



## Application for Licence Amendment

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

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<b>Licence Number</b>	L6316/1991/13
<b>Licence Holder</b>	Water Corporation
<b>File Number</b>	DER2016/000916-1~2
<b>Premises</b>	Wagin Sewage Facility 1801 Cowcher Road WAGIN WA 6315  Legal description – Lot 1801 on Plan 175363  As defined by the Premises maps attached to the Revised Licence
<b>Date of Report</b>	<b>12 December 2023</b>
<b>Decision</b>	Revised licence granted

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

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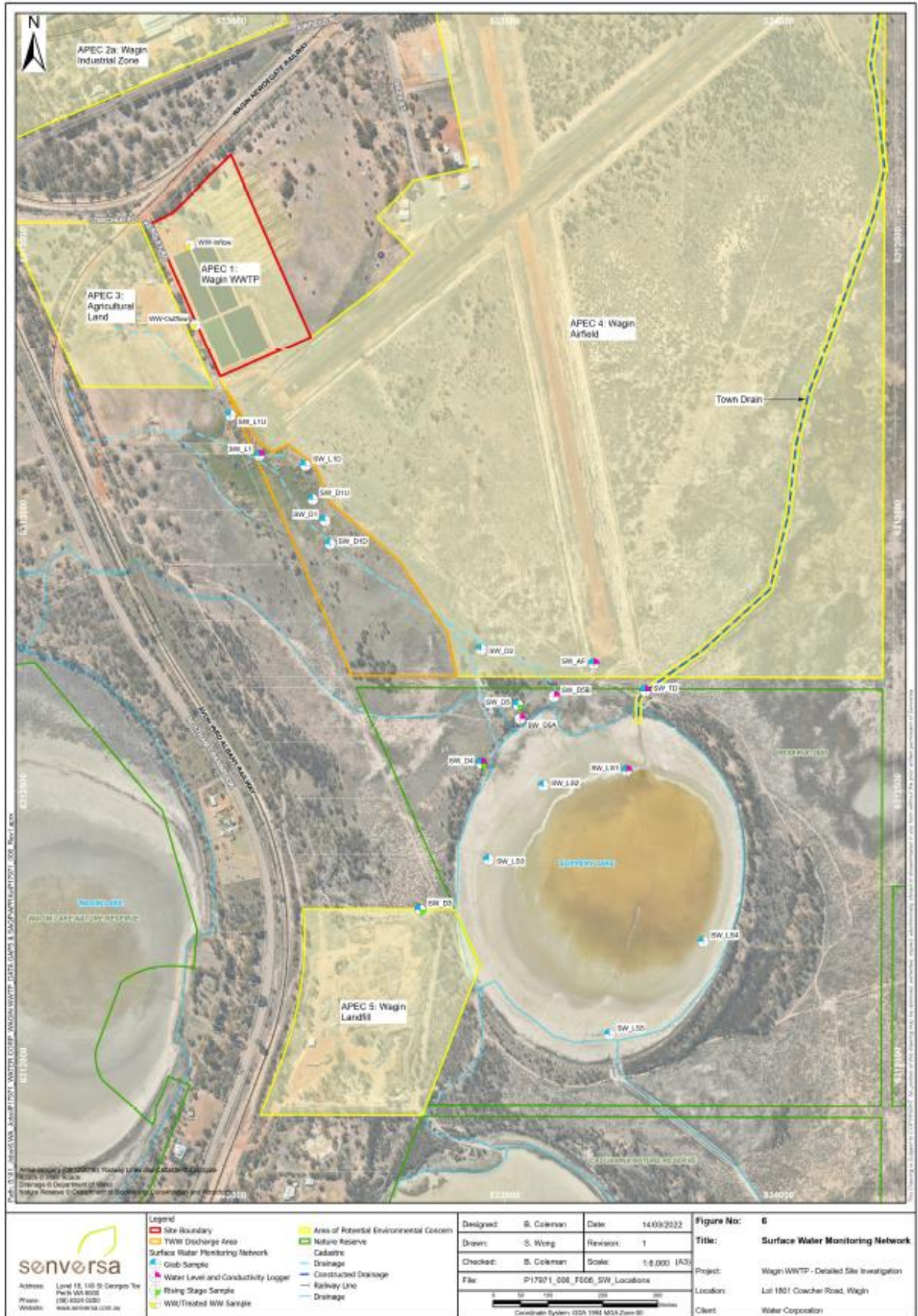


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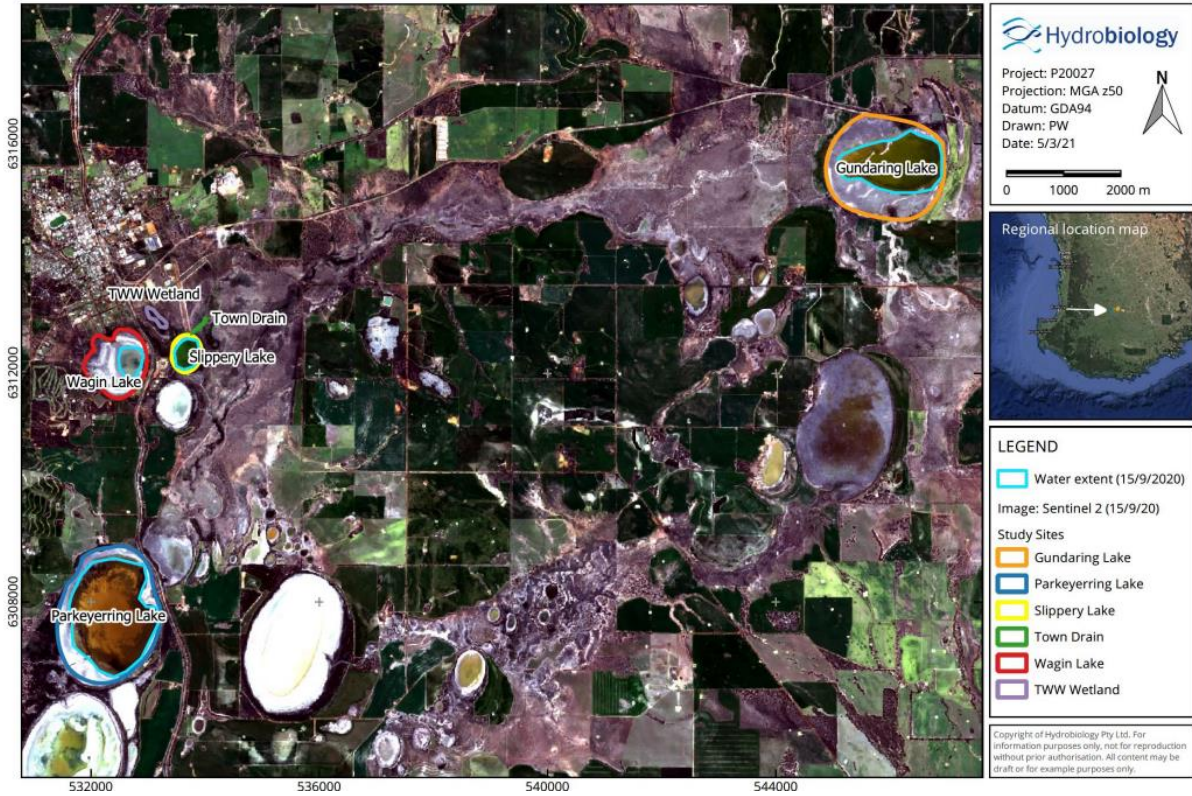


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## 1. Decision summary

Licence L6316/1991/13 is held by Water Corporation (Licence Holder) for the Wagin Sewage Facility (the Premises), located at 1801 Cowcher Road, Wagin.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during the operation of the Premises. As a result of this assessment, Revised Licence L6316/1991/13 has been granted.

The Revised Licence issued as a result of this amendment consolidates and supersedes the existing Licence previously granted in relation to the Premises. The Revised Licence has been granted in a new format with existing conditions being transferred, but not reassessed, to the new format.

## 2. Scope of assessment

### 2.1 Regulatory framework

In completing the assessment documented in this Amendment Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at <https://dwer.wa.gov.au/regulatory-documents>.

### 2.2 Background

The Premises has been in operation since 1991, with sewage pumped into the WWTP via pipeline and treatment occurring through a three-stage pond system. The Premises is currently authorised to accept and treat sewage at a rate of 260 m<sup>3</sup>/day per annual period. Treated sewage is discharged, via a 200 m PVC pipe, into an open drainage channel that slopes north to southeast from the Kersley Road reserve and through adjacent lands towards the Slippery Lake A-Class Nature Reserve. The Slippery Lake A-Class Nature Reserve is located approximately 600 m southeast of the PVC pipe discharge point. The lake is also subject to agricultural runoff, airport runoff, discharge of groundwater abstraction from around the Wagin townsite and potentially leachate from a Class II landfill located less than 100 m to the west.

In 2018, the Licence Holder submitted an amendment application for the premises to remove redundant information within the Licence preamble and align environmental improvement conditions with commitments made in a new draft Environmental Improvement Plan. As a part of this amendment assessment, DWER undertook a review of the foreseeable risk events to public health, amenity, water resources and the environment from the acceptance and treatment of sewage waste at the Premises.

Through the 2018 review, DWER determined that the discharge of treated sewage presents:

- a high risk to the environment due to the potential for nutrients within the discharge of treated sewage from the sewage facility to result in cyanobacterial blooms within Slippery Lake and cause short term impact to ecosystem services; and
- a high risk to public health due to the discharge periodically significantly exceeding 1000 cfu/100 mL *Escherichia coli* and potential for pathogens to impact human health.

Industry Regulation (IR) determined that the high risk to the environment was not consistent with the conservation of flora and fauna of the Slippery Lake A-Class Nature Reserve and based on the information available the risk from the on-going discharge of treated sewage at the current quality and quantity was unacceptable.

Based on this risk assessment, a revised Licence was granted on 14 September 2018. In consideration of the risks from the discharge of treated sewage, conditions were placed on the

Licence to limit the discharge of treated sewage from the sewage facility. The limit required that treated sewage is not discharged to the environment after 30 June 2023 at the current quality and quantity due to the unacceptable risk to the environment.

Additionally, several adjacent land parcels were classified by DWER in June 2018 as 'Possibly contaminated – investigation required' (PC-IR) under the *Contaminated Sites Act 2003* (CS Act) due to their use as a discharge channel for TWW. The Premises was not classified under the CS Act at that time. The Contaminated Sites classification identifies a requirement for further soil and groundwater investigations to delineate and characterise the nature and extent of site-related contamination.

## 2.3 Application summary

On 20 September 2022, the Licence Holder submitted an application to the department to amend Licence L6316/1991/13 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). Supporting information provided with the application contains detailed monitoring and site assessment data to address data gaps identified through the 2018 Licence review, which contributed to the unacceptable risk rating for the ongoing discharge of treated sewage to Slippery Lake. Amendments sought under this application are detailed below.

### 2.3.1 Discharge of TWW to Slippery Lake

The Licence Holder is seeking to authorise ongoing the discharge of treated sewage from the WWTP to the TWWDA. To address information gaps identified through the 2018 Licence review, the Licence Holder has conducted a detailed site investigation (DSI), with the intent of this to demonstrate that the ongoing discharge of treated sewage at the current quality and quantity will not have a measurable impact on the physical and ecological values of Slippery Lake. A summary of the Licence Holder's undertakings for the DSI, Licence Holder findings and the Delegated Officers conclusions on these findings are outlined below. Investigation levels that have be applied against contaminants of potential concern (COPCs) for varying relevant receptors are presented in Table 1.

During the amendment application assessment, it was identified that the department would require additional time to undertake a detailed risk assessment for the suitability of the ongoing discharge to Slippery Lake. The additional time required for the assessment was likely to extend past the cease date of 30 June 2023 for the discharge of treated wastewater (TWW) specified on the existing Licence.

As such, the department initiated an amendment to the existing Licence on 6 June 2023. The amendment was limited to extending the discharge cease date of 30 June 2023 by six months to 30 December 2023. This amendment was granted to the Licence Holder on 23 June 2023.

**Table 1: Investigation levels**

COPCs	Receptor	Investigation level (IL)
Metals Major Ions Nutrients	Human health – Surface water and Groundwater	<p>Consistent with the NEPM, where the CSM indicates that there may be public exposure to contaminants in surface water (or in groundwater where it discharges to a river, lake or estuary) via recreational activities, the Guidelines for Managing Risks in Recreational Water (NHMRC 2008) apply.</p> <p>Consistent with NHMRC (2008), DoH (2014) has specified that the non-potable use guidelines (NPUG) should be applied for the assessment of chemical substances in recreational waters, or groundwater that discharges to recreational waters. Where no published guideline was available for a particular compound, recreational guideline values were derived by applying a conservative 10-fold factor to the available drinking water guidelines.</p>

		<p>The following points are made with respect to ammonia, chloride, sulfate, aluminium, iron and zinc:</p> <ul style="list-style-type: none"> <li>• The non-potable use guidelines for ammonia, chloride, aluminium and iron presented in DoH (2014) are aesthetic-based guidelines.</li> <li>• The non-potable guideline for sulfate presented in DoH (2014) is less than 10x the drinking water standard value to account for potential health effects on livestock and domestic animals ingesting water under non-potable use scenarios.</li> </ul> <p>None of the guidelines for the above analytes are considered relevant to assessing risks due to recreational exposure within Slippery Lake or the TWWDA and are not considered further in the assessment.</p>
	<p>Ecology - Surface Water and Groundwater</p>	<p>Default guideline values published in ANZG (2018) are not considered applicable to temporary waters and saline inland lakes; however, in the absence of suitable guidelines, these have been adopted as ILs for screening purposes.</p> <p>The large-scale effects of altered hydrology in the wheatbelt have led to Slippery Lake becoming measurably degraded and it may be considered a highly disturbed system. On this basis, investigation levels based on a 90% species protection level (SPL) have been adopted (which is more conservative than the SPL of 80% recognised as being appropriate in the DWER decision report (DWER, 2018)).’</p> <p>Given that ecosystem conditions cover a broad range of salinities, the lowest of the fresh or marine water guidelines has been used for risk assessment purposes, as a conservative measure.</p> <p>Note that 95 % SPLs are also included in attached tables to enable a more conservative comparison with guidelines if required.</p> <p>As a conservative measure, a 99% SPL was applied to assess toxicants that are subject to bioaccumulation and biomagnification.</p>
	<p>Human Health - Soil and Sediment</p>	<p>HILs have been applied to both surficial soils and sediments to evaluate risks associated with exposure during use of the site (i.e. via direct contact with soils during digging etc).</p> <p>The following levels have been applied:</p> <ul style="list-style-type: none"> <li>• Commercial / Industrial Use: (relevant to the TWWDA and surrounds).</li> <li>• Recreational/Open Space: relevant to the TWWDA/Reserve areas and Slippery Lake.</li> </ul> <p>HILs for metals were sourced from NEPC (2013). No applicable human health guidelines for nutrients in soil or sediment.</p>
	<p>Ecology - Soil and Sediment</p>	<p>Sediment - As per ANZG (2018), the DGVs represent the concentrations below which there is a low risk of unacceptable effects occurring and are intended to be used along with other lines of evidence to protect aquatic ecosystems.</p> <p>Soil - While DGVs have been applied to assess risks associated with surface water processes within the TWWDA and Slippery Lake, EILs have also been applied as an additional measure to assess risks to ecological receptors, which may be more relevant to the TWWDA, or to samples representative of the deeper profile.</p> <p>The following levels have been applied:</p> <ul style="list-style-type: none"> <li>• Areas of ecological significance (relevant to Slippery Lake nature reserve).</li> <li>• Commercial / Industrial (possibly relevant to TWWDA).</li> </ul>



		EILs for metals were sourced from NEPC (2013). No applicable ecological guidelines for nutrients in soil or sediment.
Nutrients – physical and chemical stressors	Ecology - Surface Water and Groundwater	<p>Default guideline values (DGVs) published in ANZG (2018) are not considered applicable to temporary waters and saline inland lakes; however, in the absence of suitable guidelines, these have been adopted as ILs for screening purposes.</p> <p>Under the ANZG (2018), Australia and its coastal waters have been subdivided into 59 designated marine ecoregions (or so-called mesoscale bioregions), and 12 inland water drainage divisions. According to the online ANZG (2018) database, the site is located within the Southwest Coast inland water drainage division. At this juncture, no regional DGVs have been published to date for any of the 12 inland water drainage divisions.</p> <p>DGVs for physical and chemical stressors were therefore sourced from ANZECC &amp; ARMCANZ (2000), for slightly disturbed marine (inshore) ecosystems (i.e. Slippery Lake) or inland wetlands (TWWDA) to assess the risk of adverse indirect effects due to nutrients.</p> <p>It is important to note that DWER (2021) does not recommend using concentrations of nutrients in marine waters as indicators of ecosystem health, but instead recommends monitoring of productivity indicators (e.g. chlorophyll-a, algal biomass etc) as environmental quality guidelines.</p>
CAB Indicators	Human health – Surface water and Groundwater	<p>The following alert levels for the management of algae/cyanobacteria in recreational waters were sourced from NMHRC (2008):</p> <ul style="list-style-type: none"> <li>• Green Alert: ≥ 500 to &lt;5,000 cells/mL</li> <li>• Amber Alert: ≥ 5,000 to &lt;50,000 cells/mL</li> <li>• Red Alert: ≥50,000 cells/mL</li> </ul> <p>In addition, WHO (1999) includes a guideline of 20,000 cells/ML for human health concerns relating to CABs.</p>

**Key Finding:** The Delegated Officer considers that all adopted assessment criteria that the Licence Holder has assigned to determine investigation levels for COPC within samples are acceptable.

**Wastewater (WW) / treated wastewater (TWW) contaminant loadings**

The Licence Holder has conducted sampling and analysis of wastewater (WW) and treated wastewater (TWW) within the WWTP over three seasonal monitoring events, being late wet season (September 2020) dry season (March 2021) and mid wet season (July 2021). The intent of this sampling was to obtain better understanding of contaminant loadings within WW and TWW. The results from this sampling against the investigation levels applied for each COPC are summarised in Table 2 below.

The Licence Holder has outlined the following key points from this data summary:

- There were no exceedances of health-based recreational ILs for human health.
- Concentrations of most dissolved metals (including mercury (non-existent) and selenium) were below the ecological and/or recreational ILs, with the exception of aluminium, copper and zinc.
- PFAS (PFOS) concentrations in TWW were generally higher than reported in WW, except in July 2021, where maximum PFAS concentrations were recorded.
- The composition of PFAS was variable across the study period.

- Several perfluoroalkyl carboxylic acids (PFCAs) were detected, including perfluorooctanoic acid (PFOA), which was reported below the adopted ecological and recreational ILs.
- Several Perfluoroalkyl Sulfonic Acids (PFASs) were detected, including perfluorooctanesulfonic acid (PFOS), which exceeded the ecological ILs (>1,000-fold in WW and <1,000 in TWW).

The Licence Holder considers that the contaminant loadings within WW and TWW are now adequately understood as a result of the data obtained through the three sampling events.

**Table 2: Summary of WW and TWW IL exceedances**

Analyte	IL	Sep-20		Mar-21		Jul-21	
		WW	TWW	WW	TWW	WW	TWW
<b>Nutrients (mg/L)</b>							
NH <sub>3</sub> -N <sup>1</sup>	0.9	65.4	<0.01	78.3	1.2	24.1	6.89
NO <sub>x</sub> -N <sup>2</sup>	0.005	<0.01	3.86	<0.01	<0.01	2.64	13.1
TN <sup>2</sup>	0.23	67.1	16.2	89	11.9	38.4	35
TP <sup>2</sup>	0.02	8.21	8.2	18.3	15.2	5.3	8.31
ORP <sup>2</sup>	0.005	7.37	8.0	17	13	4.0	7.38
<b>Cyanobacterial Indicators (mg/m<sup>3</sup>)</b>							
Chlorophyll-a <sup>2</sup>	0.7	2	1,830	5	329	3	1,430
<b>Microbial Pathogens (CFU/100 mL)</b>							
<i>E. Coli</i> <sup>3</sup>	1,000	4,300,000	650	6,800,000	700	42,000,000	4,700
<i>Enterococci</i> <sup>3</sup>	40	290,000	120	610,000	260	360,000	1,200
<b>Metals (mg/L)</b>							
Aluminium <sup>1</sup>	0.0008	0.033	0.028	0.09	<5	0.216	0.014
Cobalt <sup>1</sup>	0.001	<0.0001	0.0000004	0.003	0.0007	0.0011	0.0004
Copper <sup>1</sup>	0.0013	0.0083	0.114	0.0522	0.0977	0.0121	0.0628
Zinc <sup>1</sup>	0.012	0.039	0.002	0.014	0.0016	0.027	0.004
<b>PFAS (ug/L)</b>							
PFOS <sup>1</sup>	0.00023	0.02	0.06	<0.01	0.02	0.28	0.03

Notes:   = below all adopted criteria   = ≤10 fold above IL   = ≤100 fold above IL   = ≤1000 fold above IL   = >1000 fold above IL. ILs are the lowest value of the marine/freshwater ecological ILs per Table 4-5 <sup>1</sup> toxicant IL; <sup>2</sup> physical stressor GIL; <sup>3</sup> recreational IL.

**Key Finding:** The Delegated Officer notes frequent exceedances in the adopted investigation levels for both wastewater and treated wastewater. The Delegated Officer considers that treatment processes for wastewater in place at the plant result in some removal of CoPCs and a 4-log reduction in pathogens prior to infiltration and/or discharge, indicating a basic level of treatment is occurring.

**Groundwater characterisation**

To better understand groundwater depth, flow direction, and any potential impacts to groundwater arising from WW / TWW seepage, the Licence Holder installed an additional 11 groundwater monitoring bores in the vicinity of the premises, the TWWDA, and Slippery Lake. The bores were installed in September 2020 and their locations are outlined in Figure 1 below.

The bores were sampled during three cross season monitoring events, being September 2020, March 2021, and July 2021.

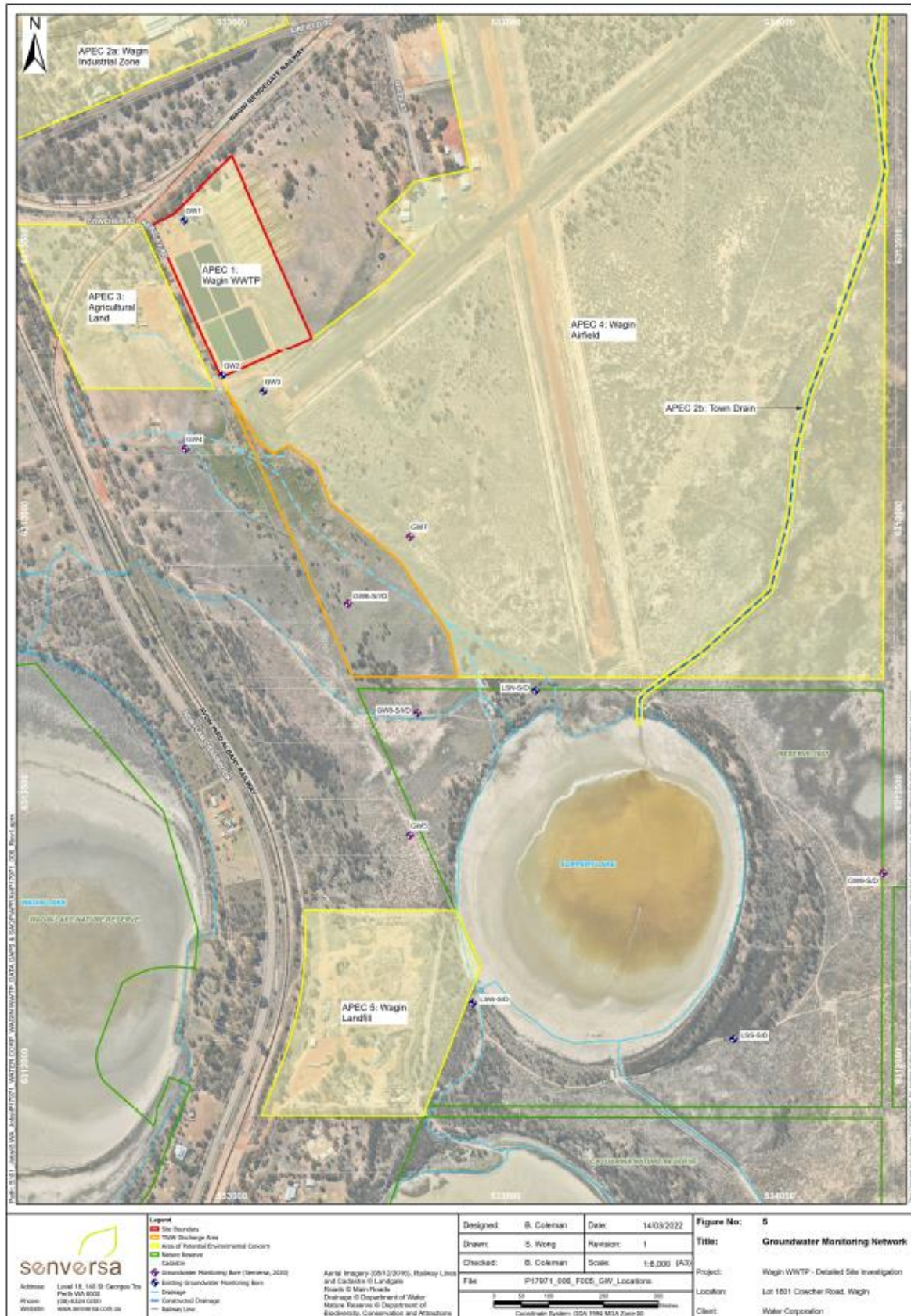


Figure 1: Groundwater monitoring network



During the construction of the bores within the TWWDA, soils were observed to be saturated within the upper 1 – 2.5 m of the soil profile, which was interpreted to relate to rainfall conditions during drilling. The soils were consistently saturated by approximately 6.5 mBGL. To assess the presence of groundwater within the shallow horizon, bores GW6, GW8 and GW9 were installed as a multi-well cluster.

Results from the groundwater monitoring bore installation summary indicate that there is minimal differences in groundwater elevations for the clustered wells within the upper 9m of the aquifer, which suggest the presence of a continuous shallow aquifer. Groundwater elevation within bores with a deeper screened interval (being bores LSN-D, LSS-D and LSW-D), were slightly higher than within the shallow aquifer, suggesting the confinement of a deeper groundwater system.

Groundwater flow direction for both the shallow and deep aquifers is assumed to be broadly south-easterly, migrating from the WWTP and TWWDA in the direction of Slippery Lake. It is therefore assumed that groundwater beneath the TWWDA may discharge to Slippery Lake.

Groundwater elevation level was calculated using level loggers installed in two bores (GW8 and LSN-S) between 25 September 2020 to 29 March 2021. Data obtained from within this time period demonstrated that both bores were responsive to rainfall events and saw rapid increases in water levels after rain.

Field parameters in groundwater samples taken during the three cross season monitoring events were relatively consistent. Groundwater is saline to hypersaline, with the lowest salinities observed within GW1 (up hydraulic gradient of the WWTP) and GW4 (cross-hydraulic gradient of the WWTP). The highest salinity was observed in GW9-S (to the east of Slippery Lake).

As a result of these findings, the Licence Holder considers that groundwater quality is adequately characterised and delineated across the seasonal range to inform the risk evaluation.

**For noting:** The Delegated Officer has referred the application and supporting documents to groundwater technical experts within DWER for comment.

Technical experts have provided the following comments in relation to groundwater characterisation:

1. The general direction of groundwater flow, which shows the results of groundwater monitoring, appears to show groundwater beneath the WWTP flows in the direction of Slippery Lake indicating that the WWTP may be a source of contamination to Slippery Lake, as indicated in Figure 2. This Figure is misleading, however, as there are not enough groundwater monitoring bores in the vicinity of the WWTP to draw groundwater contours with a high level of confidence or to triangulate the direction of groundwater flow in this area. In particular, the construction of the 248.4 mAHD groundwater contour to follow an ephemeral creek line is not hydraulically feasible.
2. It is considered more likely that there is a groundwater mound beneath the treatment ponds at the WWTP, and that groundwater contours to the south of these ponds would trend in a more southerly direction than shown in Figure 2. That is, it is considered to be likely that there would be a component of groundwater flow from these ponds towards Slippery Lake.
3. It is also considered to be likely that the rate of groundwater flow from the ponds towards Slippery Lake would be very slow, and that contaminants from the WWTP would be subject to extensive natural attenuation processes before arrival at the lake. This would, however, have to be demonstrated through additional groundwater monitoring in the area.





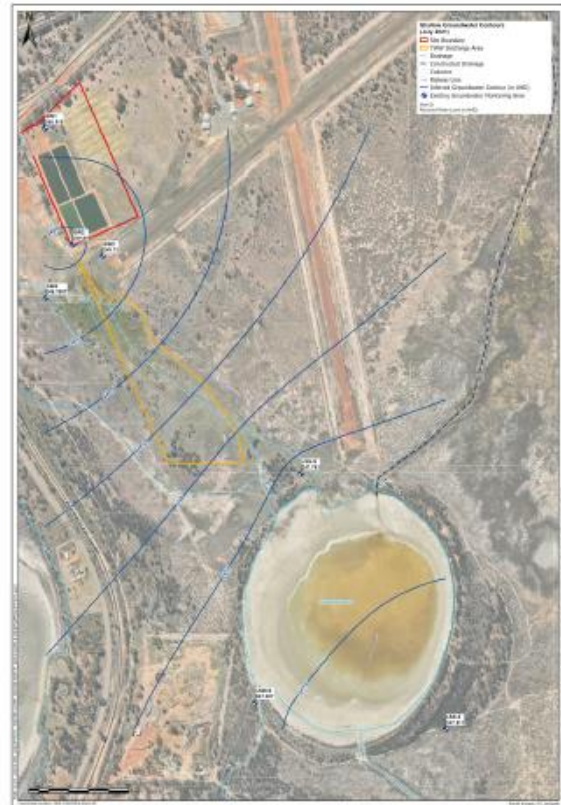
Shallow Aquifer (September 2020)



Deeper Aquifer (September 2020)



Shallow Aquifer (March 2021)



Shallow Aquifer (July 2021)

Figure 2: Inferred groundwater flow direction

### **Nature and Extent of Groundwater Impacts**

The 11 additional groundwater bores installed in September 2020 were sampled using a low-flow method and groundwater was analysed for nutrients, metals, chlorophyll, pathogens, major ions, per- and polyfluoroalkyl substances (PFAS)) during the three cross season monitoring events, being September 2020, March 2021, and July 2021. The intent of this sampling was to determine whether any impacts to groundwater were occurring as a result of the migration of COPC from the WWTP, and the extent of these impacts if recorded.

A comparison of sampled parameters against their respective adopted ILs is summarised as follows.

- Nutrients:
  - All nutrient concentrations were below the adopted health-based recreational ILs and toxicant ILs for both marine and freshwater systems.
  - TN concentrations exceeded the physical stressor IL (<10-fold) at all wells except for GW01 (up hydraulic gradient of the site).
  - TP concentrations exceeded the physical stressor IL at several wells, but did not exceed the IL at GW1 (up-hydraulic gradient), GW2 and GW3 (down hydraulic-gradient of the site) and GW8-S, I, D (within the TWWDA).
  - While TN concentrations at GW2 and GW3 (immediately down-hydraulic gradient of the site) were higher than those at GW1 (up-hydraulic gradient), they were also within the range of background and cross-hydraulic gradient concentrations, suggesting seepage from the treatment ponds is having a minimal effect on groundwater quality.
  - Nutrient concentrations in groundwater beneath the TWWDA and Slippery Lake were generally within the range of background/cross-hydraulic gradient concentrations, with maximum TN and TP concentrations in groundwater 10-fold to 100-fold below TWW concentrations, respectively.

**Key finding:** The Delegated Officer has referred the application and supporting documents to groundwater technical experts within DWER for comment. Technical advice received advises that:

‘The magnitude of nitrogen and phosphorus concentrations that were measured in groundwater samples are comparable with nutrient concentrations that have been measured elsewhere in agricultural areas in the Wheatbelt. Additionally, the observed distribution of nutrient concentrations does not appear to show a clear association with the WWTP. That is, the existing groundwater monitoring data show no evidence that the WWTP is a significant source of nutrient contamination in groundwater.’

However, technical experts consider that three cross seasonal monitoring events may not have provided sufficient information to draw accurate long-term conclusions in relation to nutrient concentrations and migration.

- Pathogens:
  - E.coli and Enterococci concentrations were either at or below the LOR in all groundwater samples analysed in all monitoring events, with the exception of GW02 in July 2021, where both exceeded the IL
- Metals
  - Aluminium, copper and zinc all exceeded the ecological ILs (marine and/or freshwater) in one or more wells.
  - Maximum copper and zinc concentrations were reported in wells GW2 and GW3, immediately down-hydraulic gradient of the site.
  - Metal concentrations in groundwater beneath the TWWDA and Slippery Lake were within the range of cross-hydraulic gradient or background wells.
  - Concentrations of metals were generally consistent across all monitoring events.

**Key finding:** The Delegated Officer has referred the application and supporting documents to groundwater technical experts within DWER for comment. Technical advice received advises that:

'The pH of groundwater in the Tertiary aquifer is acidic and has a comparable level of acidity to similar aquifers elsewhere in the Wheatbelt region. The acidity is probably due to the partial oxidation of naturally occurring sulfide minerals in the aquifer matrix, and this is likely to have released elevated concentrations of some metals into groundwater (particularly dissolved aluminium).

The observed distribution of metals in groundwater near the WWTP is consistent with a natural source for these chemical constituents, and there is currently no evidence that the treatment plant is a significant source of metal contamination in groundwater.'

However, the Delegated Officer considers that three cross seasonal monitoring events may not have provided sufficient information to draw accurate long-term conclusions in relation to metal concentrations and migration.

- **PFAS:**
  - Several PFAS compounds were detected in groundwater, with maximum concentrations consistently reported at GW2, immediately down-hydraulic gradient of the site.
  - Several PFCAs were detected, including PFOA, which was reported below the ecological and recreational ILs.
  - Several PFSA's were detected, including PFOS, which exceeded the ecological IL at GW2 (immediately down-hydraulic gradient of the site), LSW-S (down-hydraulic gradient of the Wagin landfill), GW6-D (within the TWWDA) and LSN-S (Slippery Lake Nature Reserve).
  - The sum of PFHxS and PFOS was below the recreational IL at all wells during all sampling events.

**Key findings - Conclusions:** The Delegated Officer has referred the application and supporting documents to groundwater technical experts within DWER for comment. Regarding these comments, the Delegated Officer has drawn the following conclusions in consideration of the ongoing regulation and monitoring of potential impacts to groundwater:

1. It is currently difficult to distinguish distinct sources of groundwater contamination near the WWTP. This is because historical waste disposal and agricultural land use in the area is likely to have produced leachate with a similar chemical composition to treated wastewater discharged from the facility. Consequently, elevated concentrations of nitrogen compounds detected in groundwater in the area could be from a variety of sources.
2. Given the current absence of evidence to demonstrate the WWTP's contribution to groundwater contamination, the below additional information would be required to clearly indicate that the WWTP is the source of elevated concentrations of chemical constituents in groundwater, including:
  - a. A trend of increasing concentrations of chemical constituents in groundwater samples collected immediately downgradient of the WWTP by comparison with monitoring bores that are located immediately upgradient and cross-gradient from the facility; and
  - b. The presence of elevated concentrations of specific chemical constituents in groundwater that are commonly present in treated municipal wastewater, but are rarely present in groundwater contamination from other sources.
3. In particular, including a suite of specific chemical constituents in the groundwater



monitoring program that would clearly identify the WWTP as a source of contamination would have increased the level of confidence in the results that were obtained from the Licence Holders investigations. Specific chemical constituents in groundwater that could be used to “fingerprint” the WWTP as a distinct source of contamination include:

- a. Elevated concentrations of boron compounds (from washing powders);
- b. The presence in groundwater of specific artificial sweeteners (such as sucralose) that are resistant to wastewater treatment;
- c. The presence of caffeine in groundwater samples;
- d. The presence in groundwater of specific pharmaceutical compounds that are resistant to wastewater treatment; and
- e. The presence of an elevated ratio of rubidium/strontium in groundwater samples

As a result of this, and given that only three sampling events have been undertaken, the Delegated Officer considers that further groundwater monitoring is required to clearly identify the potential contribution of the WWTP to groundwater contamination in the area.

Despite this, however, concentrations of chemical constituents of concern in groundwater near the WWTP are considered to be generally low.

### **Surface water characterisation and flow model**

To better understand surface water inputs to Slippery Lake, the Licence Holder has undertaken a detailed water balance study for Slippery lake, which receives inputs from the following sources:

- Town Drain
- Airfield Drain
- West Catchment (from land west of the TWWDA which includes the Wagin Landfill)
- Direct rainfall
- TWWDA
- Groundwater discharge.

The study has been undertaken with regard to field observations at the site, which indicate that:

- There are no discernible drainage channels directly connecting the TWWDA and Slippery Lake, indicating that the overland flow connection can only occur via sheet-flow during saturated conditions; and
- TWW only potentially enters Slippery Lake during high-rainfall events, when the catchment between the TWWDA and Slippery Lake is saturated / waterlogged.

The water inputs to Slippery lake, their assumed entry points and surface water loggers used for the water balance study are indicated in Figure 3. It is important to note that the water balance model is conservative, given that it assumes that flow will occur from the TWWDA to Slippery Lake with no loss of water to evaporation or infiltration.





**Figure 3: Water inputs to Slippy Lake and water level loggers**

Findings from the water balanced are summarised as follows:

- No flow is interpreted to have occurred at Bund Breakthrough 1 and 2, although it is noted that Bund breakthrough 1 was waterlogged for a period in mid 2021.
- The west catchment discharge was visually observed to have a minor flow into Slippy Lake in early June 2021.
- It was not possible to directly measure flow of TWW from the TWWDA to Slippy Lake due to the very flat nature of the ground surface and lack of a defined flow channel. As such, inputs from the TWWDA were estimated using a mass balance approach.
- A comparison of the modelled TWW that may discharge to Slippy Lake with the total TWW volumes discharged from site indicates that on average, approximately 10% of the TWW volumes discharged to the TWWDA may enter Slippy Lake.
- The estimate of TWW that potentially reaches Slippy Lake is dependent on rainfall, with higher volumes expected in wetter months.

To characterise the surface water inputs to Slippy Lake, the Licence Holder undertook a surface water sampling and analysis program. The program involved monthly sampling across the wet season and one sampling event in the dry season, with 14 samples collected for each sampling event from across the TWWDA, Slippy Lake, the Town Drain, Airfield Drain. Sampling locations are outlined in Figure 4.



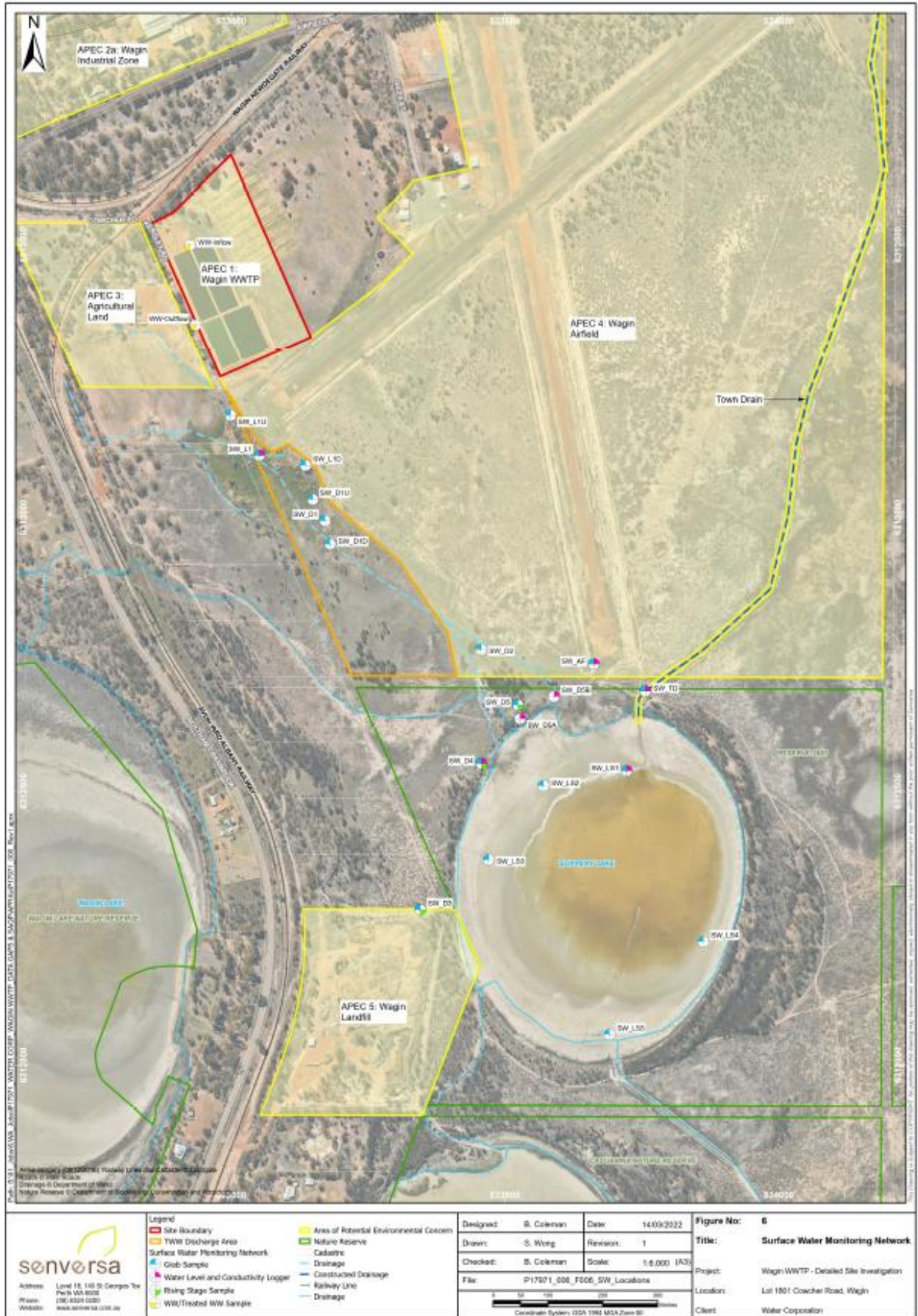


Figure 4: Surface water sampling locations

The surface water field parameter findings may be summarised as follows:

- Surface water salinity within the TWWDA was fresh to marginal and was relatively consistent throughout the monitoring period.
- Salinity within Slippery Lake ranged from brackish to hypersaline at SW\_LS4 in December 2020. This showed a similar range and temporal trend to the reference lakes.
- Drainage water within the Town Drain was saline to highly saline (6,033 mg/L in July 2021 to 17,781 mg/L in September 2021), while drainage in the Airfield Drain was brackish to saline.
- Redox conditions were generally oxidising within Slippery Lake however conditions tended to become more reducing over the late 2021 wet season.

**Key finding:** The Delegated Officer has referred the application and supporting documents to technical experts within DWER for comment. Technical advice received is that:

'The results of the water balance assessment to quantify the average annual amount of surface runoff that would flow from the wastewater discharge area appear to be accurate. This assessment indicated that surface runoff is a relatively small component of the overall water balance for the area, and that most of the discharge to the area is lost by evaporation.

However, the Delegated Officer considers that even infrequent flow events have the potential to carry large amounts of chemical constituents from treated wastewater to Slippery Lake, both in dissolved form and adsorbed to suspended particles that are transported by surface flow.

Additionally, the importance of this potential transport pathway for chemical constituents from the wastewater disposal area to Slippery Lake is not adequately understood and requires verification through ongoing monitoring.

### **Use of 'Reference lakes'**

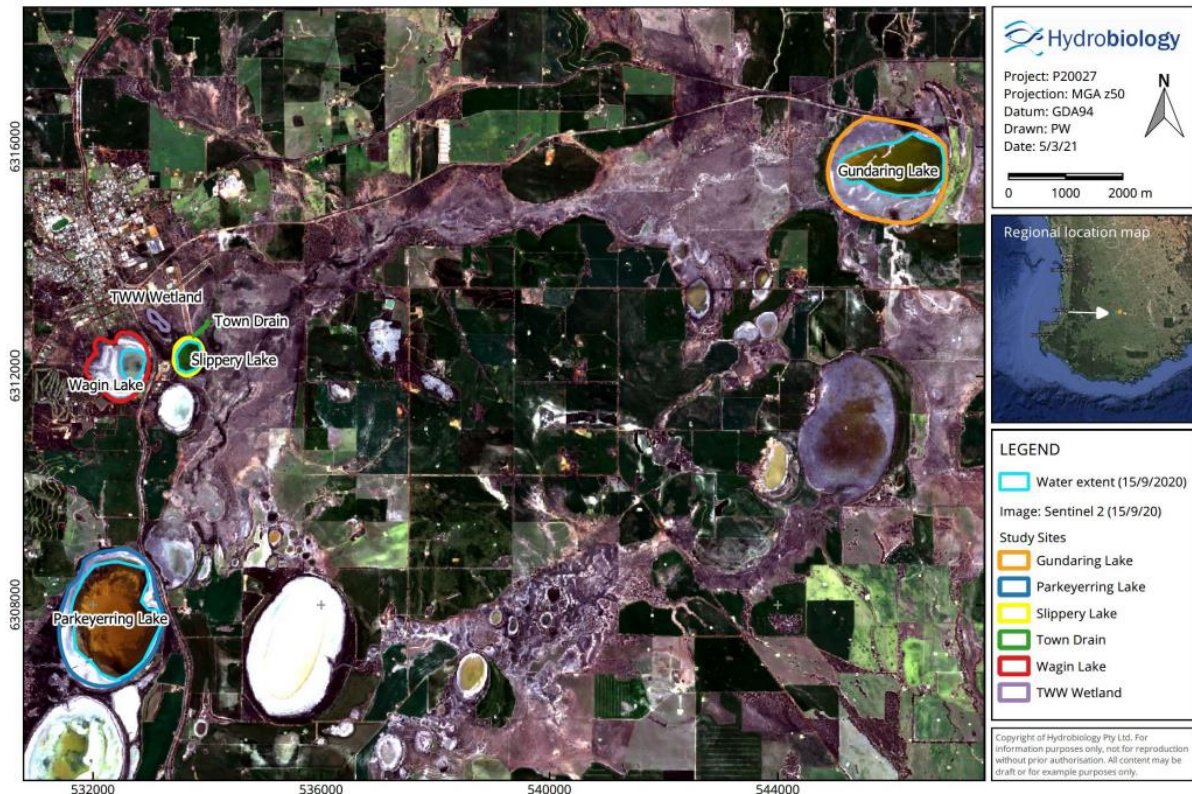
To establish whether surface water inputs to Slippery Lake are affecting the concentration of nutrients and other COPC within Slippery Lake, the Licence Holder has also taken samples from three nearby salt lakes (being Lake Wagin, Lake Gundaring and Lake Parkeyerring) with the intent that these samples provide background concentration levels for a regional salt lake for comparison with Slippery Lake. The key difference between Slippery Lake and the reference lakes, for the point of comparison, is the additional surface water impacts. The locations of the reference lakes in relation to Slippery Lake are outlined in Figure 5.

The Licence Holder has applied the following criteria for selecting these three lakes for use as 'reference lakes' throughout the supporting information:

- Both Gundaring and Parkeyerring Lakes are within Class A Nature reserves, and Wagin Lake is vested as a nature reserve;
- The lakes are located within the same catchment as Slippery Lake and are hence representative of regional conditions;
- The lakes share a similar natural period in which they will refill, with the exception of inputs to Slippery Lake from the town drain;
- The lakes do not have point source nutrient inputs; and
- The suitability of the lakes was confirmed through attendance to the lakes in site visits.

The Licence Holder notes that despite Slippery Lake being a Class A Reserve, the area is highly disturbed, and there are no known lakes in the region that have not been impacted by vegetation clearing, dryland salinity, sedimentation or other drainage / hydrology changes over the last 100 years or so of agricultural practices across the region. It is also noted that as Wagin Lake is located closer to the Wagin townsite, the lake may be subject to inputs from contaminated groundwater or surface water infiltration. However, since Wagin Lake does not have point sources of nutrient impact it is still considered appropriate for use as a reference lake.





**Figure 5: Reference Lake locations in relation to Slippery Lake**

**Key finding:** The Delegated Officer has referred the application and supporting documents to technical experts within DWER for comment. Technical advice received is that:

‘It is agreed that the environmental values of Slippery Lake have been degraded by the effects of land salinisation in the region.’

Although environmental values of Slippery Lake have been degraded, DWER does not support allowing the current wastewater disposal practice to continue without significant changes taking place should it be demonstrated that current practices are contributing to further degradation of Slippery Lake.

This is because, despite its degraded nature, Slippery Lake has been classified as an A-class reserve. This means that under provisions of the *Land Administration Act, 1997*, the lake and surrounding land “...holds intrinsic community value or is of high conservation value that should be preserved and maintained for the benefit of future generations”.

Consequently, State government agencies and public utilities have an obligation to minimise the risks of any potential harmful impacts taking place on Slippery Lake, despite its current degraded nature. It also means that a comparison of the ecological status of Slippery Lake with other wetlands is largely irrelevant.’

The Delegated Officer acknowledges that the use of reference lakes to assess the ecological status of a particular wetland is a valid concept. However, it is also considered that natural variation between the lakes, including overall inputs from differing sources and the varying sizes and hence dilution potential of the lakes, may create unseen variables that can affect results obtained through sampling.

As such, whilst the Delegated Officer will consider sampling results from Slippery Lake compared to sampling results obtained from the reference lakes, it should be noted that the reference lakes themselves will differ in concentrations and may not provide an accurate overview of true background concentrations with ground and surface water in the vicinity of



Slippery Lake.
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### **Nature and Extent of Surface Water/Drainage Impacts**

Samples taken under the surface water sampling and analysis program were also analysed for a suite of nutrients, metals, chlorophyll, pathogens, major ions, biological oxygen demand (BOD) and PFAS. The intent of this sampling was to determine whether any impacts to Slippery Lake were occurring as a result of the migration of COPC from the WWTP through surface water, and the extent of these impacts if recorded.

A comparison of sampled parameters against their respective adopted ILs is summarised as follows.

- Nutrients:
  - TN and TP concentrations were highest in the TWWDA at SW\_L1 and comparable with TWW.
  - TN showed a marked decrease with distance from the site, with concentrations at SW\_D4 being approximately a third of that recorded at SW\_L1.
  - TP concentrations were highest at SW\_D4 which indicative of west catchment and TWWDA flows, with concentrations being approximately half of that recorded at SW\_L1.
  - TN concentrations reported in the reference lakes under late 2020 wet season conditions were up to five times higher than observed in Slippery Lake; however, concentrations in the 2021 late wet season were generally comparable.
  - TN concentrations were highest during the late 2020 wet season sampling events, and were broadly consistent during the 2021 wet season, with slight increases observed as conditions moved to drying in October 2021.
  - TN concentrations exceeded the physical stressor IL at all sample locations. The greatest exceedances were observed in the TWWDA (at SW\_L1) and Gundaring and Parkeyerring Lakes (<200-fold), while exceedances at Slippery Lake ranged from 40- to 150-fold.
  - TP concentrations exceeded the physical stressor IL in all samples (<4,000-fold at the discharge point SW\_L1 in the TWWDA, and <83-fold at Slippery Lake and 75-fold in the reference lakes).
- Chlorophyll-a (indicator for cyanobacteria):
  - Chlorophyll-a was measured in surface water grab samples taken across 6 sampling events staggered cross seasonally between 1 November 2020 and 1 November 2021
  - Concentrations of chlorophyll-a were above the IL for all samples collected at all sample locations within the TWWDA, however there were several sampling events where it was not detected in Slippery Lake
  - Maximum chlorophyll-a in the TWWDA was reported at SW\_L1.
  - Chlorophyll-a results at SW\_L1 were relatively consistent over time.
  - Maximum concentrations of chlorophyll-a at Slippery Lake were observed in September 2020. Chlorophyll-a concentrations in Slippery Lake decreased with time over the 2021 wet season.
  - While chlorophyll-a concentrations in the reference lakes were initially lower than reported in Slippery Lake, concentrations over the 2021 wet season were slightly higher than in Slippery Lake.
- Microbial pathogens:
  - *Enterococci* concentrations were highest in samples from the TWWDA and at SW\_D3 (adjacent to Wagin Landfill).
  - *Enterococci* concentrations within Slippery Lake were marginally higher than those recorded across the reference lakes.

- *Enterococci* concentrations exceeded the adopted recreational IL in the TWWDA, Slippery Lake, the town drain and the reference lakes, indicating that there may be a potential risk to the health of recreational users.
  - No clear trend was established between *Enterococci* concentrations and rainfall.
  - *E.coli* concentrations exceeded the recreational IL within the TWWDA only.
  - Concentrations of *E.coli* were generally lower in Slippery Lake compared to the reference lakes, suggesting that outside of the TWWDA, elevated *E.coli* may be unrelated to site activities.
- Metals:
    - Metal concentrations typically exceeded the ILs by double in Slippery Lake, the reference lakes and other sampling areas, and by 10-fold in the TWWDA.
    - Concentrations of aluminium, cobalt, copper, lead, manganese, nickel and zinc exceeded the ecological ILs in one or more samples from all sampling areas.
    - Mercury and selenium concentrations were below the ILs in all samples analysed.
    - Maximum concentrations of aluminium, copper and zinc were consistently higher in samples from the TWWDA compared to Slippery Lake and the reference lakes.
    - Concentrations of aluminium peaked in July 2021 (TWWDA) and September 2021 (Slippery Lake)
    - Zinc concentrations were higher in all sample areas compared to Slippery Lake
  - PFAS:
    - Concentrations of all PFAS compounds were below the adopted recreational ILs
    - PFOS broadly exceeded the ecological IL (applied at the 99% SPL) in samples recovered from the TWWDA, Slippery Lake, Town Drain, Wagin Airfield, Wagin Landfill, and Wagin Lake.
    - The PFAS composition and concentrations in WW and TWWDA were relatively similar.
    - PFAS observed in Wagin Lake, the Wagin Landfill, Town Drain and Airfield Drain exhibited a different composition to that found in WW and TWWDA.
    - Total PFAS concentrations within Slipper Lake were lower than reported in the TWWDA.

**Key finding:** The Delegated Officer has referred the application and supporting documents to technical experts within DWER for comment. Technical advice received is that:

'In addition to measuring surface flows, it is important that water quality is assessed for the early stages of a surface flow event from the wastewater disposal area to Slippery Lake. This is because this is the time-period where the quality of the surface runoff is likely to be particularly poor. Consequently, it is recommended that several passive automatic water samplers are employed along the surface channel between the treated wastewater disposal area and Slippery Lake to obtain water samples at the onset of a flow event.

The ongoing monitoring of the quality of surface runoff, together with flow rates and the duration of flow-events, would enable the contaminant loads that are discharged in runoff to Slippery Lake to be better quantified.'

The Delegated Officer will consider this advice when setting conditions in the revised Licence.

### **Environmental Conditions within Slippery Lake**

To determine the ecological conditions within Slippery Lake the Licence Holder has provided the results of an ecological study for five sample sites, being Slippery Lake, the TWWDA and the reference lakes. Due to the ephemeral nature of salt lakes, Wagin Lake was dry during 4 of the 9 sampling rounds, Gundaring Lake was dry 1 out of the 9 sampling rounds, Parkeyerring Lake was dry 2 out of the 9 sampling rounds and Slippery Lake was dry 2 out of the 9 sampling rounds, resulting in limited aquatic ecology variables that were able to be surveyed. The intent of this study was to determine whether the TWW discharge is impacting Slippery Lake through

an association with algal blooms.

The sites were sampled during September to October 2020 to reflect the late wet season / recessionary season. Ecological parameters sampled for included bioindicators of water quality, food sources / toxicant pathways, ecological receptors of conservation concern and parameters used to assess cyanobacterial bloom risk. The results from this study were also compared to results obtained to a previous ecological study undertaken by the Licence Holder in 2014, although it should be noted that the TWWDA was not sampled at this time.

Results are summarised as follows:

- The Slippery Lake phytoplankton community was dominated by halophilic/salt-tolerant diatom species and no cyanobacteria were identified.
- The Slippery Lake and reference lake phytoplankton communities and ecology were distinct from that of the TWWDA, which was fresh to brackish and containing a significantly higher diversity of aquatic flora and fauna.
- The two reference lakes that were not dry (being Parkeyerring and Gundaring Lakes) contained phytoplankton species more tolerant of hypersaline conditions than Slippery Lake, indicating freshwater inputs to Slippery Lake may be affecting the phytoplankton community.
- Phytoplankton communities in the TWWDA were dominated by species that prefer fresh water, as opposed to those that prefer salinity which were found across the salt lakes.
- A toxic freshwater cyanobacteria species was detected in samples from the TWWDA and not detected in any of the lakes. Two non-toxic cyanobacteria were present at a reference lake (Gundaring Lake), indicating the potential for cyanobacteria to occur without TWW inputs.
- Diatom communities were highly distinct between all sampling locations and there were no species in common between the sites.
- The species richness of diatoms was relatively high at all sites when compared to other hypersaline lakes in the Wheatbelt area.
- The degree of diatom community similarity between Slippery Lake and the TWWDA was minimal and falls within the range of similarity the reference lakes also display with the TWWDA.
- Analysis of macroinvertebrate communities indicated that Slippery Lake was within the range expected for salt lakes and sampled parameters were within the range of the reference lakes.
- The TWWDA was inhabited by macroinvertebrate species that are more sensitive to changes or degraded water quality than Slippery Lake.
- The TWWDA had the highest species richness of avifauna, followed by Slippery Lake, which was expected given the decrease salinity noted across these two environments.

The Licence Holder included key ecological parameters in routine sampling undertaken to October 2021 to ensure ecological monitoring was undertaken during peak wet season conditions. This included the monitoring of physio-chemical parameters and cyanobacterial indicators within Slippery Lake surface water. These results can be summarised as follows:

- Cyanobacteria were observed in low numbers in Slippery Lake in three out of six sampling events, with the numbers within the range of the reference lakes.
- The significant difference in salinity between Slippery Lake and the TWWDA would prevent the direct transfer of any benthic algae species, indicating the risk of negative effects from algal blooms within Slippery Lake would be low.
- Cyanobacterial counts marginally exceeded the NHMRC (2008) guidelines range for 'surveillance' for one monitoring event, however similar exceedances were seen in the reference lakes.
- Biochemical Oxygen Demand (BOD) was significantly higher in Slippery Lake than the

reference lakes.

- BOD concentrations within the TWWDA were highly variable and ranged from 8 mg/L to 1,490 mg/L
- BOD values in Slippery Lake are more likely to be driven by in-situ primary production from benthic algae and associated biomass production, than direct inputs from the TWWDA.

Additional data obtained during this time period supported the ecological study's conclusions that Slippery Lake's ecology is similar to the ecology of the reference lakes, indicating that that TWW discharge is having little to no detectable impact on the ecology of Slippery Lake.

**Key finding:** The Delegated Officer consider that the following data gaps remain in relation to ecological monitoring:

1. A comprehensive ecological study has only been undertaken during the late wet season. Higher surface water flows during the peak wet season are expected to increase the likelihood of hydrological connectivity between the TWWDA and Slippery Lake and therefore increase the potential for nutrient and contaminant transportation to Slippery Lake. Whilst the Licence Holder has undertaken limited additional monitoring over the peak wet season, detailed results have not been provided during the time frame at which Slippery Lake is at the highest risk of impact from discharges of TWW.
2. Limit study has been undertaken to characterise the magnitude and frequency of surface flow events between the TWWDA and Slippery Lake, where there is potential for large amounts of nutrients and contaminants from TWW to enter Slippery Lake.
3. There is limited understanding on the capacity of the TWWDA to extract contaminants prior to the discharge entering Slippery Lake. Sampling results indicate that the capacity of the TWWDA to extract nutrients is approximately 3-fold for nitrogen and 2-fold for phosphorus, however this will need to be validated through further monitoring.
4. Ongoing monitoring will be required to verify preliminary findings of the ecological study, as samples obtained during the sampling period may not be representative of ecological or environmental conditions across the lakes and the TWWDA long term.
5. The reference lakes and Slippery Lake were dry for multiple sampling rounds and across different sampling rounds, meaning that data obtained across the sampling period is not consistent between the lakes. Comparison with only two reference lakes, considering that natural variation will also exist within the sampling areas, may not have provided an accurate representation of comparison with background salt lake concentrations within the Wheatbelt.

Where information required to inform decision making is limited, a premises may be subject to a higher degree of regulatory control, as specified in the *Industry Regulation – Guide to Licensing*.

The Delegated Officer will consider the significance of these data gaps when setting conditions in the revised Licence.

### 2.3.2 Changes to monitoring program

In light of the above supporting information, the Licence Holder has proposed the following changes to current monitoring conditions specified on the exiting Licence.

#### **Groundwater sampling frequency**

The Licence Holder considers that results from the DSI indicate that TWW inputs to groundwater are unlikely to cause negative impacts to Slippery Lake as groundwater concentrations down-



hydraulic gradient of the WWTP were within the range of background concentrations. As such, the Licence Holder proposes that the Department amend current groundwater monitoring sampling frequency from quarterly to bi-annually.

### **Surface water monitoring**

From the results of the DSI, the Licence Holder considers that there is a need for the continued assessment of the discharge of TWW from the TWWDA to Slippery Lake. As such, the Licence Holder is proposing to implement a surface water monitoring program for the surface water at Slippery Lake and within the TWWDA where samples are taken at critical surface inflow areas to Slippery Lake between the months of May to November, when surface water flows are likely to be present. This monitoring will be undertaken with the intent that it will assist the Licence Holder in managing the ongoing discharge of TWW. The Licence Holder proposes to reflect this monitoring program through the addition of new monitoring conditions on the Licence.

**Key finding:** Technical advice received considers that ‘surface water flows as a potential transport pathway for chemical constituents from the wastewater disposal area to Slippery Lake are not adequately understood. Consequently, the Licence Holder’s recommendation to undertake surface water monitoring at critical surface inflow areas to Slippery Lake is supported. This would help quantify the magnitude and frequency of surface flow events, and would indicate how they change over time. It is recommended that at least one such flow gauging site is installed in the wastewater discharge area to determine how quickly surface flows occur in response to rainfall in this area, where soils are permanently saturated.

The ongoing monitoring of the quality of surface runoff, together with flow rates and the duration of flow-events, would enable the contaminant loads that are discharged in runoff to Slippery Lake to be better quantified.’

The Delegated Officer will consider this matter when setting conditions in the revised Licence.

### **2.3.3 DWER initiated amendments**

The Delegated Officer has reviewed the existing Licence and considers the following changes to conditions should be included under this amendment.

#### **Removal of redundant conditions**

Through the 2018 Licence review it was identified that the groundwater data being obtained through the existing Licence conditions was insufficient to make definitive conclusions on the likelihood of contaminants migrating through the shallow aquifer to Slippery Lake. Separation distance between the base of ponds at the premises and groundwater had also not previously been determined.

As a result of this finding, the following additional regulatory requirements were implemented to the revised Licence granted on the 14 September 2018:

- Condition 5 - defines the minimum new groundwater monitoring bore specifications required to help inform the risk of potential impact from emissions of seepage and submission requirements to confirm the installation of the bores.
- Condition 5 - requirement to assess the permeability of the local soils (different methods are specified to reflect the different soil types) and to log the soil types encountered during bore construction with the appropriate standard.
- Condition 9 – groundwater monitoring of standing water level and contaminant concentrations utilising new groundwater bores.
- Condition 10 – for estimating the seepage rate and subsequently the rate of nitrogen and phosphorus emissions from the ponds, which will be considered in conjunction with groundwater and soil data to inform ongoing risk assessments for seepage emissions.

- Condition 14 – requirement for the submission of a report outlining seepage, standing water level, soil permeability and separation distance findings.

The intent of the report required by Condition 14 was that the summary of findings could be used to determine the appropriateness of the pond systems and validate the effectiveness of the control measures to minimise the mobilisation of contaminants in groundwater (pond liner, hydraulic heads on the liner and separation distance to groundwater). A more complete understanding of groundwater standing water levels, groundwater quality results, soil permeability analysis, pond seepage rate assessment and separation distance to groundwater distances will inform the assessment of risk to the environment from seepage.

The Licence Holder submitted the reports required by Conditions 5 and 14 on 1 March 2019 as required by Licence conditions. DWER commenced review of these reports in response the submission of this Licence amendment. The contents of these reports have been reviewed against condition wording within the Licence to ensure all regulatory obligations under these conditions have been met by the Licence Holder, with the intent to remove these conditions from the revised Licence should compliance be demonstrated.

The review of the Licence Holder's compliance report submission in accordance with the requirements of conditions 5 and 14 of the Licence can be summarised as follows:

- The Licence Holder has fulfilled all reporting requirements associated with conditions 5 and 14. As such, these conditions can be removed from the Licence through subsequent amendment applications as the conditions will be redundant if carried forward.
- Condition 10 may also be removed from the Licence, as this specifies requirements for seepage rate testing across the ponds. Compliance with this condition has been demonstrated through this review of the compliance report.
- Soil permeability results suggest that underlying soils to the TWW ponds will permit a slow migration of TWW via infiltration to groundwater. However, this may not be a factor due to the small separation distance to groundwater of 0.3 m – 0.73 m beneath the secondary and tertiary ponds and noting the across pond infiltration rate of 7.47 kL/day.
- No consideration is given to groundwater mounding beneath the ponds as a result of infiltration, which is to be expected given the small separation distance to groundwater.
- There is no guidance available outlining permissible loading limits for TN and TP within TWW for infiltration. Therefore, the suitability of the TN and TP loadings should be considered through a risk assessment for the premises, noting that groundwater will ultimately discharge into the Class A reserve area of Slippery Lake.

**Key Finding:** The Delegated Officer will amend the Licence to remove conditions where compliance with investigation / reporting requirement conditions in the existing Licence has been demonstrated.

It is noted that groundwater mounding has not been considered in the reports, nor has it been considered in the DSI.

Whilst the Licence Holder has advised in supporting documentation to this application that the calculated permeability of the WWTP ponds have a calculated permeability of  $1.33 \times 10^{-9}$ , DWER technical experts consider that it is likely that a groundwater mound does exist beneath the infiltration ponds.

### **General amendments**

In amending the Licence, the CEO has also:

- updated the format and appearance of the Licence;

- revised licence condition's numbers, and removed any redundant conditions and realigned condition numbers for numerical consistency; and
- corrected clerical mistakes and unintentional errors.

The obligations of the Licence Holder have not changed as a result of these amendments and the department has not undertaken any additional risk assessment of the Premises related to these amendments.

### 3. Legislative context

#### 3.1 Conservation and Land Management Act 1984

The land and water body referred to as Slippery Lake, being Lot 63 on Plan 233158, is defined as a nature reserve under Section 6(5) of the Conservation and Land Management Act 1984 (CALM Act) and subsequently vested with the Conservation and Parks Commission (CPC) under Section 19 of the CALM Act. Section 5 of the CALM Act defines nature reserves as being reserved for '... the conservation of flora or fauna or both flora and fauna ...'.

The Department of Biodiversity Conservation and Attractions (DBCA) is responsible for day-to-day management of the Slippery Lake Nature Reserve for the purpose of conservation of flora and fauna on behalf of the CPC. The CPC document Position Statement No. 5 June 2011 Drainage states that the CPC: '... will evaluate proposals for drainage effecting vested land and where deemed to be beneficial or neutral to the values of the reserve, the proposals may be supported'.

In correspondence dated 8 August 2017 DBCA advised that the discharge of treated sewage is not within the context of Position Statement No. 5 June 2011 Drainage. In addition, DBCA advised, in regard to the discharge of treated sewage, that '... impacts on lands ... should be either positive or neutral ...'.

This amendment application was referred to DBCA for their comment on the suitability of permitting the ongoing discharge of TWW from the WWTP. DBCA confirmed that 'The DBCA Wheatbelt Region has undertaken an assessment of the likely future ongoing impacts of discharging waste water...into Slippery lake and have determined that there is unlikely to be a negative impact from this activity on conservation asset and values associated with the lake and surrounding reserve'.

**Key Finding:** The Delegated Officer considers that any approval of the application for premises activities under Part V of the EP Act must be consistent with the environmental values of the Slippery Lake A Class Nature Reserve, being the conservation of flora and fauna.

#### 3.2 Planning approvals

No development/ planning approval for the Wagin sewage facility operations at the Premises is recorded by the Shire of Wagin (correspondence with the Shire of Wagin 19 May 2016).

Under Shire of Wagin town planning scheme no.2 district zoning scheme, 1 March 2005 the Premises is zoned public purposes sewage treatment works. The Premises is vested with the Minister for Water for the use of sewage treatment. Under Section 6 of the Planning and Development Act 2005 the public works are exempt from development/ planning approval. Figure 5 describes the surrounding land uses as zoned under the Shire of Wagin town planning scheme no.2.

The discharge of treated sewage is to the Kersley Road reserve (Lot 350 on Plan 77669) before potentially travelling across land occupied by the Shire of Wagin for the regional airport (Lot 310 on Plan 405628), crossing road reserve and entering the A Class nature reserve known as

Slippery Lake. The discharge of treated sewage may also impact on part of Lot 17 and Lot 18 on Plan 223186 (land zoned 'rural' under the Shire of Wagin town planning scheme no.2).

Correspondence received from the Shire of Wagin dated 21 August 2017 confirmed that there are no matters or decisions regarding planning approvals or the Town Planning Scheme that relate to the Premises.

## 4. Risk assessment

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

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

### 4.1 Source-pathways and receptors

#### 4.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this Amendment Report are detailed in

Table 3 below.

Table 3 also details the control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

**Table 3: Licence Holder controls**

Emission	Sources	Potential pathways	Proposed controls
TWW	Discharge of TWW from the WWTP to the TWWDA	Seepage to land causing impacts to underlying soils, groundwater, and down-hydraulic receptors of groundwater including Slippery Lake	N/A The Licence Holder has provided supporting information through the submission of the DSI to demonstrate the ongoing discharge of TWW is not causing negative impacts to groundwater or down hydraulic receptors. Groundwater monitoring will be undertaken to monitor nutrient and other contaminant loadings.
		Surface water flows ultimately discharging to Slippery Lake	The Licence Holder has provided supporting information through the submission of the DSI to demonstrate the ongoing discharge of TWW is not causing impacts to Slippery Lake. Surface water monitoring will be undertaken for nutrient and other contaminant loadings as well as flow capacity from the TWWDA. The Licence Holder intends to conduct ongoing surface water monitoring on critical surface inflow areas to Slippery



Emission	Sources	Potential pathways	Proposed controls
			Lake.

#### 4.1.2 Receptors

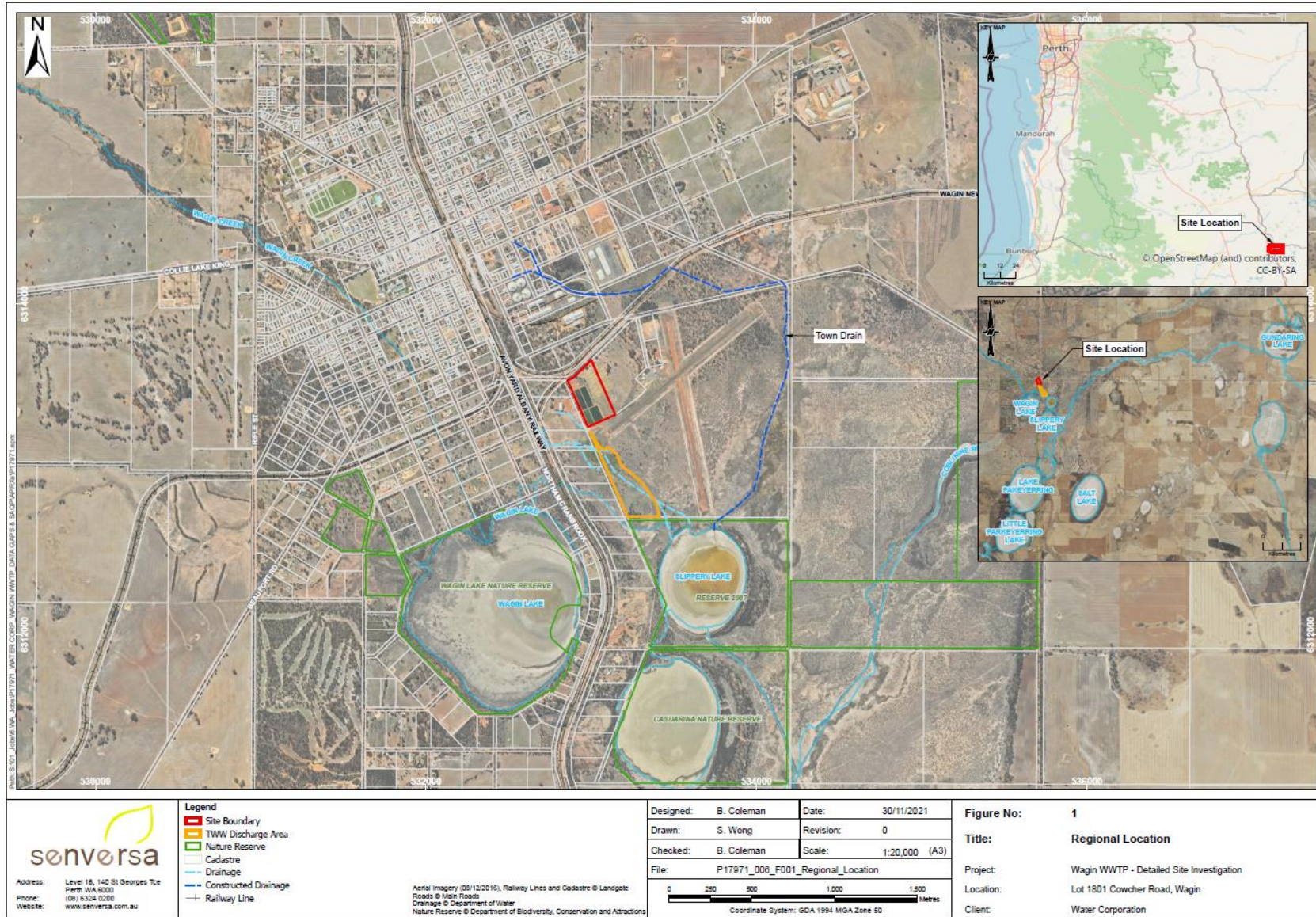
In accordance with the *Guideline: Risk assessments* (DWER 2020), the Delegated Officer has excluded employees, visitors and contractors of the Licence Holder’s from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under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

Table 4 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental siting* (DWER 2020)).

**Table 4: Sensitive human and environmental receptors and distance from prescribed activity**

Human receptors	Distance from prescribed activity
Residential Premises	The closest residences are located approximately 360 m west of the sewage facility infrastructure with additional residences located further west and northwest. A residence is also located approximately 750 m south of the sewage facility infrastructure.
Rural zoned land	Directly west of the Premises across the Kersley Road Reserve a number of lots are zoned “rural” for at least 0.5 km. Directly west Lot 1 on Plan 51587 and Lot 19 on Plan 223186 contain agricultural infrastructure, including a shed and livestock and have unrestricted access to the drainage channel.
Industrial zoned land	Directly north across road and railway reserve offices/ buildings exist from approximately 260 m north of the sewage facility infrastructure.
Wagin Airport (Lot 310 on Plan 405628)	Directly east of the Premises, the airstrip extends east from approximately 50 m south of the sewage facility infrastructure and offices/ buildings are located approximately 300 m east of the sewage facility infrastructure. Lands in the southwest corner of Lot 310 on Plan 405628 where the drainage channel passes through do not have access restrictions.
Lots 673, 674 and 675 on Plan 223186, road reserves and Lot 63 on Plan 233158.	Vacant land, being Lots 673, 674 and 675 on Plan 223186, and Lot 63 on Plan 233158 (Slippery Lake Nature Reserve) including where the drainage channel passes through do not have any access restrictions or infrastructure.
Environmental receptors	Distance from prescribed activity
Geomorphic Wetlands	Slippery Lake (Lot 63 on Plan 233158) is located

Parks and Wildlife Managed Lands and Waters	approximately 800 m south east down hydraulic gradient from the discharge to treated sewage. Slippery Lake is an A Class Nature Reserve vested with the CPC under Section 19 of the CALM Act for the protection of flora and fauna.
Threatened Ecological Communities	The boundary to numerous Threatened Ecological Communities are located approximately 1.5 to 2.3 km south and south east of the Premises down gradient of the catchment for Slippery Lake.
Threatened / Priority Fauna	A vulnerable mammal, being listed on the Schedule 3 Wildlife Conservation (Specially Protected Fauna) Notice 2015 was identified near the northern boundary of Slippery Lake in 2016 and conservation dependant mammals listed on the Schedule 6 Wildlife Conservation (Specially Protected Fauna) Notice 2015 were identified near the southern boundary of Slippery Lake in 2017.
Slippery Lake (surface water)	800 m south east - A Class Nature Reserve
Underlying Groundwater	Depth of groundwater around Slippery Lake is 0 – 4 mBGL (perched aquifer) and >18 mBGL (confined aquifer). The perched aquifer is connected to Slippery Lake.  Depth of groundwater at the sewage facility is conservatively assumed to be at a depth of 4-6 mBGL based on the soil profile established within Final EIA 2015. No abstraction bores have been identified within 800 m of the Premises.
Major perennial watercourse: Coblinine River (surface water)	Approximately 2.4 km south east (flowing from the north east to the south west).  Part of the Hardy Inlet - Blackwood River Catchment. Surface water connection between Slippery Lake and the Coblinine River is considered a rare event.



**Figure 6: Regional location of Wagin WWTP**

Licence: L6316/1991/13



## 4.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 4.1. Where linkages are incomplete they have not been considered further in the risk assessment.

Where the Licence Holder has proposed mitigation measures/controls (as detailed in Section 4.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the Licence Holder’s proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the Licence Holder’s controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in

Table 5.

The Revised Licence L6316/1991/13 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. wastewater treatment and ongoing treated wastewater discharge.

The conditions in the Revised Licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

**Table 5. Risk assessment of potential emissions and discharges from the Premises during operation**

Risk Event					Risk rating <sup>1</sup>	Licence Holder’s controls sufficient?	Conditions <sup>2</sup> of licence	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence Holder’s controls	C = consequence L = likelihood			
Discharge of TWW from the WWTP to the TWWDA	Discharge to land (TWW)	Seepage to land causing impacts to underlying soils, groundwater, and down-hydraulic receptors of groundwater including Slippery Lake	Users of receiving lands and Slippery Lake A Class Nature Reserve Drainage channel environment	Refer to Section 5.1	C = Moderate L =Likely <b>High Risk</b>	N	Conditions 3, 6, 7, and 12	Refer to Section 4.3.1
		Surface water flows ultimately discharging to Slippery Lake	Slippery Lake A Class Nature Reserve (aquatic and terrestrial flora / fauna)		C = Major L =Likely <b>High Risk</b>	N	Conditions 3, 8 and 12	Refer to Section 4.3.2

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



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

## 4.3 Detailed risk assessment

### 4.3.1 TWW – seepage to land and groundwater

The Delegated Officer has reviewed the supporting information provided by the Licence Holder and advice received from technical experts and considers the following:

- Treatment processes for wastewater prior to infiltration and/or discharge result in some removal of CoPCs, however a 4-log reduction in pathogen is observed.
- There are not enough groundwater monitoring bores in the vicinity of the WWTP to draw groundwater contours with a high level of confidence or to triangulate the direction of groundwater flow in this area. However, groundwater beneath the WWTP is likely to flow in the direction of Slippery Lake.
- It is considered likely that there is a groundwater mound beneath the treatment ponds at the WWTP, however no information has been provided in relation to this by the applicant. Based on this, it is also likely that there would be a component of groundwater flow from the treatment ponds towards Slippery Lake.
- The rate of groundwater flow from the ponds towards Slippery Lake is assumed to be very slow, and the Licence Holder has presented evidence to suggest that nutrients (nitrogen and phosphorus) are subject to extensive natural attenuation processes before arrival at the lake. However, there is no monitoring data to support this in relation to other contaminants.
- Groundwater monitoring data submitted in support of this application shows no evidence that the WWTP is a significant source of nutrient or metal contamination in groundwater and concentrations of COPC in groundwater are generally low. However, this data has only been obtained from three cross seasonal monitoring events, which may not provide sufficient information to draw accurate long-term conclusions in relation to nutrient concentrations and migration.
- It is difficult to distinguish distinct sources of groundwater contamination near the WWTP due to surrounding activities which likely to produce leachate with similar chemical compositions to TWW. Additional evidence will be required to indicate whether the WWTP is a contributing source to elevated concentrations of COPC in groundwater.

The groundwater pathway for contaminants from TWW to migrate towards Slippery Lake is still poorly understood. This can be attributed both to insufficient sampling data and insufficient bore placement in the vicinity of the WWTP. Additionally, there has been insufficient sampling data obtained at this point to draw long term conclusions as to whether the WWTP is a significant source of nutrient or metal contamination in groundwater.

However, advice received from technical experts within DWER generally concludes that the transportation of contaminants from the WWTP to Slippery Lake using a groundwater pathway is much less of a concern than the surface water pathway, especially during high surface water flow events which have the potential to transport high concentrations of contaminants to Slippery Lake in a short amount of time. Technical advice also states that concentrations of CoPC in groundwater in the vicinity of the WWTP are low, and whilst the data is insufficient, it is likely that the direction of groundwater flow from the WWTP is towards Slippery Lake, and so while gaps in the understanding of groundwater pathways and sampling exist, the Delegated Officer has determined that these gaps can be addressed through the ongoing monitoring of groundwater at the premises using the existing groundwater monitoring network.

The Delegated Officer will also implement the monitoring of additional groundwater parameters from the expanded monitoring bore network which will act as an indicator for TWW, including boron, sucralose, and caffeine. These parameters will be monitored for on an annual basis. The

inclusion of TWW specific parameters in monitoring requirements will provide additional data to better define the pathway of TWW through groundwater towards Slippery Lake. This will also help to remove uncertainty as to whether TWW from the WWTP is a contributing source to elevated concentrations of COPC in groundwater.

To ensure sufficient data is gathered, the Delegated Officer believes it appropriate to retain the current groundwater monitoring sampling frequency at quarterly through this amendment. Quarterly monitoring of groundwater will provide more assurance on conclusions drawn for long term impacts to Slippery Lake.

The Delegated Officer will review groundwater monitoring data results as they are received through annual reporting submissions. The Delegated Officer may reexamine and modify the frequency of groundwater monitoring and the groundwater monitoring parameter suite should data gaps remain or be addressed through ongoing monitoring and reporting of data.

#### 4.3.2 TWW – surface water flows to Slippery Lake

In light of supporting information provided by the Licence Holder and advice received from technical experts, the Delegated Officer considers the following:

- Overland flow events from the WWTP have the potential to carry large amounts of chemical constituents from TWW to Slippery Lake, both in dissolved form and adsorbed to suspended particles that are transported by surface flow.
- The potential of flow events to act as a transport pathway for chemical constituents from the wastewater disposal area to Slippery Lake and the magnitude and frequency of surface flow events is not adequately understood and requires verification through future monitoring.
- DWER has an obligation to minimise the risks of any potential harmful impacts taking place on the Class A reserve Slippery Lake, despite its current degraded nature.
- Sampling data obtained from the reference lakes may not provide an accurate overview of true background concentrations with ground and surface water in the vicinity of Slippery Lake.
- Ongoing monitoring will be required to verify preliminary findings of the ecological study, as samples obtained during the sampling period may not be representative of ecological or environmental conditions across the lakes and the TWWDA long term.
- Detailed ecological monitoring as not been undertaken during the late wet season, when surface water flows during the peak wet season are expected to increase the likelihood of hydrological connectivity between the TWWDA and Slippery Lake and at which Slippery Lake is at the highest risk of impact from discharges of TWW.
- Sampling results indicated that capacity of the TWWDA to extract nutrients prior to the discharge entering Slippery Lake was approximately 3-fold for nitrogen and 2-fold for phosphorus, However, the is limited understanding on the capacity of the TWWDA to extract other contaminants.

From the results of the DSI, the Licence Holder considers that there is a need for the continued assessment of the discharge of TWW from the TWWDA to Slippery Lake. As such, the Licence Holder is proposing to implement a surface water monitoring program for the surface water at Slippery Lake where samples are taken at critical surface inflow areas to Slippery Lake between the months of May to November, when surface water flows are likely to be present. This monitoring will be undertaken with the intent that it will assist the Licence Holder in managing the ongoing discharge of TWW. The Licence Holder proposes to reflect this monitoring program through the addition of new monitoring conditions on the Licence.

The surface water flow pathway for contaminants from TWW to migrate towards Slippery Lake



is still poorly understood. To better understand this data gap, the Licence Holder intends to implement a surface water monitoring program for the surface water at Slippery Lake and within the TWWDA where samples are taken at critical surface inflow areas to Slippery Lake between the months of May to November, when surface water flows are likely to be present. The Delegated Officer will incorporate this new monitoring schedule into conditions within the Licence to help quantify the magnitude and frequency of surface flow events. Whilst it has been recommended by internal technical experts that the Licence Holder install several passive automatic water samplers along the surface channel between the TWWDA and Slippery Lake to obtain water samples at the onset of a flow event, the Delegated Officer believes that the monitoring schedule and frequency proposed by the Licence Holder will be sufficient to provide outstanding information in quantifying surface water flow events. As such, the Delegated Officer will not incorporate this requirement into Licence conditions, noting that should data acquired through the new monitoring schedule not sufficiently address outstanding data gaps, the Delegated Officer may review the suitability of monitoring conditions and include additional monitoring requirements if deemed appropriate.

Technical experts suggested the installation of passive automatic water samplers as the use of these would assist in determining how quickly surface water flows occur in response to rainfall in the area where soils are permanently saturated, and assist in quantifying the volume of the surface water flows and how quickly these may travel through the TWWDA to Slippery Lake. This information could be used to also determine the capacity of the surface water flows to transport nutrients through the TWWDA to Slippery Lake. In the absence of passive automatic water samplers installation and to better understand whether surface water flows containing contaminants from TWW are impacting the concentration of COPC and / or the ecology of Slippery Lake, the Delegated Officer agrees with the Licence Holder that there is a need to implement the proposed surface water monitoring program at Slippery Lake. This monitoring, coupled with the monitoring undertaken at the treated sewage discharge point, which is currently undertaken at the premises, will provide an indicator of the migration capacity of contaminants from the WWTP to Slippery Lake. However, to also remove the uncertainty surrounding the source of contamination to Slippery Lake given that other inputs to the lake may also be providing contamination (i.e. the town drain, the airfield drain and the west catchment area), the Delegated Officer will also add the parameters boron, sucralose, and caffeine to both the new surface water monitoring and existing discharge monitoring. Comparing the ratios between nutrients, COPC and TWW specific parameters within samples from the discharge point and samples taken from Slippery lake will provide an indicator of the capacity of surface water flows to transport contaminants from the WWTP through the TWWDA to Slippery Lake. Surface water monitoring points for inclusion in the Licence are included in Figure 7.

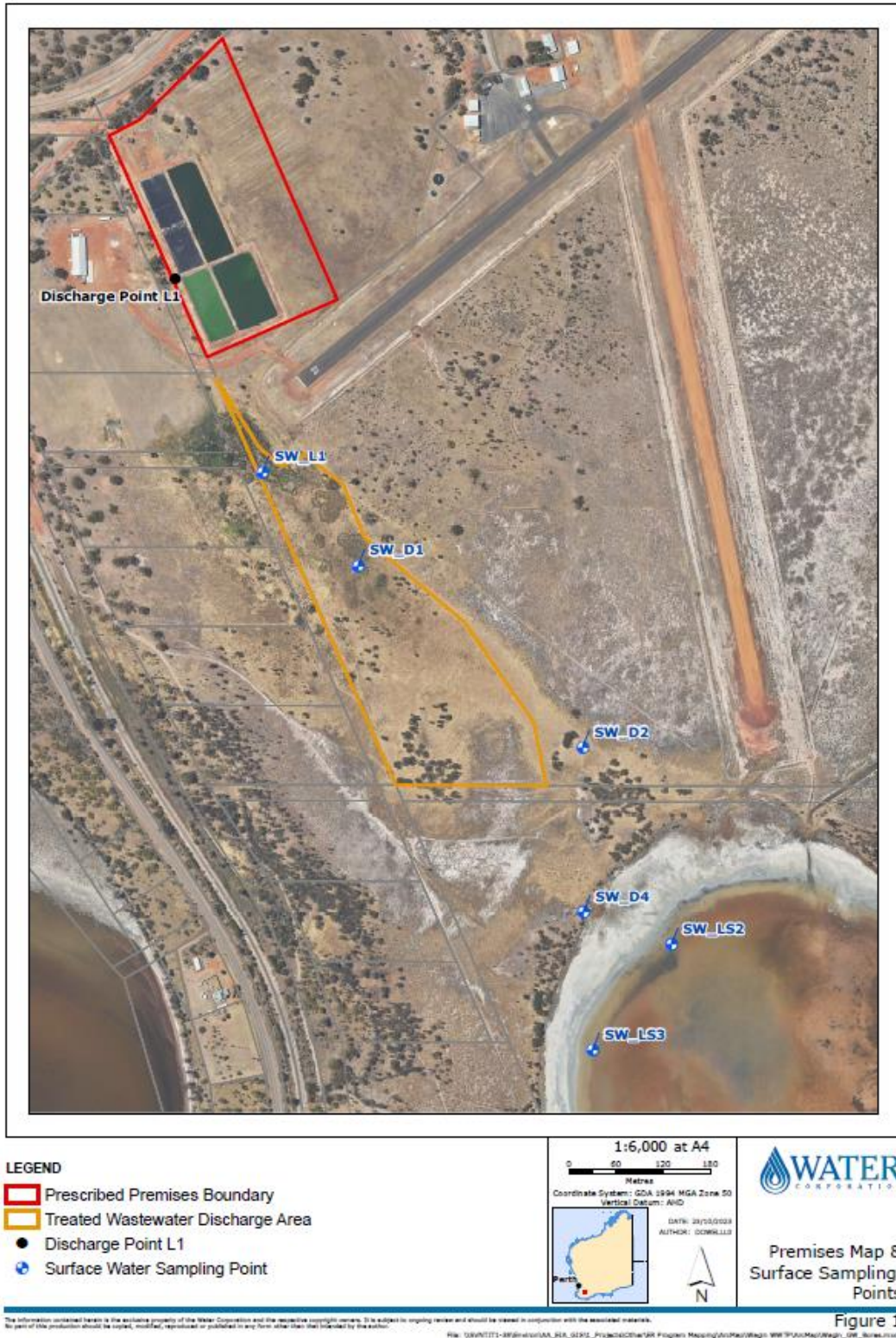


Figure 7: Surface water monitoring network

## 5. Consultation

Table 6 provides a summary of the consultation undertaken by the department.

**Table 6: Consultation**

Consultation method	Comments received	Department response
Shire of Wagin advised of proposal on 21 December 2022	None received.	N/A
Department of Biodiversity, Conservation and Attractions (DBCA) advised of proposal on 21 December 2022	The DBCA Wheatbelt Region has undertaken an assessment of the likely future ongoing impacts of discharging waste water...into Slippery lake and have determined that there is unlikely to be a negative impact from this activity on conservation asset and values associated with the lake and surrounding reserve.	The Delegated Officer considers that any approval of the application for premises activities under Part V of the EP Act must be consistent with the environmental values of the Slippery Lake A Class Nature Reserve, being the conservation of flora and fauna.  Noting comments from DBCA, the Delegated Officer considers that the ongoing discharge of TWW to Slippery Lake is permissible with a degree of regulatory control suitable to protect environmental values of the Class A reserve.
Licence Holder was provided with draft amendment on 29 September 2023	Licence Holder provided comments back to DWER on 23 October 2023.  Comments are outlined in Appendix 1.	DWER's response to Licence Holder comments are outlined in Appendix 1.

## 6. Conclusion

Based on the assessment in this Amendment Report, the Delegated Officer has determined that a Revised Licence will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

The Delegated Officer has determined that the implementation of a revised groundwater monitoring program and a new surface water monitoring program will act to address the data gaps that remain surrounding the potential impacts to the environment from the ongoing discharge of TWW to Slippery Lake. As such, the Delegated Officer will grant the Revised Licence without a cease date for the discharge to Slippery Lake.

The Licence Holder is required to submit monitoring data to DWER under their annual reporting requirements. Should monitoring data indicate negative impacts to Slippery Lake are occurring as a result of the ongoing TWW discharge, the Delegated Officer will review the degree of regulatory control on the Licence and may amend the Licence if additional control is found to be required to prevent further impacts.

### 6.1 Summary of amendments

Table 7 provides a summary of the proposed amendments and will act as record of implemented



changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

**Table 7: Summary of licence amendments**

Condition no.	Proposed amendments
N/A Explanatory notes	Removed from Licence – redundant text.
N/A Definitions and interpretation	Removed and incorporated into other conditions in line with current licensing format.
1 (previous Licence)	Redundant condition deleted from Licence.
1	Table reference updated. Monthly average specification added to approved capacity.
3	Table reference updated. Condition reference updated. Discharge Point L1 operational requirements updated. Groundwater monitoring bore infrastructure and equipment specifications updated to reflect new groundwater monitoring network.
5 (previous Licence)	Redundant groundwater monitoring bore installation condition deleted from Licence – condition requirements have been met.
6	Table reference updated. Additional metals specified within monitoring suite. Additional parameters added to monitoring suite. Note 2 deleted – calibrated metering device has been installed
7	Table reference updated. New groundwater monitoring bore network specified in sampling points. ‘Three consecutive months’ removed from monitoring frequency. Additional parameters added to monitoring suite. Redundant parameters removed from monitoring suite. Note 1 deleted – groundwater monitoring has commenced. Note 3 deleted – standing water level monitoring to be ongoing.
8	Inclusion of surface water monitoring conditions.
10 (previous Licence)	Redundant pond seepage rate testing condition deleted from Licence – condition requirements have been met.

11 (previous Licence)	Discharge limit cease date condition removed from the Licence.
14 (previous Licence)	Redundant reporting condition deleted from Licence – condition requirements have been met.
12	Table reference updated. Environmental reporting requirements for treated sewage discharge monitoring and groundwater monitoring updated to more clearly define information requirements. Environmental reporting requirements included for surface water monitoring.
N/A Definitions	Moved to end of conditions in line with current licensing format.
N/A Schedule 1	Schedule reference updated. Figure references added to maps. Map of premises boundary updated. Map of groundwater monitoring included. Map of surface water monitoring included.
N/A Schedule 2	Deleted and incorporated into other areas of the Licence in line with current licensing format.

## References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.

## Appendix 1: Summary of Licence Holder's comments on risk assessment and draft conditions

Reference	Summary of Licence Holder's comment	Department's response
<b>Comments on draft Licence</b>		
Condition 1, Table 1	<p>Define or delete the wording '(v) Emissions or Discharges which do not comply with an Approved Policy' and '(vi) Emissions or Discharges which do not comply with a prescribed standard'.</p> <p>There is no definition of 'Approved Policy' or of a 'prescribed standard' and in the absence of an 'Approved Policy' and a specific Policy, this condition element may be perceived as a non-compliance, albeit unintended.</p>	<p>The entire content of condition 1 can be regulated under the general provisions of the EP Act. The inclusion of condition 1 in Licence's issued by DWER is a legacy issue from when this condition was a standard condition incorporated into all Licences.</p> <p>Condition 1 will be deleted from the Licence to maintain consistency with the current condition set in use by DWER.</p>
Condition 2, Table 2	<p>Specify 'monthly average' to the approved capacity of 260 m<sup>3</sup> per day for the waste acceptance of sewage.</p> <p>Although approved capacity is presented in m<sup>3</sup> per day Water Corporation's internal wastewater design standards calculates treatment capacity through a number of variables (i.e. average dry weather flow, peak dry weather flow, maximum month flow, peak wet weather flow, peak instantaneous flow) to calculate an average annual daily flow based on different flow characteristics.</p> <p>Therefore, although the treatment capacity is represented by daily flow volume, the WWTP is designed to treat fluctuating flows, thus being licenced on a monthly averaging period is more realistic to the treatment design of the WWTP.</p>	<p>The Delegated Officer will specify 'monthly average' within waste acceptance specifications within Licence conditions to account for variable flow rates.</p> <p>However, the WWTP has previously been assessed based on a maximum design capacity of 260 m<sup>3</sup> per day. The addition of a monthly average indicates that the plant's capacity can exceed this throughput.</p> <p>As such the Licence Holder is advised to submit the actual maximum design capacity of the WWTP so this can be assessed through a subsequent amendment. This will ensure that the actual maximum design capacity can also be reflected on the permitted premises throughput under Category 54.</p>
Condition 4, Table 3	<p>Update operational requirement wording for Discharge Point L1 to 'maintained free of leaks, defect and calibrated every 5 years' from 'Maintained and calibrated in accordance with manufacturer requirements'.</p> <p>Demonstrating that the Magflow is maintained and calibrated in accordance with the manufacturers requirements is not easily audited.</p>	<p>Wording amended as requested as this does not materially change the intent of the original condition.</p>

Reference	Summary of Licence Holder's comment	Department's response
Condition 7, Table 4	<p>Remove parameter Oil and Grease.</p> <p>Oil and Grease is not a contaminant of potential concern and is not listed in Guideline, Assessment and Management of Contaminated Sites (DWER 2021) Appendix B pp 149.</p>	Parameter removed as requested.
	<p>Include additional metals within monitoring.</p> <p>As per ANZG (2018) [ANZECC (2000), Section 3.4.3.2, pg3.4-15), freely dissolved metals are the most toxic form as they are the most bioavailable. Therefore measuring dissolved metals is the most effective measure of risk to the ecological environment.</p> <p>Inclusion of additional metals provides for an outcome-based comparison to ground water and surface water for contaminant source assessment by treated sewage discharge monitoring with surface water monitoring (Condition 9, Table 6).</p>	<p>Additional metal parameters included as requested.</p> <p>Generally, total metals are monitored for in surface water samples and dissolved metals are monitoring for in groundwater. This will be reflected across all monitoring conditions to ensure the most relevant results are obtained.</p>
	<p>Replace 'Sucralose' with 'Fluoride'.</p> <p>We had enquired with our NATA labs regarding adding sucralose as an additional DWQ/WWQ parameter and were informed only their Sydney laboratory (in which they have to sub-contract to Sydney Water) is able to analyse for it with a turn-around-time of 7 days.</p> <p>Wagin is a fluoridated schemes with concentrations in the scheme consistently between 0.75 – 0.9 mg/L. Fluoride is a scientifically proven tracer for treated wastewater is as already part of the testing suite and can be undertaken at no extra cost to government. Fluoride is a small ion and is considered to be a conservative tracer (e.g. Vengosh and Pankratov, 2005). It migrates with water without interacting with solids and can be used as an indicator of the TWW.</p> <p>Therefore, the Corporation advises substituting sucralose for caffeine &amp; fluoride instead since both these parameters are analysed locally in Perth. Hence, in case of emergency sampling – we can request for a faster turn-around-time due to logistics of sample delivery and local capacities of the NATA labs for the determination of WW infiltration/contamination.</p> <p>Water Corporation also points to the cost of analysis of sucralose. If</p>	<p>The Delegated Officer has sought further advice from internal technical experts in relation to the suitability of Fluoride as a replacement WW indicator for Sucralose. The advice states that:</p> <p>'Sucralose is a good indicator of groundwater contamination by WW. This is because the chemical is highly persistent in groundwater, is not readily absorbed by aquifer sediments, and is resistant to biodegradation by microorganisms in groundwater. This is not the case for Fluoride (which can have multiple natural sources) or for caffeine (which can be readily biodegraded). It is important to use the correct parameters to adequately assess potential environmental impacts.'</p> <p>Additionally, the Delegated Officer notes that the Licence Holder has not undertaken any research into ambient background concentrations of Fluoride in the surrounding environment, and that Fluoride can naturally attenuate in clay and bind to carbonates, indicating it will not provide an accurate representation of WW movement through the</p>



Reference	Summary of Licence Holder's comment	Department's response
	<p>sucralose were to be added onto the licence parameter list, analysis of just this one parameter would be 50% over the total yearly laboratory costs for the Wagin WWTP licence. Water Corporation questions the value for money provided with one parameter accounting for 50% of the laboratory costs.</p>	<p>environment.</p> <p>It is outlined through the amendment report that the largest risk to Slippery Lake is the potential rapid transport of contaminants through surface water flows through the TWWDA, and that this pathway is poorly understood. Sucralose has been added to the monitoring suites within the Licence to assist in addressing data gaps that remain in relation to this pathway.</p> <p>As such the Delegated Officer will retain Sucralose within monitoring suites on the Licence. Together with boron and caffeine, this additional monitoring of WW indicators will help to provide additional information regarding the transmissibility of contaminants through surface water flows between the WWTP and Slippery Lake, which will inform the degree of regulatory control required for the ongoing regulation of the TWW discharge from the WWTP.</p>
	<p>Reduce frequency of monitoring from Monthly to Quarterly.</p> <p>The Wagin pond plant has been operation for 30 years, TWW results display limited variation in quality from month to month. On the basis of the long-term consistent operation of the plant showing with demonstrated operational variability Water Corporation requests TWW monitoring at L1 is maintained at quarterly intervals. This requested amendment does not reduce the interpretive value of the monitoring data set or increase risk to the environment. This requested amendment is consistent with other monitoring effort for Condition 8 and Condition 9.</p>	<p>Monitoring frequency amended as requested to align with monitoring frequencies specified in Conditions 8 and 9.</p>
	<p>Confirming that a calibrated metering device capable of measuring the cumulative volume of treated sewage discharged from the Premises in kL/day to a minimum accuracy of total daily volume has been installed as required by Note 2 to Table 4.</p>	<p>Note deleted as now redundant.</p>
<p>Condition 8, Table 5</p>	<p>Request removal of groundwater monitoring bores GW5, GW6, GW7 and GW8 from the monitoring schedule.</p>	<p>The Delegated Officer has reviewed the Licence Holder's comments in the context of advice received by technical experts in assessing this application.</p>

Reference	Summary of Licence Holder's comment	Department's response
	<p>Water Corporation requests the groundwater monitoring efforts is maintained at four bores quarterly (in-line with current licence). The request is based on the demonstrated evidence acknowledged by DWER within the Draft Decision Report including:</p> <ul style="list-style-type: none"> <li>• The WWTP is well established having been in operation for over 30 years. The L6316/1991/13 draft decision report confirms 'nutrient concentrations in groundwater beneath TWWDA and Slippery Lake were generally within the range of background water/cross-hydraulic gradient concentrations, with TN and TP concentrations in groundwater 10-fold and 100-fold below TWW concentrations, respectively'.</li> <li>• The report finds 'the observed distribution of metals in groundwater near the WWTP is consistent with a natural source ..... and there is current no evidence that the treatment plant is a significant source of metal contamination in groundwater'.</li> <li>• The report concludes 'concentrations of chemical constituents of concern in groundwater near the WWTP are considered to be generally low' and 'would be subject to extensive natural attenuation processes'.</li> <li>• Inclusion of increased monitoring parameters (incl. TWW presence absence indicators)</li> </ul> <p>Based on the current demonstrated environmental outcomes after a 30 year operational period, Water Corporation proposes the doubling of groundwater monitoring effort from four bores to eight bores, does not reduce or inform the risk to the environment beyond what achieved with the existing 4 bores with the expanded monitoring parameters.</p> <p>The trigger for doubling the groundwater monitoring effort (i.e. number of bores) is limited to better understanding the groundwater contours (Draft Decision Report page 7), which may be considered beyond the scope of the licence in the context of the existing monitoring bore network (proposed to be maintained) and the absence of groundwater contaminated links to the WWTP after over a 30 year period of operation.</p>	<p>On conclusion of this assessment, the groundwater pathway for contaminants from TWW to migrate towards Slippery Lake is poorly understood. This can be attributed both to insufficient sampling data and insufficient bore placement in the vicinity of the WWTP. Additionally, there has been insufficient sampling data obtained at this point to draw long term conclusions as to whether the WWTP is a significant source of nutrient or metal contamination in groundwater.</p> <p>However, the technical advice generally concludes that the transportation of contaminants from the WWTP to Slippery Lake using a groundwater pathway is much less of a concern than the surface water pathway, especially during high surface water flow events which have the potential to transport high concentrations of contaminants to Slippery Lake in a short amount of time.</p> <p>Technical advice also states that concentrations of CoPC in groundwater in the vicinity of the WWTP are low, and whilst the data is insufficient, it is likely that the direction of groundwater flow from the WWTP is towards Slippery Lake.</p> <p>Whilst the Delegated Officer acknowledges gaps in the understanding of groundwater pathways and sampling data, the Delegated Officer has determined that these gaps can be addressed through the ongoing monitoring of groundwater at the premises using the existing groundwater monitoring network. Licence conditions and text within the amendment report have been updated to reflect this.</p> <p>The addition of boron, sucralose and caffeine will remain for the groundwater monitoring suite.</p>
	<p>Remove reference to 'total' from metals parameters.</p> <p>As per ANZG (2018) [ANZECC (2000), Section 3.4.3.2, pg3.4-15), freely dissolved metals are the most toxic form as they are the most bioavailable.</p>	<p>Generally, total metals are monitored for in surface water samples and dissolved metals are monitoring for in groundwater. This will be reflected across all monitoring</p>

Reference	Summary of Licence Holder's comment	Department's response
	<p>Therefore measuring dissolved metals is the most effective measure of risk to the ecological environment.</p> <p>Remove total biochemical oxygen demand, total suspended solids and phosphate from parameters.</p> <p>Total biochemical oxygen demand, total suspended solids, and phosphate are not a contaminant of potential concern and is not listed within the Guideline, Assessment and Management of Contaminated Sites (DWER 2021) Appendix B pp 149.</p> <p>Additionally analysis of these parameters does not reduce the interpretive value of the monitoring data set or increase risk to the environment.</p> <p>Replace 'Sucralose' with 'Fluoride' (reasoning provided above within comments on Condition 7 Table 4).</p>	<p>conditions to ensure the most relevant results are obtained.</p> <p>In this instance, 'total' will be removed in favour of 'dissolved' metals.</p> <p>The Delegated Officer agrees with the Licence Holder's comments that the removal of biochemical oxygen demand, total suspended solids and phosphate from the groundwater monitoring suite will not reduce the interpretive value of the overall monitoring suite and as such will remove these parameters as requested.</p> <p>It should be noted that contaminants required in groundwater monitoring on Licence's will not mirror the contaminants listed within the <i>Guideline, Assessment and Management of Contaminated Sites</i> as the intent of monitoring requirements on Licence's is not to undertake a full contaminated sites investigation.</p> <p>DWER response provided within comments on Condition 7 Table 4.</p>
<p>Condition 9, Table 6</p>	<p>Remove reference to sampling points – passive automatic water samplers.</p> <p>Water Corporation foresees a number of issues with the practicalities of installing such devices – unmanned site (likelihood of theft), topography and vegetation cover within the TWWDA and irregular surface water flow between TWWDA and Slippery Lake.</p> <p>Water Corporation proposes alternative monitoring of surface water after the first rainfalls for the first year on a monthly basis if water present. Based on the DSI (Senversa, 2022) water will be present May/June to November 2024.</p> <p>Sampling points to be amended to indicate points within the TWDDA and Slippery Lake.</p>	<p>The installation of passive automatic water samplers was recommended for inclusion in surface water monitoring conditions on the Licence through technical advice received to inform the amendment assessment.</p> <p>However, the Delegated Officer notes the Licence Holder's concerns and deems the alternative methodology for monitoring surface water appropriate.</p> <p>As such, conditions within the Licence will be revised to reflect the alternative monitoring program and sampling points.</p> <p>Reference to passive automatic water samplers will also be removed from the determinations in the amendment report.</p>

Reference	Summary of Licence Holder's comment	Department's response
	<p>Remove reference to sampling points – v-notch weir.</p> <p>V-notch weirs are not feasible for the TWWDA and are unable to be installed without a channel flow. As discussed in Section 8.3 of the DSI (Senversa, 2022), there are no discernible drainage channels connecting the TWW discharge area and Slippery Lake, indicating overland flow connection can only occur via sheet-flow during saturated conditions. The site photographs taken during the DSI (Senversa, 2022 – Appendix J) illustrate the limitations of installing such devices within TWW discharge area, with the area being flat and highly vegetated.</p> <p>Sampling points to be amended to indicate points within the TWDDA and Slippery Lake.</p>	<p>It is noted across the DSI that the Licence Holder was able to install v-notch weirs at other key inflow points to Slipper Lake, perhaps where more discernible drainage channels were present.</p> <p>However, the Delegated Officer notes the Licence Holder's concerns regarding v-notch weir installation across the TWWDA and deems the alternative methodology for monitoring surface water appropriate.</p> <p>As such, conditions within the Licence will be revised to reflect the alternative monitoring program and sampling points.</p> <p>Reference to the installation of v-notch weirs will also be removed from the determinations in the amendment report.</p>
	<p>Remove reference to 'total' from metals parameters.</p> <p>As per ANZG (2018) [ANZECC (2000), Section 3.4.3.2, pg3.4-15), freely dissolved metals are the most toxic form as they are the most bioavailable. Therefore measuring dissolved metals is the most effective measure of risk to the ecological environment.</p>	<p>Generally, total metals are monitored for in surface water samples and dissolved metals are monitoring for in groundwater. This will be reflected across all monitoring conditions to ensure the most relevant results are obtained.</p>
	<p>Remove total biochemical oxygen demand, total suspended solids and phosphate from parameters.</p> <p>Total biochemical oxygen demand, total suspended solids, and phosphate are not a contaminant of potential concern and is not listed within the Guideline, Assessment and Management of Contaminated Sites (DWER 2021) Appendix B pp 149. Additionally analysis of these parameters does not reduce the interpretive value of the monitoring data set or increase risk to the environment.</p>	<p>The Delegated Officer considers that biochemical oxygen demand and total suspended solids within the surface water monitoring suite will be beneficial in informing results, as biochemical oxygen demand is an indicator of the amount of oxygen required or consumed by microbial decomposition or organic material in water, and total suspended solids are an indicator of turbidity and hence the capacity of sunlight dependant microbes to develop. These parameters will be maintained in the monitoring suite.</p> <p>The Delegated Officer will remove the requirement for the monitoring of Phosphate and replace it with 'reactive phosphorus' as both are representative of biologically available phosphorus, but reactive phosphorus is more</p>



Reference	Summary of Licence Holder's comment	Department's response
		generally included within standard testing suites within NATA accredited laboratories.  It should be noted that contaminants required in groundwater monitoring on Licence's will not mirror the contaminants listed within the <i>Guideline, Assessment and Management of Contaminated Sites</i> as the intent of monitoring requirements on Licence's is not to undertake a full contaminated sites investigation.
	Replace 'Sucralose' with 'Fluoride' (reasoning provided above within comments on Condition 7 Table 4).	DWER response provided within comments on Condition 7 Table 4.
Condition 13, Table 7	In relation to reporting on Condition 7 requirements, remove text requiring 'a diagram with aerial image overlay showing all monitoring locations and depicting groundwater level contours, flow direction and hydraulic gradient (relevant site features including discharge points and other potential sources of contamination must also be shown)'.  Potential TWW condition error, as the requirement for an 'aerial image overlay ....and depicting groundwater level contours, flow direction and hydraulic gradient...' is not relevant to TWW.	This requirement appears to have been included as standard condition wording and will not apply for the monitoring of TWW.  Requirement removed as requested.
Condition 13, Table 7	In relation to reporting on Condition 9 requirements, remove text requiring 'locations and depicting groundwater level contours, flow direction and hydraulic gradient'.  Potential surface water condition error, as the requirement for an 'aerial image overlay ....and depicting groundwater level contours, flow direction and hydraulic gradient'...is not relevant to surface water monitoring and is addressed in the Condition 8 element of the environmental reporting.	This requirement appears to have been included as standard condition wording and will not apply for the monitoring of surface water.  Requirement removed as requested.
<b>Comments on draft Amendment Report</b>		
Section 2.3.1 Investigation levels (key finding section)	Remove reference to 'adopted acceptable criteria'.  DWER notes WW & TWW exceed adopted criteria (Table 2). Environmental and public health criteria (guideline values) as per ANZG (2018) [ <a href="https://www.waterquality.gov.au/anz-guidelines/guideline-values/default">https://www.waterquality.gov.au/anz-guidelines/guideline-values/default</a> ] applies to the receiving receptor, not the discharge of	The Delegated Officer notes that whilst the ANZG (2018) guideline values apply to the receiving environment, it is the Licence Holder who has adopted investigation levels derived from ANZG (2018) for WW and TWW.  However, the Delegated Officer will amend the wording

Reference	Summary of Licence Holder's comment	Department's response
	TWW, as such the finding 'frequent exceedances in the adopted acceptable criteria for both wastewater and treated wastewater' is not contextually correct as ANZG (2018) is not an appropriate criterion for WW and TWW assessment.	within this section of the report from 'acceptable criteria' to 'investigation levels' to better align with data presented in Table 2 of the amendment report.
Section 2.3.1 WW/TWW contaminant loadings (key findings section)	<p>Remove reference to 'minimal removal of pathogens and CoPC' and replace with '4-log reduction of pathogens'.</p> <p>The key finding stating "minimal removal of pathogens" through the treatment processes is a highly subjective statement and potentially misleading in the public domain. Please revise to quantify reduction; e.g. E.coli concentrations show a 4-log reduction between WW and TWW measured concentrations which equates to a 99.99% reduction in pathogens.</p>	<p>Whilst the reduction of pathogens within TWW is more considerable than the reduction of other CoPC, the Delegated Officer still considers that only a basic level of treatment is occurring through the WWTP process.</p> <p>As such, the Delegated Officer will amend previous wording to reflect the 4-log reduction in pathogens and will still reflect that a basic level of treatment is occurring. This is consistent with technical advice received from Contaminated Sites experts within DWER who were consulted to inform this assessment.</p>
Section 2.3.1 Groundwater characterisation (for noting section)	<p>Remove statement 'appears to show that the WWTP is now likely to be a direct source of contamination to Slippery Lake' from key point 1. Consider replacing with 'groundwater beneath the WWTP is likely to flow in the direction of Slippery Lake'.</p> <p>Please amend statement to be more aligned to the issue considered which is groundwater flow. Stating 'show that the WWTP is now likely to be a direct source of contamination' is potentially misleading and is not in the context of the groundwater flow directions. The statement presents a risk of miss-interpretation once in the public domain which may have a negative impact on Water Corporation.</p>	<p>The Delegated Officer will amend wording to 'appears to show groundwater beneath the WWTP flows in the direction of Slippery Lake, indicating that the WWTP may be a source of contamination to Slippery Lake'.</p> <p>The Delegated Officer believes this wording relays the Licence Holder's intent whilst remaining consistent with technical groundwater advice received to inform the application.</p>
Section 2.3.1 Nature and extent of groundwater impacts (key findings section)	<p>Key finding 1 - please amend to acknowledge WWTP is currently demonstrated to pose a low risk to nitrogen compounds in groundwater.</p> <p>Key finding 2 – please include 'Given the current absence of evidence to demonstrate the WWTP is source of contamination' in finding.</p> <p>Key Findings Conclusions are not well aligned with findings in the report with regard to nitrogen contamination conclusions and required additional evidence. Further evidence is provided in dot points below to support Water Corporations justification.</p>	<p>Information presented within the DSI has been considered in informing the amendment assessment and has presented to internal groundwater experts for comment.</p> <p>The summary of the key findings for the nature and extent of groundwater monitoring impacts is that further groundwater monitoring is required to clearly identify the potential contribution of the WWTP to groundwater contamination in the area.</p>

Reference	Summary of Licence Holder's comment	Department's response
	<ul style="list-style-type: none"> <li>• Finding 1 – Findings demonstrate the WWTP is not a significant source of contaminants to groundwater.                             <ul style="list-style-type: none"> <li>○ Wagin WWTP has been operating since 1991, therefore the ponds have been holding WW for over 30 years, with nutrient concentrations in groundwater beneath the TWW discharge area 10- to 100-fold below TWW concentrations. Additionally the 2022/23 AER groundwater data demonstrates a TN concentration difference of 0.4 mg/L between GW1 and GW3 (located immediately down-hydraulic gradient of the WWTP) in 2022/23.</li> <li>○ Section 7.7 of the DSI (Senversa, 2022) calculated the mass discharge for groundwater to Slippery Lake using concentration data of GW03 (immediately down-hydraulic gradient of the WWTP) with results showing the maximum TN loading of 0.7 kg/year. Section 8.6 of the DSI shows the total surface water TN loading to Slippery Lake is 335 kg/year, illustrating the maximum contribution through groundwater loading is ~0.2%.</li> </ul> </li> <li>• Finding 2 – A trend of increasing constituents in groundwater immediately down-hydraulic gradient of the WWTP is not required to be measured to indicate that the WWTP is a source of elevated concentrations in groundwater, as:                             <ul style="list-style-type: none"> <li>○ The WWTP is well established having been in operation for over 30 years. The L6316/1991/13 draft decision report confirms 'nutrient concentrations in groundwater beneath TWWDA and Slippery Lake were generally within the range of background water/cross-hydraulic gradient concentrations, with TN and TP concentrations in groundwater 10-fold and 100-fold below TWW concentrations, respectively'.</li> <li>○ The report finds 'the observed distribution of metals in groundwater near the WWTP is consistent with a natural source ..... and there is current no evidence that the treatment plant is a significant source of metal contamination in groundwater'.</li> <li>○ The report concludes 'concentrations of chemical constituents of concern in groundwater near the WWTP are considered to be generally low' and 'would be subject to extensive natural attenuation processes'.</li> </ul> </li> </ul>	<p>Key Finding 1 states that it is difficult to distinguish sources of groundwater contamination near the WWTP and that elevated concentrations of nitrogen compounds detected in groundwater in the area could be from a variety of sources. There is no specific reference to potential inputs to contamination from the WWTP in this statement. As such, the proposed amended wording will not be included as it is not relevant to this statement.</p> <p>The Delegated Officer will amend the text in Key Finding 2 to reflect that there is a current absence of evidence to demonstrate the WWTP's contribution to groundwater contamination, noting that this inclusion does not change the outcomes of the finding.</p>
Section 2.3.1	Consider amending the below statement as follows:	Information presented within the DSI has been considered in informing the amendment assessment and has

Reference	Summary of Licence Holder's comment	Department's response
<p>Surface water characterisation and flow model (key findings section)</p>	<p>'Additionally, the importance of this potential transport pathway for chemical constituents from the wastewater disposal area to Slippery Lake is not adequately understood <b>requires verification through ongoing monitoring.</b>'</p> <p>Key Finding is not well aligned with findings in the report with regard to understanding of environmental risk including cyanobacteria bloom risk within Slippery Lake. Further evidence is provided in dot points below to support Water Corporations justification.</p> <ul style="list-style-type: none"> <li>• The 14-month sampling period characterised a full year of seasonal conditions, across a large spatial extent, and across all potentially impacted media in a highly detailed and scientific study. It is only limited in that due to timing constraints we were not able to verify findings through ongoing seasonal monitoring.</li> <li>• Monthly surface water sampling (when surface water was present) was conducted at 13 locations within the TWW discharge area, Slippery Lake and surrounding drains over a 14-month period to assess chemical constituent loadings from the TWW discharge area to Slippery Lake. Section 8.6 of the DSI (Senversa, 2022) has quantitatively calculated the mass of chemical constituents entering Slippery Lake from each of the sources contributing to Slippery Lake. The surface water contaminant flux model considers infrequent flow events discharging to Slippery Lake.</li> <li>• Section 12.1.2 of the DSI (Senversa, 2022) found the risk that the discharge of TWW to the TWWDA and subsequent overland flow to Slippery Lake that may result in cyanobacteria bloom formation that impacts the community values of Slippery Lake is considered to be low and acceptable.</li> <li>• The DSI (Senversa, 2022) risk assessment (refer Section 12.0 of the DSI) considered all potential transport pathways for TWW to impact Slippery Lake including overland flow. The DSI was completed with no remaining data gaps and the risk to Slippery Lake from ongoing operations as determined to be low and acceptable.</li> </ul>	<p>presented to internal groundwater experts for comment.</p> <p>The Delegated Officer will include the proposed amended wording as additional text to the original statement in the key finding, noting that this does not change the outcome of the statement. This also remains consistent with technical advice received from Contaminated Sites experts within DWER who were consulted to inform this assessment.</p>
<p>Section 2.3.1 Use of 'Reference</p>	<p>Consider amending the below statement as follows: 'However, <del>DWER does not support the view implied in supporting information that the degraded nature of Slippery Lake is a valid reason for</del></p>	<p>The intent of this key finding is to outline that DWER will not support activities that will result in further degradation to the Class A Reserve area of Slippery Lake.</p>



Reference	Summary of Licence Holder's comment	Department's response
lakes' (key findings section)	<p><del>allowing the current wastewater disposal practice to continue without significant changes taking place</del> <b>although environmental values of Slippery Lake have been degraded, DWER does not support this as a valid reason for allowing further degradation of Slippery Lake.'</b></p> <p>Please amend statement to be more aligned with findings in the report with regard to why the current wastewater disposal practice can continue without significant changes taking place.</p> <p>The principal findings of the DSI (Senversa, 2022) were "that discharge at the current quality and quantity has not resulted in measurable impact to Slippery Lake and is unlikely to result in impact in the future." DSI never "implies" that current practices are acceptable because of the degraded nature of Slippery Lake and Water Corporation request this wording by DWER be removed as it is not factually correct.</p>	<p>Wording will be amended as requested to remove reference to 'implies' and state that 'DWER does not support allowing the current wastewater disposal practice to continue without significant changes taking place should it be demonstrated that current practices are contributing to further degradation of Slippery Lake'.</p>
Section 2.3.1 Nature and extent of surface water / drainage impacts (key findings section)	<p>Consider amending the below statement as follows:</p> <p><del>'Consequently, it is recommended that several passive automatic water samplers are employed along the surface channel between the treated wastewater disposal area and Slippery Lake to obtain water samples at the onset of a flow event'</del> <b>surface water samples between the treated wastewater disposal area and Slippery Lake are obtained at the onset of a flow event.'</b></p> <p>The recommendation to install passive automatic samplers and v-notch weirs to the TWWDA is not feasible as there is not channel flow and flow is intermittent across an open field.</p> <p>DWER refers to installing these devices along the "surface channel" between the TWW discharge area and Slippery Lake. As discussed in Section 8.3 of the DSI (Senversa, 2022), there are no discernible drainage channels connecting the TWW discharge area and Slippery Lake, indicating overland flow connection can only occur via sheet-flow during saturated conditions. Due to the restrictions on monitoring because of this sheet-flow the DSI calculated loadings to Slippery Lake via a contaminant flux model Section 8.6 of the DSI (Senversa, 2022).</p> <p>The scope of the DSI included the installation of loggers and rising stage at sample locations SW-D3 to SW_D5 (within the TWW discharge area);</p>	<p>The installation of passive automatic water samplers was recommended for inclusion in surface water monitoring conditions on the Licence through technical advice received to inform the amendment assessment. It is also noted across the DSI that the Licence Holder was able to install v-notch weirs at other key inflow points to Slipper Lake, perhaps where more discernible drainage channels were present.</p> <p>However, the Delegated Officer notes the Licence Holder's concerns with the installation of both the passive automatic water samplers and the v-notch weirds and deems the alternative methodology for monitoring surface water appropriate.</p> <p>As such, conditions within the Licence will be revised to reflect the alternative monitoring program and sampling points.</p> <p>Reference to passive automatic water samplers and v-notch weir installation will also be removed from the determinations in the amendment report.</p>

Reference	Summary of Licence Holder's comment	Department's response
	<p>however, these locations did not record any response to rainfall events (i.e. minor water was noted (logger data was noisy) and no flow occurred).</p> <p>Water Corporation points to this as the practicalities of installing v-notch weirs and passive automatic samplers within the TWW discharge area is not possible. The site photographs taken during the DSI (Senversa, 2022 – Appendix J) illustrate the limitations of installing such devices within TWW discharge area, with the area being flat and highly vegetated.</p>	
<p>Section 2.3.1 Environmental conditions within Slippery Lake (key findings section)</p>	<p>Key finding 1: As per section 12.1.1 of the DSI (Senversa, 2022), the ecological study focussed on the late wet season as the drying period from September to November each year when lake levels are dropping and the water temperature is increasing. Although the wet season is when the hydrological connectivity between the TWW discharge area and Slippery Lake would be highest, this doesn't correlate with timing of highest risk to ecological receptors.</p> <p>Consider the following amendment:</p> <p>'A comprehensive ecological study has only been undertaken during the <del>late two</del> <b>two</b> wet seasons. Higher surface water flows during the peak wet season are expected to increase the likelihood of hydrological connectivity between the TWWDA and Slippery Lake and therefore increase the potential for nutrient and contaminant transportation to Slippery Lake. Whilst the Licence Holder has undertaken <del>limited additional</del> monitoring over the <del>peak two</del> <b>two</b> wet seasons, <del>detailed results have not been provided during the time frame at which Slippery Lake is at the highest risk of impact from discharges of TWW.</del> <b>ongoing monitoring is required to verify the findings.'</b></p> <p>Key finding 2: Whilst the study was time sensitive, the 14-month study was comprehensive in terms of scope including groundwater, surface water, porewater and sediment sampling, aquatic ecology surveys, drone survey, water balance and groundwater and surface water flux modelling and a detailed ecological risk assessment. Due to site conditions and surface water flow characteristics between TWW discharge area and Slippery Lake, i.e. no defined flow channels monitoring direct inputs (flow and concentrations) is not possible. Because of this, inputs into Slippery Lake where quantified through a surface water contaminant flux (Section 8.6 of</p>	<p>Key finding 1 outlines that the timing of highest risk to ecological receptors is anticipated to be during the peak wet season, when the likelihood of hydrological connectivity between the TWWDA and Slippery Lake is expected to increase and therefore increase the potential for nutrient and contaminant transportation in large surface water flow events. This finding has been informed by technical advice from DWER internal experts, who were also presented with the DSI for review to inform this assessment.</p> <p>Monitoring during this timeframe has not been undertaken. As such, the wording in Key Finding 1 will be retained.</p> <p>The intent of Key Finding 2 is to outline determinations made in relation to the extent of study undertaken to characterise the magnitude and frequency of surface water flow events only.</p> <p>Whilst site characteristic constraints have been mentioned as reasoning for the limited study undertaken, it is noted in comments below on Key finding 3 that 'surface water samples were collected along the flow path from the TWW</p>

Reference	Summary of Licence Holder's comment	Department's response
	<p>the DSI) which found in the 2021 wet season TWW discharge area accounted for 1.2% of TN and 30.1% of TP loading to Slippery Lake.</p> <p>Consider the following amendment:</p> <p><del>'Limit study has been</del> <b>Monthly sampling was</b> undertaken to characterise the magnitude and frequency of surface flow events between the TWWDA and Slippery Lake, where there is potential for large amounts of nutrients and contaminants from TWW to enter Slippery Lake.'</p>	<p>discharge point, within the TWWDA to Slippery Lake.</p> <p>The proposed change in terminology to 'monthly sampling' changes the outcome of the finding. AS such, the Delegated Officer will retain the original wording.</p>
	<p>Key finding 3: Surface water samples were collected along the flow path from the TWW discharge point, within the TWW discharge area to Slippery Lake (refer to DSI Section 8.0). Section 8.5 of the DSI concluded nitrogen and phosphorus concentrations showed a marked decrease with distance from the site, with concentrations at SW_D4 (i.e. indicative of West Catchment /TWW flow) being approximately 3-fold less for nitrogen and 2-fold less for phosphorus than recorded at SW_L1.</p> <p>Consider the following amendment:</p> <p><del>'There is limited understanding on</del> The capacity of the TWWDA to extract nutrients and / or contaminants prior to the discharge entering Slippery Lake <b>was found to be approximately 3-fold for nitrogen and 2-fold for phosphorus.'</b></p>	<p>Wording will be amended to incorporate the Licence Holder's suggestion. As there is still limited understanding on the capacity of the TWWDA to extract contaminants prior to the discharge entering Slippery Lake, this wording will be retained.</p>
	<p>Key finding 4: The investigation was conducted over a 14-month sampling period. Monthly surface water sampling (when surface water was present) was conducted at 13 locations within the TWW discharge area, Slippery Lake and surrounding drains, sediment sampling at 74 locations, porewater sampling at 7 locations, and continuous chlorophyll-a and phycocyanin monitoring within Slippery Lake. This intensive 14-month investigation allowed along with desktop study information established the ecological values of Slippery Lake and the TWW discharge area, refer to Section 13.4 of DSI (Senversa, 2022) for full findings.</p> <p>Consider the following amendment:</p> <p><del>'The limited 14-month</del> sampling period, along with <del>limited</del> number of samples obtained during the sampling period, <del>may not be representative of</del> <b>established</b> ecological or environmental conditions across the lakes and</p>	<p>Information presented within the DSI has been considered in informing the amendment assessment.</p> <p>The Key Finding outlines the Delegated Officer's concerns that the sampling data provided may not be representative of ecological or environmental conditions long term. To state that ecological and environmental conditions have been established is contradictory to this statement.</p> <p>As such the Delegated Officer will amend the Key Finding Wording to state that 'Ongoing monitoring will be required to verify preliminary findings of the ecological study, as samples obtained during the sampling period may not be representative of ecological or environmental conditions across the lakes and the TWWDA long term.' This does not change the Key Finding outcome.</p>

Reference	Summary of Licence Holder's comment	Department's response
	<p>the TWWDA, <b>however ongoing monitoring is required to verify these findings</b> long term.'</p> <p>Key finding 5: Wagin Lake was not dry over the study period, it was dry during 4 of the 9 sampling rounds compared to Gundaring Lake being dry 1 out 9 and Parkeyerring Lake 2 out of 9 times. Slippery Lake was also dry 2 out 9 times. This drying is a function of the ephemeral nature of the Wheatbelt salt lakes. Slippery Lake ecology was consistently within the range of ecological parameters at the reference lakes, and as expected for Wheatbelt salt lakes, with no cyanobacterial algal species were identified.</p> <p>Consider the following amendment:</p> <p>'As Wagin Lake was dry <del>over the study period</del> <b>four out of the nine sampling rounds during the study period, compared to Gundaring Lake being dry one out of nine and Parkeyerring Lake two out of nine sampling rounds</b>, <del>samples could not be obtained and only data from two reference lakes was used for comparison with Slippery Lake. Comparison with only two reference lakes, considering that natural variation will also exist within the sampling areas, may not have provided an accurate representation of comparison with background salt lake concentrations within the Wheatbelt.</del> <b>This drying out is a function of the ephemeral nature of the Wheatbelt salt lakes.'</b></p>	<p>The Delegated Officer has amended Key Finding to reflect the ephemeral nature of the salt lakes as highlighted by the Licence Holder.</p> <p>Please note that this highlights further complications in using the 'Reference lakes' for comparison with Slippery Lake, as on top of the natural variation between the lakes, the inconsistencies in when samples were taken as to when lakes were able to be sampled will increase uncertainties as to whether sampling data is comparable.</p>
<p>Section 2.3.2</p> <p>Surface water monitoring (key findings section)</p>	<p>Consider the following amendment:</p> <p>'The Delegated Officer considers that surface water flows as a potential transport pathway for chemical constituents from the wastewater disposal area to Slippery Lake are <del>not adequately understood</del> <b>required to be verified through ongoing monitoring</b>. Consequently, the Licence Holder's recommendation to install v-notch weirs on critical surface inflow areas to Slippery Lake is supported. Such installations would help quantify <del>the magnitude and frequency of surface flow events, and would indicate how they change over time. It is recommended that at least one such flow gauging site is installed in the wastewater discharge area to determine how quickly surface flows occur in response to rainfall in this area, where soils are permanently saturated</del> <b>surface water samples between the treated wastewater disposal area and Slippery Lake are obtained at the onset of a flow event.</b></p>	<p>It is noted across the DSI that the Licence Holder was able to install v-notch weirs at other key inflow points to Slipper Lake, perhaps where more discernible drainage channels were present.</p> <p>However, the Delegated Officer notes the Licence Holder's concerns regarding v-notch weir installation across the TWWDA and deems the alternative methodology for monitoring surface water appropriate.</p> <p>As such, conditions within the Licence will be revised to reflect the alternative monitoring program and sampling points.</p> <p>The original wording will be amended to reflect the alternative sampling methodology proposed by the Licence Holder. Reference to the installation of v-notch weirs will</p>



Reference	Summary of Licence Holder's comment	Department's response
	<p>V-notch weirs are not feasible for the TWWDA and are unable to be installed without a channel flow.</p> <p>As discussed in Section 8.3 of the DSI (Senversa, 2022), there are no discernible drainage channels connecting the TWW discharge area and Slippery Lake, indicating overland flow connection can only occur via sheet-flow during saturated conditions.</p> <p>The site photographs taken during the DSI (Senversa, 2022 – Appendix J) illustrate the limitations of installing such devices within TWW discharge area, with the area being flat and highly vegetated.</p>	<p>also be removed from the determinations in the amendment report.</p>
<p>Section 4.1.1 Emissions and Controls Table 3</p>	<p>Amended text to state that 'the Licence Holder intends to conduct ongoing surface water monitoring on critical surface inflow areas to Slippery Lake' instead of referencing v-notch weir installation.</p> <p>Water Corporation points to this as the practicalities of installing v-notch weirs within the TWW discharge area. As discussed in Section 8.3 of the DSI (Senversa, 2022), there are no discernible drainage channels connecting the TWW discharge area and Slippery Lake, indicating overland flow connection can only occur via sheet-flow during saturated conditions.</p> <p>The site photographs taken during the DSI (Senversa, 2022 – Appendix J) illustrate the limitations of installing such devices within TWW discharge area, with the area being flat and highly vegetated.</p>	<p>It is noted across the DSI that the Licence Holder was able to install v-notch weirs at other key inflow points to Slipper Lake, perhaps where more discernible drainage channels were present.</p> <p>However, the Delegated Officer notes the Licence Holder's concerns regarding v-notch weir installation across the TWWDA and deems the alternative methodology for monitoring surface water appropriate.</p> <p>As such, conditions within the Licence will be revised to reflect the alternative monitoring program and sampling points.</p> <p>Reference to the installation of v-notch weirs will also be removed from the determinations in the amendment report.</p>
<p>Section 4.2 Risk ratings Table 5</p>	<p>DWER state the risk ratings have been assessed in accordance with the Guideline: Risk Assessment (DWER 2020). Water Corporation requests DWER explain what information was considered to determine consequence and likelihood ratings assigned.</p> <p>Attachment 6A (Environmental Assessment Summary) of the licence amendment (19/09/2022) assessed the seepage to land causing impacts to underlying soils, groundwater and down-hydraulic receptors of groundwater including Slippery Lake as low risk and also assessed surface water flows ultimately discharging to Slippery Lake as low risk. Water</p>	<p>DWER utilise a source, pathway, receptor model when conducting risk assessments, with the consequence and likelihood of an event occurring informing the final risk rating. Please refer to Table 1 within the <i>Guideline: Risk Assessment (2020)</i> for a full overview of the risk criteria process.</p> <p>The sources, pathways and receptors used to inform the risk ratings generated as a result of this amendment application are listed in Table 5. The information used to</p>

Reference	Summary of Licence Holder's comment	Department's response
	<p>Corporation would like to understand how DWER conducting the same assessment found both these risks to be high.</p>	<p>inform these decisions is outlined throughout this Amendment Report.</p>
<p>Section 4.3.1 TWW – Seepage to land and groundwater</p>	<p>The dot point stating “minimal removal of pathogens” through the treatment processes is a highly subjective statement and potentially misleading in the public domain. Please revise to quantify reduction; e.g. E.coli concentrations decreasing by a factor of 10,000 during all three sampling rounds between WW and TWW.</p> <p>Consider the following amendment:  ‘Treatment processes for wastewater prior to infiltration and/or discharge result in <del>minimal removal</del> <b>4-log reduction of pathogens</b> and CoPC.’</p>	<p>Whilst the reduction of pathogens within TWW is more considerable than the reduction of other CoPC, the Delegated Officer still considers that only a basic level of treatment is occurring through the WWTP process.</p> <p>Wording will be amended to to reflect the 4-log reduction in pathogens and will still reflect that a basic level of treatment is occurring in regards to the removal of CoPCs in treated wastewater. This is consistent with technical advice received from Contaminated Sites experts within DWER who were consulted to inform this assessment.</p>
	<p>Section 7.4 of the DSI (Senversa, 2022) illustrates the interpolated contours indicate groundwater flow direction in both aquifers was south-easterly.</p> <p>Consider the following amendment:  <del>‘There are not enough groundwater monitoring bores in the vicinity of the WWTP to draw groundwater contours with a high level of confidence or to triangulate the direction of groundwater flow in this area. Groundwater beneath the WWTP is likely to flow in the direction of Slippery Lake.’</del></p>	<p>This information has been informed by DWER internal groundwater experts and hence will not be removed from the amendment report.</p> <p>However, the Delegated Officer will add the Licence Holder's proposed text to the existing statement.</p>
	<p>The calculated permeability of the ponds of 1.33E-09 m/s, demonstrating WWTP ponds are not leaking and are not a source of contaminants to groundwater and don't pose a risk to Slippery Lake.</p> <p>Consider the following amendment:  <del>‘It is considered likely that there is a groundwater mound beneath the treatment ponds at the WWTP, however no information has been provided in relation to this by the applicant</del> <b>the calculated permeability of the ponds of 1.33E-09 m/s, demonstrating WWTP ponds are not leaking.</b> Based on this, it is also likely that there would be a component of groundwater flow from the treatment ponds towards Slippery Lake.’</p>	<p>The addition of information in relation to the ponds permeability does not relate to the finding in relation to groundwater mounding.</p> <p>Technical experts who have reviewed supporting documentation to this assessment consider that a groundwater mound is likely to be present underneath the ponds as a result of infiltration over time, which is to be expected given the small separation distance to groundwater.</p> <p>The Delegated Officer will retain the original wording,</p>

Reference	Summary of Licence Holder's comment	Department's response
	<p>Section 7.6 of the DSI (Senversa, 2022) "nutrient concentrations in groundwater beneath the TWWDA and Slippery Lake were within the range of background/cross-hydraulic gradient concentrations, with maximum TN and TP concentrations in groundwater 10-fold to 100-fold below TWW concentrations, respectively."</p> <p>Consider the following amendment:</p> <p>'The rate of groundwater flow from the ponds towards Slippery Lake is assumed to be very slow, and contaminants from the WWTP would be subject to extensive natural attenuation processes before arrival at the lake. <del>However, there is no monitoring data to support this.</del>'</p>	<p>The Delegated Officer has amended the original wording to reflect the Licence Holder's findings that nutrients are subject to natural attenuation. However, the original wording and intent is retained for other contaminants where no evidence is presented in relation to natural attenuation.</p>
	<p>Wagin WWTP has been operating since 1991, therefore the ponds have been holding WW for over 30 years, with nutrient concentrations in groundwater beneath the TWW discharge area 10- to 100-fold below TWW concentrations.</p> <p>Consider the following amendment:</p> <p>'The existing groundwater monitoring data show no evidence that the WWTP is a significant source of nutrient or metal contamination in groundwater and concentrations of COPC in groundwater are generally low. <del>However, this data has only been obtained from three cross seasonal monitoring events, which do not provide sufficient information to draw accurate long term conclusions in relation to nutrient concentrations and migration.</del> <b>Whilst only three rounds of groundwater sampling were conducted for the DSI (Senversa, 2022), quarterly groundwater monitoring has been conducted since October 2018 indicating that operations are not impacting groundwater.'</b></p>	<p>A detailed assessment of previous groundwater data has not been undertaken by DWER to inform this amendment assessment.</p> <p>The Delegated Officer has amended the original wording to reflect that this finding is informed by groundwater monitoring data submitted in the Detailed Site Investigation undertaken to inform this amendment assessment.</p>
	<p>Whilst only three rounds of groundwater sampling were conducted for the DSI (Senversa, 2022), quarterly groundwater monitoring of bores GW1, GW2 and GW3 has been conducted since October 2018 (20 rounds). The results (refer to Wagin WWTP Annual Environmental Report 2022/23) indicate that operations are not impacting groundwater.</p> <p>Consider the following amendment:</p>	<p>The addition of this additional text provides no additional value to the original statement / finding.</p> <p>The Delegated Officer will retain the original wording.</p>

Reference	Summary of Licence Holder's comment	Department's response
	<p>'It is difficult to distinguish distinct sources of groundwater contamination near the WWTP due to surrounding activities which likely to produce leachate with similar chemical compositions to TWW. <b>Given the current absence of evidence to demonstrate the WWTP is source of contamination</b> additional evidence will be required to indicate whether the WWTP is a contributing source to elevated concentrations of COPC in groundwater.'</p>	
<p>Section 4.3.2 TWW – surface water flows to Slippery lake</p>	<p>Monthly surface water sampling (when surface water was present) was conducted at 13 locations within the TWW discharge area, Slippery Lake and surrounding drains over a 14-month period to assess chemical constituent loadings from the TWW discharge area to Slippery Lake. Section 8.6 of the DSI (Senversa, 2022) has quantitatively calculated the mass of chemical constituents entering Slippery Lake from each of the sources contributing to Slippery Lake. The surface water contaminant flux model considers infrequent flow events discharging to Slippery Lake.</p> <p>Consider the following amendment:</p> <p>'The potential of flow events to act as a transport pathway for chemical constituents from the wastewater disposal area to Slippery Lake is not adequately understood <b>requires verification through ongoing monitoring.</b> Limit study <b>A 14-month study</b> has been undertaken to characterise the magnitude and frequency of surface flow events, <b>however, ongoing monitoring is required to verify the findings of the study.'</b></p> <p>Wagin Lake was not dry over the study period, it was dry during 4 of the 9 sampling rounds compared to Gundaring Lake being dry 1 out of 9 and Parkeyerring Lake 2 out of 9 times. Slippery Lake was also dry 2 out of 9 times. This drying is a function of the ephemeral nature of the Wheatbelt salt lakes. Slippery Lake ecology was consistently within the range of ecological parameters at the reference lakes, and as expected for Wheatbelt salt lakes, with no cyanobacterial algal species were identified.</p> <p>Consider the following amendment:</p> <p>'Sampling data obtained from the reference lakes may not provide an accurate overview of true background concentrations with ground and</p>	<p>Information presented within the DSI has been considered in informing the amendment assessment and has presented to internal groundwater experts for comment.</p> <p>The Delegated Officer will include the proposed amended wording as additional text to the original statement in the key finding, noting that this does not change the outcome of the statement. This also remains consistent with technical advice received from Contaminated Sites experts within DWER who were consulted to inform this assessment.</p> <p>The Delegated Officer has removed reference to the drying of the lakes from this statement as it does not change the outcome of the finding. With this removal the Licence Holder's proposed revisions are not required.</p>



Reference	Summary of Licence Holder's comment	Department's response
	<p>surface water in the vicinity of Slippery Lake. As Wagin Lake was dry <b>during 4 of the 9 sampling rounds</b> over the study period, <del>the use of data from only two lakes will not provide enough information on background concentrations.</del> <b>this drying is a function of the ephemeral nature of the Wheatbelt salt lakes.'</b></p>	
	<p>The investigation was conducted over a 14-month sampling period. Monthly surface water sampling (when surface water was present) was conducted at 13 locations within the TWW discharge area, Slippery Lake and surrounding drains, sediment sampling at 74 locations, porewater sampling at 7 locations, and continuous chlorophyll-a and phycocyanin monitoring within Slippery Lake. This intensive 14-month investigation allowed along with desktop study information established the ecological values of Slippery Lake and the TWW discharge area, refer to Section 13.4 of DSI (Senversa, 2022) for full findings.</p> <p>Consider the following amendment:</p> <p>'For ecological monitoring, the <del>limited</del> <b>14-month</b> sampling period, along with <del>limited</del> number of samples obtained during the sampling period, <del>may not be representative of</del> <b>established</b> ecological or environmental conditions across the lakes and the TWWDA, <b>however ongoing monitoring is required to verify these findings</b> long term'.</p>	<p>Information presented within the DSI has been considered in informing the amendment assessment and has presented to internal groundwater experts for comment.</p> <p>The Delegated Officer will include the proposed amended wording as additional text to the original statement in the key finding, noting that this does not change the outcome of the statement. This also remains consistent with technical advice received from Contaminated Sites experts within DWER who were consulted to inform this assessment.</p>
	<p>As per section 12.1.1 of the DSI (Senversa, 2022), the ecological study focussed on the late wet season as the drying period from September to November each year when lake levels are dropping and the water temperature is increasing. Although the wet season is when the hydrological connectivity between the TWW discharge area and Slippery Lake would be highest, this doesn't correlate with timing of highest risk to ecological receptors.</p> <p>Consider the following amendment:</p> <p>'Detailed ecological monitoring <del>as not been</del> <b>was</b> undertaken during <del>the late</del> <b>two</b> wet seasons, when surface water flows during the peak wet season are expected to increase the likelihood of hydrological connectivity between the TWWDA and Slippery Lake and at which Slippery Lake is at the highest risk of impact from discharges of TWW.'</p>	<p>The timing of highest risk to ecological receptors is anticipated to be during the peak wet season, when the likelihood of hydrological connectivity between the TWWDA and Slippery Lake is expected to increase and therefore increase the potential for nutrient and contaminant transportation in large surface water flow events. This finding has been informed by technical advice from DWER internal experts, who were also presented with the DSI for review to inform this assessment.</p> <p>Monitoring during this timeframe has not been undertaken. As such, the original wording will be retained.</p>

Reference	Summary of Licence Holder's comment	Department's response
	<p>Surface water samples were collected along the flow path from the TWW discharge point, within the TWW discharge area to Slippery Lake (refer to DSI Section 8.0). Section 8.5 of the DSI concluded nitrogen and phosphorus concentrations showed a marked decrease with distance from the site, with concentrations at SW_D4 (i.e. indicative of West Catchment /TWW flow) being approximately 3-fold less for nitrogen and 2-fold less for phosphorus than recorded at SW_L1.</p> <p>Consider the following amendment:</p> <p><del>'There is limited understanding on</del> The capacity of the TWWDA to extract nutrients and / or contaminants prior to the discharge entering Slippery Lake <b>was found to be approximately 3-fold for nitrogen and 2-fold for phosphorus.'</b></p>	<p>The Delegated Officer has amended the original wording to reflect the Licence Holder's findings that nutrients are subject to natural attenuation. However, the original wording and intent is retained for other contaminants where no evidence is presented in relation to natural attenuation.</p>
<b>Additional comments on draft Licence after above revisions were made</b>		
<p>Condition 7, Table 4</p>	<p>Please delete Note 3 to Table 4, which requires standing water level to only be monitored for three consecutive months following the installation of GW1, GW2 and GW3.</p> <p>Standing water level will be monitored ongoingly through licence condition 7, Table 4.</p>	<p>Note deleted as requested.</p>
<p>Condition 8, Table 5</p>	<p>Under frequency column in table, please include text to specify monitoring will be undertaken when surface water is present.</p> <p>This update is requested to ensure that the Water Corporation won't be in non-compliance if surface water locations are dry during sampling periods.</p>	<p>'When surface water present' has been included within the monitoring frequency specification as requested.</p>
<p>N/A Schedule 1: Maps</p>	<p>Updated figures for the premises map, groundwater and surface water monitoring locations have been provided as requested.</p>	<p>New figures have been incorporated into Schedule 1.</p>

## Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)			
<b>Application type</b>			
Amendment to licence	<input checked="" type="checkbox"/>	Current licence number:	L6316/1991/13
		Relevant works approval number:	N/A
Date application received		20 September 2022	
<b>Applicant and Premises details</b>			
Applicant name/s (full legal name/s)		Water Corporation	
Premises name		Wagin Sewage Facility	
Premises location		1801 Cowcher Road WAGIN 6315	
Local Government Authority		Shire of Wagin	
<b>Application documents</b>			
HPCM file reference number:		DER2016/00916-1~2	
Key application documents (additional to application form):		Attachment 6A - Senversa – Environmental Assessment Summary – Wagin Wastewater Treatment Plant Attachment 8 – Senversa – Detailed site investigation – Wagin Wastewater Treatment Plant Wagin Wastewater Treatment Plant Licence Amendment Request – Cover letter	
<b>Scope of application/assessment</b>			
Summary of proposed activities or changes to existing operations.		<p>Water Corporation is seeking a licence amendment to L6316/1991/13 to:</p> <ul style="list-style-type: none"> <li>allow for the continued discharge of treated sewage from Discharge Point L1 beyond 30 June 202;</li> <li>change the quarterly groundwater sampling regime to a bi-annual groundwater sampling regime as the environmental risk primarily relates to surface water and the supporting monitoring data indicates that groundwater is unlikely to impact Slippery Lake (key receptor); and</li> <li>authorise the monitoring of surface water at Slippery Lake.</li> </ul>	
<b>Category number/s (activities that cause the premises to become prescribed premises)</b>			
<b>Table 1: Prescribed premises categories</b>			
<b>Prescribed premises category and description</b>	<b>Assessed production or design capacity</b>	<b>Proposed changes to the production or design capacity (amendments only)</b>	
Category 54: Sewage facility	260 m3 day/ per annual period	No change	

Legislative context and other approvals		
Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Referral decision No: Managed under Part V <input checked="" type="checkbox"/> Assessed under Part IV <input type="checkbox"/>
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Ministerial statement No: EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Reference No:
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Amendment application – not required as previously provided
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	From Previous Licence - Decision report:  Under Shire of Wagin town planning scheme no.2 district zoning scheme, 1 March 2005 the Premises is zoned public purposes sewage treatment works. The Premises is vested with the Minister for Water for the use of sewage treatment. Under Section 6 of the Planning and Development Act 2005 the public works are exempt from development/ planning approval
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	CPS No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: N/A Licence/permit No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: Licence/permit No: Licence / permit not required.
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: N/A Type: N/A Has Regulatory Services (Water) been consulted? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Regional office: N/A



<p>Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Name: N/A                  Priority: N/A                  Are the proposed activities/ landuse compatible with the PDWSA (refer to <a href="#">WQPN 25</a>)?                  Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/></p>
<p>Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx</i>)</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p><i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i></p>
<p>Is the Premises within an Environmental Protection Policy (EPP) Area?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	
<p>Is the Premises subject to any EPP requirements?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	
<p>Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i>?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Classification: N/A                  Date of classification: N/A                  Area immediately south of Premises (i.e. discharge location) is currently classified as 'Possibly contaminated - investigation required' (June 2018)</p>