067	4.515
23 May 2019	2.475	9.093	3.721

Key Finding: *The Delegated Officer notes that:*

- 1) *The Applicant has conducted groundwater monitoring consistent with W6034 condition 11. However, these samples were conducted in early 2019. No further samples have been submitted.*
- 2) *The bore closest to the TWW discharge point is bore WTP01. Data from the groundwater results in Table 11 indicates depth to groundwater is approximately 2.08 mbgl to 2.475 mbgl. It is noted that this data is not representative of a full year weather cycle (no Winter and Spring data is available).*
- 3) *Groundwater quality results in Table 10 from data from the monitoring requirements required under W6034 indicate Turbidity and Ammonia-N exceeds ANZECC Ecosystem 2000 values for all bores at all sample times and both TN and TP exceed both ANZECC Irrigation LTGV 2000 and ANZECC Ecosystem 2000 values, at all times and for all bores.*
- 4) *Appendix 2 of W6034 provides Groundwater quality monitoring from the 'The Green – Retirement Village, Gnangara Urban Water Management Plan, August 2017'. Data presented in W6034 also indicates groundwater nutrients (Table 22) are elevated above ANZECC Irrigation LTGV 2000 values.*
- 5) *The Applicant has been discharging TWW to the Golf Course since early 2019 and groundwater monitoring has not been occurring post May 2019.*
- 6) *Given the lack of quantifiable and representative data for groundwater quality at the Premises, a precautionary approach has been applied to the Risk Assessment.*
- 7) *The detailed risk assessment for the emissions – pathway – receptors in section 9 will determine whether the WWTP operations represent an unacceptable risk to applicable human health and environmental receptors.*

6.3 Nutrient Irrigation Management Plan

The Applicant submitted an NIMP as part of the W6034 Application. The NIMP was submitted to assess the acceptability of the proposed hydraulic and contaminant loading rates for the irrigation of TWW to Turf grass on the sporting oval and golf course driving range with regards to any likely impacts to underlying groundwater and adjacent surface water bodies; and the long-term contaminant loading limits for contaminants of concern for irrigation of Turf.

The NIMP was reviewed and assessed by (the then) DoW who recommended additional monitoring bores be installed downstream and within the irrigation area to ascertain the seasonal groundwater levels. Monitoring bore WTP01 was installed close to the irrigation area as referred in Figure 3.

Given the limited TWW samples submitted as part of the Application and noting the TWW quality provided in Table 9 which identified numerous exceedances above the maximum design parameters provided in Table 4, DWER requested the Applicant update the NIMP noting these exceedances. The Applicant subsequently submitted a reviewed NIMP (dated September 2022) to the Department in October 2022.

The irrigation of TWW to the Golf Course driving range will be applied to a dedicated area of 3.8ha as outlined in Figure 1. Table 5 provides the Turf nutrient application rates proposed by the Applicant while Table 6 provides the Application rates at the irrigation area.

The proposed irrigation turf type is kikuyu and wild couch mix, special turf with high wear tolerance. High use active turf can utilise between 100-200 kg/ha/yr of Nitrogen and 5kg/ha/yr of Phosphorus (Table 5). The area has been historically irrigated at a rate of 4mm/day/m² to 8mm/day/m². The Application proposes an application rate of 125.3kg/ha/yr for Nitrogen and 5 kg/ha/yr of Phosphorus based on calculations from the “Western Australian environmental guidelines for the establishment and maintenance of turf grass areas” Swan River Trust update 2014 (Table 5).

Submission of the reviewed September 2022 NIMP in October 2022 as discussed above provides the following data for TWW quality (sourced from Table 9) in Table 12 and respective nutrient loading rates outlined in Table 13.

Table 12: TWW quality used in nutrient loading rates

TWW sample April 2019						Average	Limit ¹
TN mg/L	55	71	55	61	-	60.5	10
TP mg/L	0.28	0.57	0.12	0.07	-	0.26	0.5
TWW sample December 2022							
TN mg/L	15	8.9	6.2	5.8	7.2	8.62	10
TP mg/L	0.18	1.8	1.4	0.91	1.4	1.14	0.5

1: Limit of parameter provided from Table 4 maximum TWW design.

Table 13: Nutrient load calculations

Year	2019	2020	2021	2022
TWW total volume L/d ¹	10,650	12,150	20,850	25,200
Ave TN mg/L	60.5	-	-	8.62
Ave TP mg/L	0.26	-	-	1.14
Ave TN mg/day	644,325	-	-	217,244
Ave TP mg/day	2,769	-	-	28,679
Ave TN kg/day	0.6	-	-	0.2
Ave TP kg/day	0.003	-	-	0.09
Ave TN kg/ha/yr	61.9	-	-	20.9
Ave TP kg/ha/yr	0.3	-	-	2.8
Turf Guideline limit²				
TN	100-200 kg/ha/year			
TP	5 kg/ha/year			

1: P&DC limit of the WWTP is 130,000L/d

2: Limit provided in Table 5 Turf nutrient application rates.

Key Finding: *The Delegated Officer notes that:*

- 1) *The irrigation of TWW to the Golf Course driving range will be applied to a dedicated area of 3.8ha as outlined in Figure 1. Table 5 provides the Turf nutrient application rates proposed by the Applicant while Table 6 provides the Application rates at the irrigation area.*
- 2) *The proposed irrigation turf type is kikuyu and wild couch mix, special turf with high wear tolerance. High use active turf can utilise between 100-200 kg/ha/yr of Nitrogen and 5 kg/ha/yr of Phosphorus (Table 5).*
- 3) *The area has been historically irrigated at a rate of 4 mm/day/m² to 8 mm/day/m². The irrigation application rate for TWW discharged at the Premises is proposed to be 5 L/day/m².*
- 4) *The Application proposes an application rate of 125.3 kg/ha/yr for Nitrogen and 5 kg/ha/yr of Phosphorus based on calculations from the “Western Australian environmental guidelines for the establishment and maintenance of turf grass areas” Swan River Trust update 2014 (Table 5).*
- 5) *At the request of DWER, the Applicant submitted a revised NIMP based on the limited TWW sample data.*
- 6) *From the limited sample data in 2019, Table 12 outlines that TWW data for TN was above the maximum design criteria for the WWTP while TP was below the*

maximum design criteria for the WWTP.

- 7) From the limited sample data in 2022, Table 12 outlines that TWW data for TN was below the maximum design criteria for the WWTP while TP was above the maximum design criteria for the WWTP.
- 8) The P&DC of the WWTP is 130,000L/day and Table 13 provides respective total volumes of TWW discharged to the turf irrigation area from 2019 to 2022. The maximum TWW total volume thus far is 25,200 L/day in 2022.
- 9) Using the current limited data for TWW quality and discharge volumes the current discharge of TWW to Turf is below the maximum allowed under the Turf Guidelines as provided in Table 13. For 2022, which has the highest volume of TWW discharge, TN is 20.9 kg/ha/yr and TP is 2.8 kg/ha/yr compared to the Turf Guideline limit of 100-200 kg/ha/yr and 5 kg/ha/yr respectively.
- 10) Given the lack of quantifiable and representative data for TWW discharges to the irrigation area at the Premises, a precautionary approach has been applied to the Risk Assessment.
- 11) The detailed risk assessment for the emissions – pathway – receptors in section 9 will determine whether the WWTP operations represent an unacceptable risk to applicable human health and environmental receptors.

6.4 Monitoring of noise emissions

The Applicant has submitted a Noise Assessment for the WWTP. In October 2022 an assessment of the WWTP occurred at the following 12 points identified in Figure 4 using a SVANTEK 979 Sound Level meter.

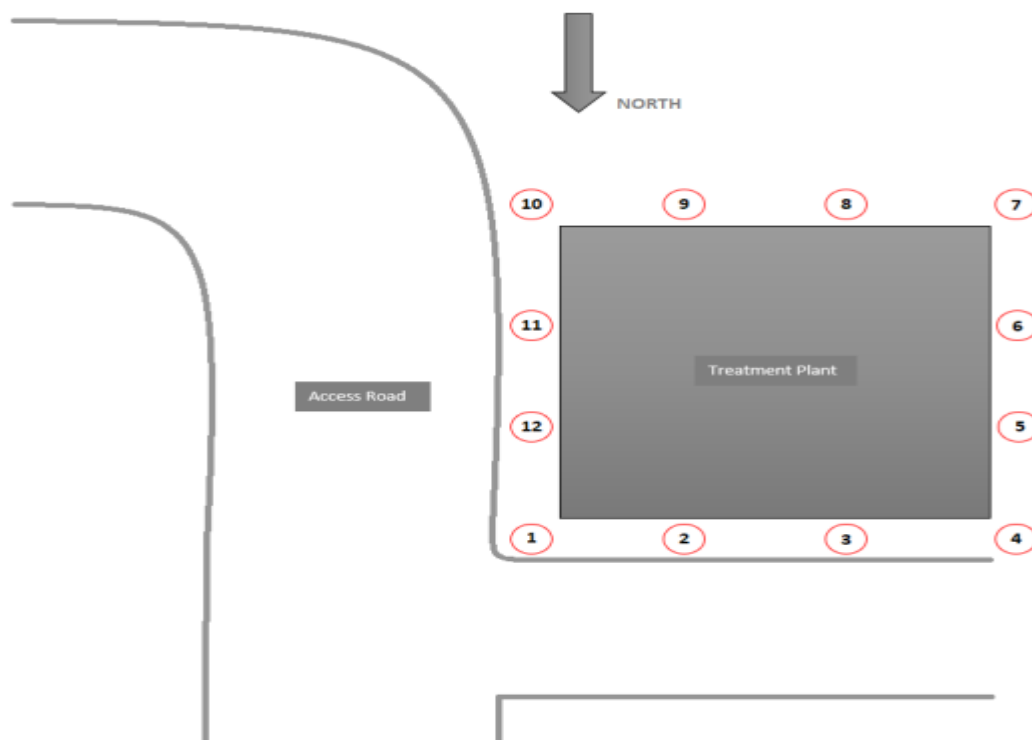


Figure 4: Noise assessment locations

The results from the assessment are outlined in Table 14 compared to Assigned levels from regulation 8 Table 1 the Noise Regulations which are provided in Table 15.

Table 14: Noise Assessment at WWTP

Location	LAeq,T dB(A)	Lpeak dB(c)
1	46.2	81.1
2	43.2	80.4
3	47.4	80.5
4	46.5	83.7
5	42.1	80.2
6	42.3	80.6
7	45.6	76.7
8	48.9	74.2
9	49.9	86.7
10	50.2	89.5
11	52.3	76.2
12	48.9	90.5

Table 15: Noise Regulation assigned noise levels.

Type of premises receiving noise	Time of day	Assigned levels (dB)		
		LA10	LA1	LA max
Noise Sensitive premises any area other than highly sensitive area	All hours	60	75	80

Key Finding: *The Delegated Officer notes that:*

- 1) *The Applicant sampled noise emissions at the WWTP in October 2022. The results are provided in Table 14.*
- 2) *Noise emissions sampled at the WWTP have been reviewed and assessed against the applicable assigned levels in the Noise Regulations.*
- 3) *The maximum allowable limit of 80 dB has not been exceeded in any of the samples. The average noise emission reading of 47 dB is less than any assigned level in Table 1 under the Noise Regulations.*

7. Consultation

DWER consulted with the following Stakeholders in formal correspondence sent on 8 December 2022 requesting comments by 5 January 2023:

- City of Wanneroo.
- DoH.
- DBCA.
- Fairway Village – the Green (Strata Management).
- Lakelands Golfview Estate Resident.
- Lakelands Golfview Estate Resident.
- Lakelands Golfview Estate Resident.

DWER received comments from the following Stakeholders:

- City of Wanneroo. No comment received.
- Department of Health provided a response to DWER in a letter dated 23 December 2022.
- DBCA. Comment received 24 January 2023 – DBCA has no comments regarding the Application.
- Fairway Village – the Green (Strata Management). No comment received.
- Lakelands Golfview Estate Resident. No comment received.
- Lakelands Golfview Estate Resident. No comment received.
- Lakelands Golfview Estate Resident. No comment received.

Stakeholder comments are summarised in Appendix 3.

8. Location and siting

8.1 Siting context

The proposed WWTP is located within the suburb of Gnangara in the City of Wanneroo, Western Australia. The development area is zoned rural, with the suburb of Gnangara zoned mostly semi-rural and urban.

The WWTP is located in the south-eastern corner of Lot 5 Clubhouse Lane, Gnangara (Figure 3 and 5). Approximately 3.8 hectares of the southern half of the Golf Course (on Lot 7 Clubhouse Lane), is proposed to be irrigated with TWW from the WWTP. Figure 5 outlines the location and siting of the WWTP in relation to sensitive residential receptors.



Figure 5: WWTP sitting

8.2 Residential and sensitive receptors

The distances to residential and sensitive receptors are detailed in Table 16.

Table 16: Receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Activity
Fairway Retirement Village	2m west and 15m north - The WWTP is within the retirement village adjacent to residents.
Residential Premises	70m south and 60m east of the Premises.
Lakelands Country Club Golf Course	Approximately 200m to the west (measured from WWTP boundary).

8.3 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 17. Table 17 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 *Guideline: Environmental Siting*.

Table 17: Environmental values

Specified ecosystems	Distance from the Premises
Gnangara-Moore River State Forest	~ 1.4km north-east and east of the Premises.
Jandabup Nature Reserve	~ 3km north of the Premises.
Yellagonga Regional Park	~ 6km north-west of the Premises.
Bush forever	Bush forever sites: 193 – 0.6 km south east 326 – 1.2 km nor-north west 327- 1.6 km west 463 – 1.3 km north south west 471 – 2.9 km north west of the Premises respectively.
Biological component	Distance from the Premises
Ecological Communities (Threatened Ecological Communities and Priority Ecological Communities)	TEC buffer zones are mapped across the proposed WWTP site and over parts of the golf course. Specific flora and fauna sites are described below.
Threatened/Priority Flora	Priority 4 - Banksia Woodland has been identified 1km east and 1.2 km south east from the Premises.
Threatened/Priority Fauna	Two species of threatened fauna recorded within local area but not reliant on same vegetation type as within proposal area. Threatened – Endangered categories are located 370 m east and 1.1 km north of the premises.
Topography	The Premises and immediate surrounding area, including the conservation category wetland is relatively flat and ranges between 44m and 46m AHD. The proposed irrigation area is also relatively flat, with a slight slope towards the conservation category wetland.
Acid Sulfate Soils	The DWER Perth Groundwater Atlas indicates the WWTP site is within a moderate to low ASS

	<p>disturbance risk area (within 3m from the ground surface).</p> <p>The Geotechnical report indicates surficial organic soils and Coffee rock materials at the Premises exceed the Net Acidity Action Criterion of 0.3%S. The geotechnical report indicates that coffee rock was encountered at 4.5m bgl at the Premises.</p> <p>Field testing and laboratory testing results are indicative of ASS being present at the Retirement Village site, however it is likely to be present at greater than 4m bgl at the WWTP site.</p> <p>It is unlikely that ASS or potential ASS will be encountered during the construction of the WWTP as it is being constructed to a depth greater than 2m below ground level.</p> <p>The DWER guidelines <i>DER, 2015 Identification and investigation of acid sulfate soils and acidic landscapes</i> and <i>DER, 2015 Treatment and management of soils and water in acid sulfate soil landscapes</i> have been considered.</p>
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8.4 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 18.

Table 18: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental value
Proclaimed groundwater area under the <i>Rights in Water and Irrigation Act 1914</i> (RIWI Act)	The Premises lies within an area mapped as a proclaimed groundwater area under the RIWI Act – identified as the ‘Wanneroo’ groundwater area.	Water used for potable water
Conservation category wetland	<p>Approximately 400m to the north of the proposed WWTP and approximately 230m northeast of the proposed irrigation area (Figure 3).</p> <p>Based on the inferred groundwater flow direction across the Premises the Conservation category wetland is considered to be up hydraulic gradient from the proposed irrigation area and is unlikely to receive any potentially impacted shallow groundwater discharge from the site.</p>	Recreational Conservation Aesthetic
Groundwater	The bore closest to the TWW discharge point is bore WTP01 (Figure 3). Data from the groundwater results in Table 11	Water is not used for potable or industrial use but used to irrigate Golf Course.

	<p>indicates depth to groundwater is approximately 2.08mbgl to 2.475mbgl. It is noted that this data is not representative of a full year weather cycle (no Winter and Spring data is available).</p> <p>According to the Perth Groundwater Map the groundwater quality is classed as fresh, between 250 – 500 mg/L (milligrams of salt per litre). It has a high risk of iron staining, therefore unsuitable for garden bores.</p> <p>DWER's Perth Groundwater Map groundwater contours indicate groundwater flows from approximately north-east to south-west in the local area.</p>	
Public Drinking Water Source Area (PDWSA)	<p>The Premises is approximately 640m west of a category P2 drinking water source area and 745m west of a category P1 drinking water source area (refer to Figure 10). Based on the inferred groundwater flow direction across the Premises from the DWER Perth Groundwater Map the PDWSA is considered to be up hydraulic gradient from the proposed irrigation area and is unlikely to receive any potentially impacted shallow groundwater discharge from the site.</p>	Water used for potable water
Groundwater abstraction bores	<p>There are 64 groundwater abstraction bores located within 1km radius of the Premises (based on available GIS – WIN Groundwater Sites).</p> <p>The closest groundwater abstraction bores to the WWTP are located approximately 30m east and 160m south.</p> <p>The closest groundwater abstraction bores to the irrigation area are approximately 220m southeast and 410m southwest.</p> <p>According to the DWER Water Register, the golf course has a licence to extract 320 000kL of water for irrigation purposes. The</p>	Potable water Commercial water

	licence includes four bores located near the clubhouse. The bores within the golf course are approximately 30m deep.	
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8.5 Soil type

According to DPIRD data the premises is located within the Bassendean soil system. The system is located on the Swan Coastal Plain between Busselton and Jurien and contains sand dunes and sandplains with pale deep sand and semi-wet to wet soil.

The proposed WWTP is situated across three DPIRD soil sub systems. The Premises will be located on the Jandakot Phase subsystem, described as Jandakot low dunes with slopes of less than 10 per cent and generally more than 5m relief. The soil is typically grey sand over pale yellow sands generally underlain by humic and iron podzols.

The proposed irrigation area is classified DPIRD Joel Phase subsystem and the Bassendean seasonal swamps phase subsystem. They are described as low dunes with slopes of less than 10 per cent and generally more than 5m relief. The soil is typically grey sand over pale yellow sands generally underlain by humic and iron podzols and depressions with free water in winter and with soils of humus, podsols and peat.

According to the Application, soil at the Premises is described as poorly graded sand overlain by relatively thin topsoil. The sand is described as fine to medium grained, white to pale grey in colour with trace fines. A coffee rock layer (limonite – cemented sand grains) was encountered at 4.5m below the WWTP Premises. This layer is weakly cemented however is less permeable than the surrounding Bassendean sands.

The Application indicates that soil permeability rates at WTP01, WTP02 and BH03 (Figure 3) were estimated between 1.9×10^{-4} m/s (16m/day) and 2.6×10^{-4} m/s (22m/day). According to the Application, field tests were conducted in accordance with AS1726 (1993), Lakelands Retirement Village - Geotechnical Investigations Report, October 2015.

Geotechnical investigations were conducted at the proposed irrigation area as shown in Figure 6. Four hand auger boreholes denoted HA01 to HA04 were excavated using a 100mm diameter auger to a depth of 2m below existing ground levels in June 2017. According to CMW Geosciences who conducted the investigations, groundwater was not encountered in the boreholes. Ground conditions encountered during the investigation were generally consistent with the published geology for the area (fine to coarse grained sand).

The subsurface profile encountered from the investigation are summarised below in Table 19.

Table 19: Summary of Soil Stratigraphy as encountered

Description	Depth to top of layer (m)			
	HA01	HA02	HA03	HA04
Topsoil: Sand (SP)	0.0	0.0	0.0	0.0
SAND (SP)	0.45	0.3	0.1	0.25

TOPSOIL: SAND (SP) Fine to coarse grained, angular to sub-rounded, black to dark grey;

SAND (SP) rootmat to 0.1m; with rootlets; trace organics, overlying;
Fine to coarse grained, sub-angular, grey to pale grey-white trace
fines.

Test Location Plan – 30/06/2017



Figure 6: Location of boreholes HA01 – HA04.

8.6 Meteorology

The Premises is located on the Swan Coastal Plain in the Perth Region. The Perth region experiences a Mediterranean climate characterised by mild and wet winters and warm to hot dry summers. In the Perth metro region between 1994 and 2022 February the mean temperature is 31.6 degrees Celsius, with the lowest mean temperature recorded in July is 19.5 degrees Celsius. The summer period experiences heat waves that last up to four to five days. Most rainfall occurs during winter in association with cold fronts from the south-west.

8.6.1 Wind direction and strength

The closest Bureau of Meteorology monitoring station is the Perth Metro station located 16.5km from the Premises. The following wind roses provided in Figure 7 represent the various percentage of wind occurrences recorded at 9am and 3pm over 50 years.

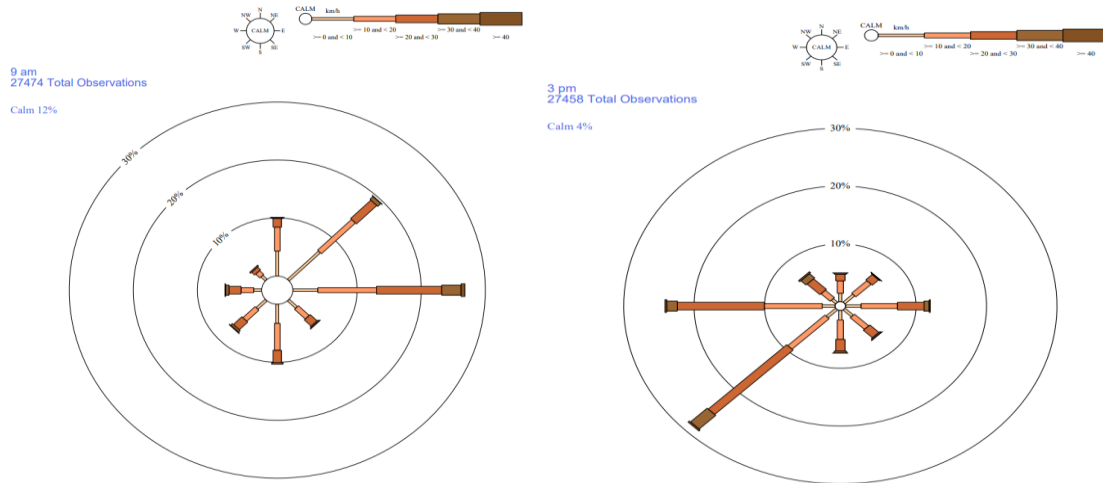


Figure 7: Wind roses for the Premises

It is important to note that these wind roses show historical wind speed and wind direction data for the Perth Airport weather station and should not be used to predict future data.

The wind roses in Figure 7 indicate prevailing wind direction at 9 am will predominantly be from the East and may impact residential premises approximately 60m east of the Premises. The wind direction at 3 pm will predominantly be from the southwest and potentially impact residential premises approximately 70m southwest of the Premises. Both the 9am and 3pm wind roses indicate it the weather will be calm for 12% and 4% respectively. At this time given the very close proximity to sensitive receptors at the WWTP (Table 16) any odour present during calm conditions may impact these residents at these times.

8.6.2 Rainfall and temperature

The mean annual rainfall recorded at the Perth Metro station between 1993 and 2022 is 735.6 mm with the highest average rainfall recorded in July and the lowest in December. Most rainfall falls in between June July and August each year.

The annual evaporation rate for Perth is approximately 2061mm, with monthly evaporations exceeding average monthly rainfall for all months other than June, July and August.

The mean annual temperature at the Perth Metro station between 1944 and 2022 is 24.6°C with February being the hottest month at 32°C and July being the coolest month at 18°C.

9. Risk assessment

9.1 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 20.

The identification of the sources, pathways and receptors to determine Risk Events are set out in Table 20 below.

Table 20. 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		
Wastewater Treatment Plant	Operation of WWTP	Noise	Current residential premises located 2m west and 15m north of the Premises. 70m south and 60m east of the Premises. Lakeland Golf Course Approximately 200m to the west (measured from WWTP boundary).	Air / wind dispersion	Amenity impacts causing nuisance	No There is only very limited access to the WWTP so vehicle movement will be restricted and infrequent. The size of the Premises does not allow for vehicles to gain speed and thus noise is restricted. The Aerators will not generate significant noise above current operational noise. Distance to receptors, scale and type of operations and lack of reasonably foreseeable impact. No known significant emission sources or history of noise emission impacts. Noise can be adequately regulated by the EP Noise Regs.

Risk Events					Continue to detailed risk assessment	Reasoning
Sources/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
	Dust		Air / wind dispersion	Amenity impacts causing nuisance	No	<p>Only a very small area of internal gravel track occurs within the Premises and combined with limited vehicle speed, there will be minimal dust disturbance.</p> <p>Distance to receptors, scale and type of operations and lack of reasonably foreseeable impact. No known significant emission sources or history of dust emission impacts.</p> <p>Dust can be adequately regulated by section 49 of the EP Act.</p>
Operation of WWTP	Seepage / leaks / spills of untreated wastewater and TWW	<p>Specified ecosystems, surface water and groundwater.</p> <p>Conservation category wetland located 400m north of the Premises and 230m northeast of the irrigation area.</p> <p>The nearest down-gradient groundwater abstraction bore is located approximately 30m east and 160m south of the Premises.</p>	<p>Surface water runoff and seepage to groundwater.</p> <p>Ground contours indicate slight slope from Premises towards conservation category wetland, however site is relatively flat.</p> <p>Groundwater depth at least 20.8mbgl</p>	<p>Surface water and groundwater contamination.</p> <p>Soil contamination impacting native vegetation growth and survival.</p>	Yes	See section 9.4
Treatment of sewage	Odour	Current residential premises located 2m west and 15m north of	Air / wind dispersion	Amenity impacts causing nuisance	Yes	See section 9.5

Risk Events					Continue to detailed risk assessment	Reasoning
Sources/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		<p>the Premises.</p> <p>70m south and 60m east of the Premises.</p> <p>Lakeland Golf Course Approximately 200m to the west (measured from WWTP boundary).</p>				
TWW	Irrigation of TWW to Golf Course	<p>Conservation category wetland located 400m north of Premises and 230m from the proposed irrigation area. This is up hydraulic gradient from the irrigation area.</p> <p>There are 64 groundwater abstraction bores located within 1km radius of the Premises (based on available GIS – WIN Groundwater Sites).</p> <p>The closest groundwater abstraction bores to the WWTP are located approximately 30m east and 160m south.</p> <p>The closest groundwater abstraction bores to the irrigation area are approximately 220m southeast and 410m</p>	Direct discharge to land and infiltration to Groundwater	<p>Leaching of nutrients into groundwater and runoff into surface water receptors and Wetland and Bore water abstraction area.</p> <p>Direct contact with soil and abstraction of groundwater</p> <p>Groundwater impacts and groundwater is estimated to be between 2.08 and 2.475mbgl.</p> <p>Impacts to water quality, vegetation survival and ecological function of wetland.</p>	Yes	See section 9.6

Risk Events					Continue to detailed risk assessment	Reasoning
Sources/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		southwest				

9.2 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 21 below.

Table 21: 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 22 below.

Table 22: 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.

9.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment Table 23 below:

Table 23: 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.

9.4 Risk Assessment – Spills and Leaks

9.4.1 Description of Spills and Leaks

A spill/leak of wastewater (mainly untreated or partially treated), sludge or solids could result in contamination of surface water, groundwater and soil. Contamination of groundwater could occur through infiltration of the contaminants through the soil. Surface water bodies could become contaminated by either groundwater flows expressing at the surface, impacting groundwater, or contaminated storm water runoff entering nearby surface water receptors.

9.4.2 Identification and general characterisation of emission

The WWTP will operate continuously and has as a P&DC of 130m³/day and TWW will be irrigated at the Golf Course. There will be a range of process chemicals used throughout the treatment process. Typical characteristic of untreated sewage are:

- pH: 5.5 - 8
- TN: 20 – 50 mg/L
- TP: 5 – 10 mg/L
- BOD: 100 – 400 mg/L

9.4.3 Description of potential adverse impact from the emission

A conservation category wetland is located approximately 450m north of the WWTP and 320m northeast of the irrigation site. Groundwater flows in a southwest direction away from the conservation category wetland.

The nearest groundwater abstraction bore is located approximately 30m to the east and 160m

south of the Premises.

Department of Health conditions specify that a WWTP must be 30 metres from a well, bore or any watercourse. DoH has given approval in principle for the WWTP.

The private bore located approximately 30m east from the boundary of the WWTP is constructed to 59mbgl in the Perth - Superficial Swan aquifer according to DWER, GIS Mapping WIN bore data.

Residential receptors are adjacent to the WWTP.

9.4.4 Criteria for assessment

General provisions of the EP Act and the *Environmental Protection (Unauthorised Discharges) Regulations 2004* apply.

9.4.5 Applicant controls

This assessment has reviewed the controls set out in Table 24 below.

Table 24: Applicant's proposed controls for Spills and Leaks

Control	Description
Bund	<ul style="list-style-type: none"> The WWTP is a package plant that will be constructed on a concrete slab with bunding and drainage to limit stormwater ingress and prevent discharge to the surrounding environment The bund will be a 1m reconstituted limestone wall with an impervious sealer
Overflow of untreated water	<ul style="list-style-type: none"> Four collection pits will be installed at the WWTP to capture any possible overflow
Chemical storage bund	<ul style="list-style-type: none"> Chemical storage will be located at the WWTP site. Hazardous chemical drum (chlorine) will be located inside a bund at the site. Area closed off to general public Trained staff for chlorine manipulation Emergency procedures and safety calls available in case of incident
Tank Overflow	<ul style="list-style-type: none"> Immediate shut down on system to prevent overflow The tanks have a buffer capacity of 440kL equal to 4.9 days in winter and 280kL, 2.1 days in summer
Pump Failure	<ul style="list-style-type: none"> Regular inspections
Pipeline failure	<ul style="list-style-type: none"> Controls to notify loss of pressure in the pipeline
Management	<ul style="list-style-type: none"> Any overflow will be confined within the bunded area and will be cleaned up immediately to avoid odour releases. Remove wastewater and solids to the maximum practicable amount Washing the spill area to dilute any remaining wastewater and conduct it to the collection point on site, especially where there is the potential for high public exposure Disinfecting hard surfaces in high public exposure areas to reduce the risk to human health

Control	Description
Drainage management plan	<ul style="list-style-type: none"> Site drainage will be designed and implemented to safely convey stormwater. This should be designed to convey potential wastewater spills away from sensitive receptors

9.4.6 Key findings

The Delegated Officer has reviewed the information regarding Spills and Leaks and has found:

- 1. The WWTP will be constructed on a concrete hardstand and a 1m bund wall surrounding it. Chemicals will be stored in individual bunds inside the WWTP bund.*
- 2. Four collection pits will be constructed to collect any spills.*
- 3. Site drainage will be designed to convey potential wastewater spills away from sensitive receptors.*
- 4. A spills management plan will be activated immediately if any spills occur.*
- 5. The above measures are likely to prevent spills and leaks in most circumstance. In the event spills and leaks occur, there are contingency measures in place (spills management plan).*

9.4.7 Consequence

If spills and leaks occur, then the Delegated Officer has determined that the impact of spills and leaks to land will be low level on-site impacts and minimal off-site impacts local scale. Therefore, the Delegated Officer considers the consequence of spills and leaks to be **Minor**.

9.4.8 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of spills and leaks may only occur in exceptional circumstances. Therefore, the Delegated Officer considers the likelihood of spills and leaks to be **Rare**.

9.4.9 Overall rating of Spills and Leaks

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 21) and determined that the overall rating for the risk of spills and leaks is **Low**.

9.5 Risk Assessment – Odour

9.5.1 Description of Odour

Odour may be generated by the acceptance, storage and treatment of sewage wastes, removal and processing of sewage sludge and irrigation of TWW. Sewage can contain high loads of BOD and can also contain aromatic molecules which can result in odour. Odour emissions can also be exasperated where overloading of the WWTP occurs.

9.5.2 Identification and general characterisation of emission

Odour will occur continuously from the WWTP and the WWTP has a P&DC of 130m³/day and TWW will be irrigated at the Golf Course. Abnormal operating conditions may give rise to higher frequency and duration odour emission events. There may be additional odours during the desludging process.

The wind roses in Figure 7 indicate prevailing wind direction at 9 am will predominantly be from the East and may impact residential premises approximately 60m east of the Premises. The wind direction at 3 pm will predominantly be from the southwest and potentially impact residential premises approximately 70m southwest of the Premises. Both the 9am and 3pm wind roses indicate it the weather will be calm for 12% and 4% respectively. Sensitive receptors are located within 2m of the WWTP.

9.5.3 Description of potential adverse impact from the emission

Odour has the potential to cause amenity impacts causing nuisance to local sensitive receptors and the general public. Meteorological factors are expected to have a significant influence on the pathway for odour emissions and therefore the potential level of impact on receptors. Residential receptors are expected to be more sensitive than industrial receptors.

9.5.4 Criteria for assessment

No specific consequence criteria are applicable. The health, welfare, convenience, comfort and amenity of receptors are relevant in determining the consequence of odour. The closest residential receptors are 2m west and 15m north of the Premises. The Premises has received odour complaints.

9.5.5 Applicant controls

This assessment has reviewed the controls set out in Table 25 below.

Table 25: Applicant's proposed controls for Odour

Control	Description
Scrubbers	<p>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).</p> <p>The flume height will be 6m from the top of the WWTP, these will be used on the 4.65mH tanks and will be imbedded in the landscape.</p>
Covers	<p>All treatment tanks on site will be covered and ventilated through the scrubber. This is 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.</p>
Odour treatment units	<p>Addition of sodium hypochlorite to the sewage at the beginning of the treatment to increase the pH of the sewage to reduce biological conversion of dissolved sulphate to hydrogen sulphide.</p>
Management	<ul style="list-style-type: none">• The Applicant will identify the source of the odour and rectification of the cause in line with Figure 6 of the Odour Management Plan.• The Monitoring Protocol (refer to Figure 7 of the Odour Management Plan) will be used to monitor key components of the WWTP to identify system failures that may cause odour release.

Control	Description
	<ul style="list-style-type: none"> • Irrigation with treated wastewater will be limited to between the hours of 3am to 6am and 8pm and 1am. This will ensure minimum irrigation withholding times of 1 hour is achieved. • Any overflow will be cleaned up immediately to avoid odour releases, involving; <ul style="list-style-type: none"> ○ Remove wastewater and solids to the maximum practicable amount; ○ Washing the spill area to dilute any remaining wastewater and direct this wastewater to collection point on site, especially where there is the potential for high public exposure; and ○ Disinfecting hard surfaces in high public exposure areas to reduce the risk to human health.
Management	An Incident Management and Response Procedure will be implemented. Complaints received will be investigated and action undertaken until odours are at an acceptable level.
Management	The Applicant has determined according to DoH guidelines that the proposal poses a medium exposure risk level (level of human contact). The guidelines specify for this risk level that access control of the irrigation area is required. The user must maintain effective control over public access to the areas being irrigated.

9.5.6 Key findings

The Delegated Officer has reviewed the information regarding Odour and has found:

1. *The separation distance from the WWTP to sensitive Residential receptors is 2m west and 15m north.*
2. *Additional Residential premises are located 70m southwest and 60m east of the WWTP and Lakelands country club golf course is 90m west of the Premises.*
3. *Wind roses (Figure 7) indicate prevailing wind direction at 9 am will predominantly be from the East and may impact residential premises approximately 60m east of the Premises. The wind direction at 3 pm will predominantly be from the southwest and potentially impact residential premises approximately 70m southwest of the Premises. Both the 9am and 3pm wind roses indicate it the weather will be calm for 12% and 4% respectively.*
4. *The sensitive receptors nearby may be impacted by odour from the WWTP if there is a malfunction. Odour may be emitted if the process controls and pollution equipment controls fail. An alarm system will be in place to notify a malfunction. The Applicant will implement their odour management plan to reduce the amount of odour released during unexpected events and expedite clean-up of wastewater and effluent. Standby parts will be on site ready to replace failed parts to reduce the impact of odour.*
5. *Odour complaints have been lodged in relation odour from the WWTP.*
6. *Given the distance to sensitive receptors DWER has applied a precautionary approach to the risk assessment noting potential odour emissions from the WWTP.*

9.5.7 Consequence

If odour occurs, then the Delegated Officer has determined that the impact of odour emissions to sensitive receptors will be mid level impact to amenity for local scale impacts. Therefore, the Delegated Officer considers the consequence of odour to be **Moderate**.

9.5.8 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of odour occurring could occur at some time. Therefore, the Delegated Officer considers the likelihood of odour to be **Possible**.

9.5.9 Overall rating of Odour

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 21) and determined that the overall rating for the risk of Odour is **Medium**.

9.6 Risk Assessment – Irrigation of TWW

9.6.1 Description of Irrigation of TWW

TWW from the Premises will be transferred to storage tanks (2 x 100kL) located at Lakelands Country Club golf course (Figure 3). TWW will be utilised to irrigate turf at the driving range at the golf course (Figure 1). Total maximum TWW available for irrigation is 130 kL/day and will be irrigated at a rate of 5 L/day/m².

9.6.2 Identification and general characterisation of emission

The use and application of TWW for irrigation can cause land degradation, waterlogging and adversely impact natural waters causing salinity, turbidity, nutrient enrichment, leached trace metals and other harmful wastewater contaminants.

Sampling of TWW was required under W6034 condition 9 Table 4 during Commissioning of the WWTP. The Applicant advised DWER that Commissioning occurred from 17 April 2019 to 31 May 2019. Table 4 provides the maximum design parameters for TWW discharged from the WWTP while Table 9 outlines the TWW Quality from the limited samples obtained under W6034 and subsequent samples at the request of DWER (refer to section 6.1 of the Decision Report).

9.6.3 Description of potential adverse impact from the emission

Based on irrigation of TWW to land at the Golf Course there can be potential impacts from the leaching of nutrients. Excess TN and TP can lead to leaching of Nitrogen and Phosphorus into the soil with over-stimulation of plant growth (decreasing yields).

Leaching of nutrients into groundwater and runoff into surface water receptors and Wetland and Bore water abstraction area. Groundwater impacts and groundwater is estimated to be between 2.08 and 2.475 mbgl.

Impacts to water quality, vegetation survival and ecological function of wetland. Conservation category wetland located 400m north of Premises and 230m from the proposed irrigation area. This is up hydraulic gradient from the irrigation area.

Published geological maps for the area depict the flat northern portion of the site, as being underlain by peaty clay with variable sand content of lacustrine origin. The proposed irrigation area is underlain by Bassendean Sand. Below these upper soil layers, the deeper geological formation is reported to comprise of Poison Hill Greensand which is expected to occur 50m

below existing ground levels.

The nearest bore to the proposed irrigation area is approximately 220m south. If wastewater and other contaminants reach the water table water users might be exposed to harmful pathogens and contaminants.

According to the Perth Groundwater Map the groundwater quality is classed as fresh, between 250 – 500 mg/L (milligrams of salt per litre).

The Perth Groundwater Map indicates the water table is approximately 4.5 mbgl at the WWTP site.

DWER's Perth Groundwater Map groundwater contours indicate groundwater flows approximately northeast to southwest in the local area.

Five groundwater sample events occurred from January 2019 to May 2019. Groundwater quality results are provided in Table 10 while groundwater levels are provided in Table 11 while bore locations are provided in Figure 3.

9.6.4 Criteria for assessment

The following criteria have been used to evaluate the risk associated to reuse of treated wastewater:

- Department of Health's Guidelines for the non-potable uses of recycled water in Western Australia, medium exposure risk for urban surface irrigation with some restricted access and application.
- ANZECC & ARMCANZ (2000) – Chapter 4 Primary Industries LTGV (Table 4.2.11) TN (5 mg/L) and TP (0.05 mg/L) respectively.
- Heavy metals in wastewater should not exceed the quality criteria for irrigation use given in the Australian and New Zealand guidelines for fresh and marine water quality.
- Australian water quality guidelines (ANZECC and ARMCANZ 2000) provide recommended trigger values for fresh and marine water.
- The Western Australian environmental guidelines for the establishment and maintenance of turf grass area, 2014 (Turf Guidelines, 2014) which was developed by the Swan River Trust with support from the Department of Water (DoW) and the Urban Users Working group to protect the health of waterways of the Swan and Scott Coastal Plains. The guidelines provide recommended application rates for fertilizers (nitrogen and phosphorus) on the Swan Coastal Plain. The Delegated Officer acknowledges there are differences between chemical inorganic fertilizers and organic wastewater however considers the guideline relevant for provision of criteria for the assessment of nutrients in the re-use of treated wastewater.
- DER Guideline: Assessment and Management of Contaminated Sites (2014) provides ecological and human health assessment levels for soil.

9.6.5 Applicant controls

The WWTP is designed to treat effluent to a pre-determined quality prior to use in irrigation. The maximum concentrations of key TWW contaminants from the WWTP is provided in Table 4.

The Applicant conducted limited TWW samples, and these are provided in Table 9 which are then compared to the maximum design concentrations of TWW parameters provided in Table 4.

The Applicant has reviewed and re-submitted the NIMP. The NIMP was submitted to assess the acceptability of the proposed hydraulic and contaminant loading rates for the irrigation of TWW to Turf grass on the sporting oval and golf course driving range with regards to any likely impacts to underlying groundwater and adjacent surface water bodies; and the long-term contaminant loading limits for contaminants of concern for irrigation of Turf.

The Applicant has proposed nutrient loading rates provided in Table 5 and 6.

The Applicant has installed groundwater bores and can therefore monitor groundwater at the Premises.

This assessment has reviewed the controls set out in Table 26 below.

Table 26: Applicant’s proposed controls for irrigation of TWW

Control	Description														
Infrastructure	<ul style="list-style-type: none"> • The golf course will have simple non continuous barriers that direct the public towards signage or fencing with lockable gates. There will be some restricted access and application of treated wastewater in line with DoH guidelines for medium exposure risk. • Control and Alarm system will be implemented to ensure target parameters of treated wastewater are achieved prior to irrigation. • Free chlorine will be dosed, monitored and controlled automatically, in the event the required concentration is not achieved the delivery valve will shut and water will be looped back to the Polishing Tank for re-dosing until reaching the required disinfection. • The WWTP will have 4.9 days buffer capacity in winter and 2.4 days buffer capacity in summer. 														
Monitoring	<p>The following parameters will be monitored as required:</p> <ul style="list-style-type: none"> • E. Coli • Biochemical Oxygen Demand • Turbidity • Disinfection • pH • Total Nitrogen • Total Phosphorus 														
<p>The applicant will meet the following criteria which is consistent with the quality Standards of Recycled Water guidelines</p>	<table border="1" data-bbox="448 1547 983 2000"> <thead> <tr> <th data-bbox="448 1547 799 1637">Parameter</th> <th data-bbox="799 1547 983 1637">Limit Value</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1637 799 1697">pH</td> <td data-bbox="799 1637 983 1697">6.5 - 8.5</td> </tr> <tr> <td data-bbox="448 1697 799 1758">Biochemical Oxygen Demand</td> <td data-bbox="799 1697 983 1758"><20 mg/L</td> </tr> <tr> <td data-bbox="448 1758 799 1818">Turbidity</td> <td data-bbox="799 1758 983 1818"><5 NTU</td> </tr> <tr> <td data-bbox="448 1818 799 1879">Total Nitrogen</td> <td data-bbox="799 1818 983 1879">10 mg/L</td> </tr> <tr> <td data-bbox="448 1879 799 1939">Total Phosphorus</td> <td data-bbox="799 1879 983 1939">0-0.5 mg/L</td> </tr> <tr> <td data-bbox="448 1939 799 2000">Total Chlorine</td> <td data-bbox="799 1939 983 2000">0.2 - 2.0 mg/L</td> </tr> </tbody> </table>	Parameter	Limit Value	pH	6.5 - 8.5	Biochemical Oxygen Demand	<20 mg/L	Turbidity	<5 NTU	Total Nitrogen	10 mg/L	Total Phosphorus	0-0.5 mg/L	Total Chlorine	0.2 - 2.0 mg/L
Parameter	Limit Value														
pH	6.5 - 8.5														
Biochemical Oxygen Demand	<20 mg/L														
Turbidity	<5 NTU														
Total Nitrogen	10 mg/L														
Total Phosphorus	0-0.5 mg/L														
Total Chlorine	0.2 - 2.0 mg/L														

Control	Description		
	<i>E. coli</i>	<10 cfu/100ml	
Nutrient loading rates	Category	Nitrogen	Phosphorus
	Expected effluent concentration (after treatment)	10 mg/L	0.5 mg/L
	High use activity turf and phosphorus retention index for established turf (Turf Guidelines ¹). Maximum allowed for irrigation.	100-200 kg/ha/year	5 kg/ha/year
	Applicant's NIMP, detailed nitrogen and phosphorus limits for irrigation area	125.3 kg/ha/year	5 kg/ha/year
Engineering	A rehabilitation wetland buffer zone will be planted between the proposed retirement village and the existing conservation category wetland		
Management	<ul style="list-style-type: none"> • Ongoing operation and maintenance management will maintain efficient operation of the WWTP. • Irrigation water will be tested weekly for nutrient load. • Irrigation water will be monitored online for turbidity and disinfection (alarm in place). • No irrigation will be carried out during rainy periods. • The irrigation area is a driving range; patrons will not be within the proposed irrigation area. WWTP site will be fenced, and only authorized personnel will be allowed access. 		
Entitlement	<ul style="list-style-type: none"> • Lakelands Country Club has agreed to accept treated wastewater to irrigate the golf course as long as it meets the quality deemed appropriate by the Department of Health. • 5L/day/m² will be supplied to Lakelands Country Club for surface irrigation of the existing golf course. 		

9.6.6 Key findings

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

1. *Maximum design criteria for TWW parameters are provided in Table 4. The limited TWW sample data from the WWTP is provided in Table 9. Table 9 indicates both TN and TP results for TWW have been above the maximum criteria. Continued monitoring of TWW is required to understand WWTP performance and thus nutrient loading rates for irrigation of TWW at the Premises.*
2. *The Applicant has provided nutrient loading and application rates in Table 5 and 6.*
3. *The Applicant has reviewed and re-submitted the NIMP. Using the limited TWW*

data from the WWTP the nutrient loading rates are currently below the proposed nutrient loading rates for the Premises. Noting the very limited TWW data further monitoring is required to understand the potential impacts to the environment and human health resulting from irrigation of TWW.

- 4. The Perth Groundwater Atlas indicates that groundwater levels are shallow in the irrigation area.*
- 5. The bore closest to the TWW discharge point is bore WTP01. Data from the groundwater results in Table 11 indicates depth to groundwater is approximately 2.08mbgl to 2.475mbgl. It is noted that this data is not representative of a full year weather cycle (no Winter and Spring data is available).*
- 6. Groundwater quality results in Table 10 from data from the monitoring requirements required under W60354 indicate Turbidity and Ammonia-N exceeds ANZECC Ecosystem 2000 values for all bores at all sample times and both TN and TP exceed both ANZECC Irrigation LTGV 2000 and ANZECC Ecosystem 2000 values, at all times and for all bores.*
- 7. Appendix 2 of W6034 provides Groundwater quality monitoring from the 'The Green – Retirement Village, Gnangara Urban Water Management Plan, August 2017'. Data presented in W6034 also indicates groundwater nutrients (Table 22) are elevated above ANZECC Irrigation LTGV 2000 values.*
- 8. Given the very limited groundwater data further groundwater monitoring is required to understand the environment and potential receptors, including adjacent Wetlands, at the Premises.*
- 9. The WWTP buffer capacity is adequate to contain total effluent during rainfall periods with a minimum 5hrs resting time after a rainfall event to prevent over application and waterlogging of the irrigated area. There is a 7-day buffer for rainy days. The average storage buffer is 4.25 days according to the applicant's water balance. A condition of the licence will state that if more than 4.25 consecutive days of rain occurs an alternative storage of wastewater must be found, or a tanker must be engaged to take the treated effluent unable to be stored off site.*
- 10. Given the lack of quantifiable and representative data for groundwater and TWW discharges to the irrigation area at the Premises, a precautionary approach has been applied to the Risk Assessment.*

9.6.7 Consequence

If irrigation of TWW occurs, then the Delegated Officer has determined that the impact of irrigation of TWW will be mid level on-site impacts and low level off-site impacts. Therefore, the Delegated Officer considers the consequence of irrigation of TWW to be **Moderate**.

9.6.8 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of irrigation of TWW could occur at some time. Therefore, the Delegated Officer considers the likelihood of irrigation of TWW to be **Possible**.

9.6.9 Overall rating of Irrigation of TWW

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 21) and determined that the overall rating for the risk of irrigation of TWW is **Medium**.

9.7 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 27 below. Controls are described further in section 11.

Table 27: Risk assessment summary

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)
	Emission	Source	Pathway/ Receptor (Impact)			
1.	Spills and Leaks	WWTP	Refer to Table 20	Refer to Table 24	Low consequence Rare likelihood Low Risk	Acceptable.
2.	Odour	WWTP	Refer to Table 20	Refer to Table 25	Moderate consequence Possible likelihood Medium risk	Acceptable subject to proponent controls conditioned / outcomes based controls
3.	Irrigation of TWW	TWW from WWTP	Refer to Table 20	Refer to Table 26	Moderate consequence Possible likelihood Medium risk	Acceptable subject to proponent controls conditioned / outcomes based controls

10. Regulatory controls

A summary of regulatory controls determined to be appropriate for the Risk Event is set out in Table 28. The risks are set out in the assessment in section 10 and the controls are detailed in this section. DWER will determine controls having regard to the adequacy of controls proposed by the Applicant. The conditions of the Licence will be set to give effect to the determined regulatory controls.

Table 28: Summary of regulatory controls to be applied

		Controls (references are to sections below, setting out details of controls)					
		10.1.1 Waste Acceptance	10.1.2 Waste Processing	10.1.3 Infrastructure and equipment	10.1.4 Emissions and discharges	10.1.5 Monitoring	10.1.6 Reports
Risk Items (see risk analysis in section 9)	Odour	•	•	•	•		•
	Leaks and Spills			•	•		•
	Irrigation of TWW	•	•	•	•	•	•

10.1 Licence controls

10.1.1 Waste Acceptance

Licence condition 1 limits sewage acceptance to 130 m³/day.

10.1.2 Waste processing

Licence condition 2 subjects the licence holder to treatment of sewage and septage waste at or below 130 m³/day as per condition 1. TWW must be directed to the Irrigation Spray Field and there must be storage capacity in the two Storage tanks. Any sludge that is generated at the WWTP must be processed as per Table 2 and all sludge solids must be removed from the premises and disposed at a licensed landfill. Grits and screening from the inlet works must be stored in a sealed bin which is surrounded by a bunded hardstand area which returns sludge leachate to the start of the treatment process.

10.1.3 Infrastructure and equipment

Licence condition 3 requires all Premises infrastructure listed in Table 3 to be maintained as outlined in Table 3. This will ensure the integrity of the WWTP as it continues to operate and discharge to the Irrigation Spray Field.

10.1.4 Emissions and discharges

Licence condition 4 and 5 ensures any spills of environmentally hazardous materials is recovered and stored appropriately prior to disposal off-site. These are new conditions on the Proposed Licence.

Licence condition 6 ensures all TWW effluent from the WWTP is only discharged to the dedicated Irrigation Spray Field.

Licence condition 7 outlines treated wastewater limits for TN and TN discharged to the Irrigation Spray Field.

Licence condition 8 ensures Odour emissions do not cause impacts to amenity of sensitive receptors.

10.1.5 Monitoring requirements

Licence condition 9 ensures all waste acceptance and removed is monitored. When sludge is generated, waste removed is monitored.

Licence condition 10 requires the monitoring of TWW that is discharged to land at the Irrigation Spray Field for the parameters at the location specified within Table 7.

Licence condition 11 requires the monitoring of groundwater water at the locations specified within Table 8.

Licence condition 12 requires the Licence Holder to submit all monitoring samples to a NATA accredited laboratory for analysis.

Licence condition 13 identifies the required frequency of monitoring.

Licence condition 14 ensure all monitoring equipment complies with manufacturers specifications and if not, the discrepancy is bought to the CEOs attention with the submission of a report.

Licence condition 15 ensures where the requirements for calibration cannot be practicably met, or a discrepancy exists in the interpretation of the requirements, bring these issues to the attention of the CEO accompanied with a report comprising details of any modifications to the methods.

10.1.6 Reports

Licence condition 16 requires the Licence Holder to record information when it receives a compliant.

Licence condition 17 requires the Licence Holder to submit an Annual Audit Compliance Report in the approved manner.

Licence condition 18 requires the Licence Holder to submit an Annual Environmental Report (AER). Table 9 outlines all the information required to be submitted in the AER.

Licence condition 19 requires the Licence Holder to maintain accurate and auditable books for the calculation of fees, and maintenance of infrastructure, inspections and repair work, monitoring programs and complaints.

Licence condition 20 requires that the books specified under condition 19 must be legible, retained and available upon request.

11. Determination of Licence conditions

The conditions in the issued Licence in Attachment 1 have been determined in accordance with the *Guidance Statement: Setting Conditions*.

The *Guidance Statement: Licence Duration* has been applied and the issued licence expires in 20 years from date of issue.

Table 29 provides a summary of the conditions to be applied to this licence.

Table 29: Summary of conditions to be applied

Condition Ref	Grounds
Waste Acceptance Condition 1	This condition is valid, risk-based and consistent with the EP Act.
Waste Processing Condition 2	These conditions are valid, risk-based and enable flexibility in operations.
Infrastructure and Equipment Condition 3	These conditions are valid, risk-based and contain appropriate controls.
Emissions Conditions 4, 5, 6, 7 and 8	These conditions are valid, risk-based and consistent with the EP Act.
Monitoring Conditions 9, 10, 11, 12 13, 14 and 15	These conditions are valid, risk-based and consistent with the EP Act.
Reports Conditions 16, 17, 18, 19 and 20	These conditions are valid and are necessary administration and reporting requirements to ensure compliance.

DWER 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 licence under the EP Act.

12. Applicant's comments

The Applicant was provided with the draft Decision Report and draft issued Licence on 20 January 2023 (signed 19 January 2023) requesting comments by 13 February 2023. The Applicant provided comments on 13 February 2023 – the requested Premises Map was still pending at this time. Applicant comments are summarised, along with DWER's response, in Appendix 2.

13. 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 Issued Licence will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Steve Checker
MANAGER WASTE INDUSTRIES

Delegated Officer
under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key documents

	Document title	In text ref	Availability
1.	Works Approval W6034/2017/1	W6034	DWER records (A1377347)
2.	DER, October 2015. <i>Guidance Statement: Setting conditions</i> , Perth.	DER 2015b	accessed via https://www.dwer.wa.gov.au/regulatory-documents
3.	DER, August 2016. <i>Guidance Statement: Licence duration</i> , Perth.	DER 2016a	
4.	DWER, October 2019, <i>Procedure: Prescribed premises works approval and licence</i> , Perth, Western Australia	DWER 2019	
5.	DWER, December 2020, <i>Guideline: Decision Making</i> , Perth, Western Australia.	DWER 2020a	
6.	DWER, December 2020, <i>Guideline: Environmental siting</i> , Perth, Western Australia.	DWER 2020b	
7.	DWER, December 2020. <i>Guideline: Regulatory principles</i> , Perth, Western Australia.	DWER 2020c	
8.	DWER, December 2020, <i>Guideline: Risk Assessments</i> , Perth, Western Australia.	DWER 2020d	

Appendix 2: Summary of applicant’s comments on risk assessment and draft conditions

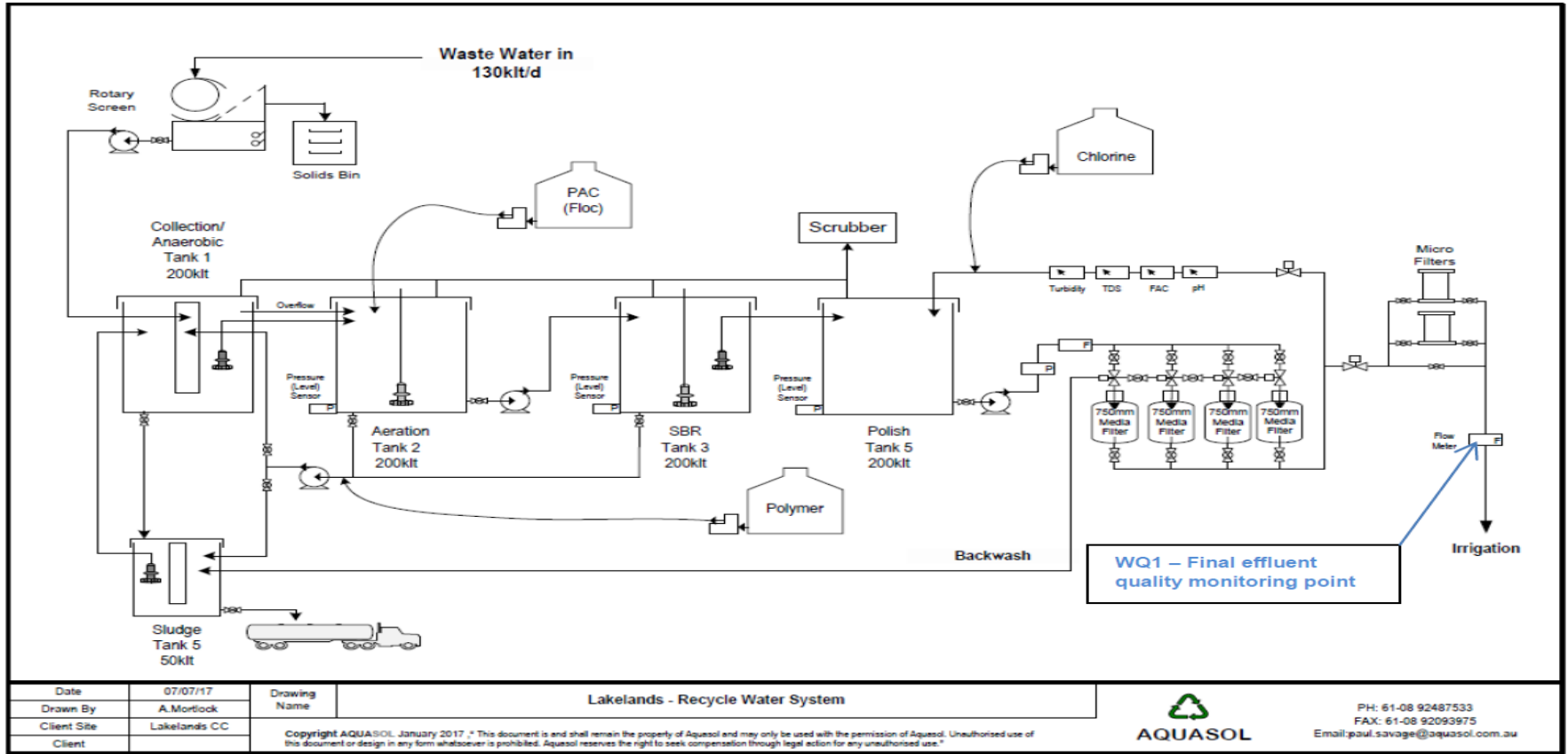
Decision Report	Summary of Licence Holder comment	DWER response
Table 24	Tank Overflow – please note the WWTP does not include emergency leach drain, buffer capacity was calculated to retain TWW in tanks until any unexpected situation is resolved.	Noted – Table 24 amended as advised.
Table 26	Engineering – A rehabilitation wetland buffer zone will be planted between the proposed retirement village and the existing conversation category wetland. Could (DWER) please specify when/where was this specified by the Applicant?	This was an Applicant control identified in the Works Approval (W6034) Decision Report in section 9.6.5 and Table 26 specifically. It is not a works approval condition for construction under Condition 1 Table 2 (Schedule 2 Table 7 and 8) of W6034.
Licence Condition	Summary of Licence Holder comment	DWER response
Premises Map	13/2/2023 – still pending from Engineering Company. Will submit as soon as possible.	Noted
Condition 3 Table 3	Infrastructure and equipment requirements. Please note the expected max TN, as stated in the updated NIMP, is 10mg/L, not <4mg/L as shown in the Table.	TN concentration should be 10mg/L as per Works Approval (W6034) Condition 10 and Table 4 Licence L9358/2022/1 and section 9.6 Discharges of TWW Risk Assessment in the Decision Report. Changed.
Condition 3 Table 3	Please note the driving range (spray field area) is not fenced. The golf course itself is fenced so only members with FOBs can obtain access. The driving range however is not authorised for the public access and warning signs are in place.	Table 23 from section 7.8.3 of the Works Approval (W6034) Decision Report identifies <i>‘the irrigation area is a driving range; patrons will not be within the proposed irrigation area. WWTP site will be fenced and only authorised personal will be allowed access’</i> . Changed wording for (i) to ‘Restrict public access to

Decision Report	Summary of Licence Holder comment	DWER response
		the Irrigation Spray Field Area’.
17	<p>“Prepare and submit to the CEO by 31 July in each year an Annual Audit Compliance Report in the approved form”.</p> <p>Could you please specify the “Approved Form”</p>	<p>The Approved Form is the Annual Audit Compliance Report (AACR) Form found on the DWER Website which can be downloaded from the website under Publications.</p> <p>Publications - Department of Water and Environmental Regulation (der.wa.gov.au)</p>

Appendix 3: Summary of Stakeholder comments

Stakeholder	Summary of Licence Holder comment	DWER response
DoH	<p>Aquasol Pty Ltd has a Recycled Water Scheme Approval 168/GC000 for the Premises granted 15 August 2019. A copy was submitted to DWER.</p> <p>Recycled Water Quality Plan (August 2019) has been submitted to DoH and accepted as satisfactory.</p> <p>Commissioning validation and verification monitoring requirements were compliant with medium exposure risk level water quality objectives. Monthly testing occurs to ensure water quality is maintained.</p>	Noted.
DBCA	DBCA has no comments regarding the Application.	Noted.

Attachment 1: Site Plan



Date	07/07/17	Drawing Name	Lakelands - Recycle Water System
Drawn By	A. Mortlock		
Client Site	Lakelands CC		
Client			

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Attachment 2: Issued Licence L9358/2022/1