



Application for Licence Amendment

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

Licence Number	L6640/1994/11
Licence Holder	Water Corporation
File Number	SWB1993-05/1
Premises	Gnarabup Wastewater Treatment Plant Gas Bay Road GNARABUP WA 6285 Legal description - Lot 603 on Deposited Plan 19971 As defined by the Premises map attached to the Revised Licence
Date of Report	21 May 2021
Proposed Decision	Revised licence granted

**MANAGER WASTE INDUSTRIES
REGULATORY SERVICES**

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

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1. Decision summary

Licence L6640/1994/11 is held by the Water Corporation (Licence Holder) for the Gnarabup Wastewater Treatment Plant (the Premises), located at Lot 603 Gas Bay Road, Gnarabup.

This Amendment Report documents the assessment of changes to the environmental monitoring conducted at the Premises. As a result of this assessment, Revised Licence L6640/1994/11 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 Application summary

On 14 December 2020, the Licence Holder submitted an application to amend Licence L6640/1994/11 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The amendment seeks to remove reference to redundant groundwater monitoring bores at the Premises and include reference to newly installed groundwater monitoring bores which will be used to satisfy ongoing monitoring requirements. No changes to the aspects of the existing Licence relating to Category 54 have been requested by the Licence Holder.

In amending the licence, the CEO has also:

- updated the format and appearance of the Licence;
- deleted the redundant AACR form set out in schedule 2 of the previous licence and advise the Licence Holder to obtain the form from the department's website;
- 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 full amendment of licence conditions as they relate to this Revised Licence are detailed in Section 5.1. The department has not undertaken any additional risk assessment of the Premises related to previously assessed activities.

The changes proposed as part of the amendment will facilitate the collection of additional environmental monitoring data which can be used in the future to reassess the risk profile of site activities, specifically in relation to the infiltration of treated wastewater at the Premises.

2.3 Background

Conditions 3.1.1 and 3.1.2 in the existing licence require that the Licence Holder undertake an improvement program and report on the completion of this program by 1 August 2016. On 18 August 2016, DWER granted an extension to this due date to 30 January 2017.

The scope of the improvement program is as follows:

“The Licensee shall provide a review of the appropriateness of the current groundwater

monitoring program to the CEO, which shall outline an assessment of each bore and if more bores are required or an alternative monitoring approach is required.”

On 27 February 2017, the Licence Holder submitted a letter to DWER to address the improvement program (Water Corporation 2017). The key points of this letter are summarised as follows:

- AECOM were engaged to review the groundwater monitoring program and determined that the current network of dry bores (1/99 and 2/99) was insufficient to monitor nutrient fate. The outcome of the review was the installation of three new bores 2/17 (midstream), 3/17 (downgradient) and 4/17 (upgradient) which was completed by 23 January 2017.
- The baseline sampling of water quality and soil (sorption testing) from the bores and beach sediment sampling indicated that, at that stage, nutrients were considered unlikely to be impacting the sensitive receptor of the Leeuwin Naturaliste Marine Park. The monitoring results to support this conclusion were not presented with the letter.
- The Licence Holder intended to increase the groundwater monitoring frequency from quarterly to monthly (to account for seasonal variation) and continue the existing ocean sampling. This data would assist the Licence Holder in selecting an upgrade option for the Premises based on treatment requirements.
- The original monitoring bores 1/99 and 2/99 were abandoned and replaced by 2/17 and 3/17.
- Ongoing monitoring of the new bores would commence once the Licence Holder had finalised long-term permissions to access the bores which are sited on Parks and Wildlife land managed by the Shire of Augusta – Margaret River.

Key Findings:

- (1) The Delegated Officer considers that the scope of the review presented in the Licence Holder’s letter dated 27 February 2017 was limited. The review did not include:
 - a description of the hydrogeological setting within the vicinity of the Premises;
 - a detailed explanation for the siting of new monitoring bores based on the groundwater flow direction and potential contaminant sources at the Premises;
 - a discussion of the new bore construction specifications with reference to the local hydrogeology and subsurface conditions;
 - a summary of baseline monitoring data; or
 - details on the decommissioning of bores 1/99 and 2/99.

3. Assessment of the monitoring network and monitoring program

3.1 Proposed groundwater monitoring network

On 2 February 2016 DWER (Compliance) conducted an inspection of the Premises to assess the operational and regulatory controls in place to manage, mitigate and monitor environmental impacts. It was identified at this time that the existing groundwater monitoring bores on the site, being 1/99 and 2/99, had been dry for a number of years and as a result, the Licence Holder had been unable to comply with groundwater monitoring conditions on the Licence.

To rectify the non-compliance the Licence Holder installed new groundwater monitoring bores, being bores 4/17 (upgradient), 3/17 (downgradient) and 2/17 (midstream), with confirmation that

installation works had been completed provided to DWER on 27 February 2017 (Water Corporation 2017).

The construction bore logs for these monitoring bores indicate that they were installed with screened intervals across the water table and the interface between the Tamala Limestone and underlying bedrock. The screen length is 6 metres in 2/17 and 4.5 metres in 3/17 and 4/17. The monitoring bores were constructed with 50 mm PVC casing, gravel packs around the screened interval, a bentonite seal at least one metre thick overlying the gravel pack and stick up completion above the ground surface.

Sampling of these bores for licence monitoring purposes commenced in July 2017, with the sampling of bore 3/17 (downgradient) delayed until October 2018 due to access concerns. It was then the intent of the Licence Holder to apply for a Licence amendment to include the new monitoring bores on the Licence.

The Annual Environmental Report (AER) and Annual Audit Compliance Report (AACR) submitted by the Licence Holder for the 2018/2019 reporting period identified that further assessment of the suitability of bore 4/17 (upgradient) was required prior to the submission of a Licence amendment application, as sampling results identified that the bore may be too close to the wastewater treatment plant (WWTP) and may not accurately represent background groundwater conditions.

As a part of this amendment application, the Licence Holder has provided the following information about background monitoring bores:

- An additional groundwater monitoring bore (5/20) was installed to the north of the site, however the bore was reported to have a limited water column, slow recharge and high sediment load resulting in elevated nutrients and was determined to be unsuitable for future compliance monitoring;
- Installation of a bore further east of the site was not considered plausible due to the requirement to clear vegetation for access for the drill rig, having to drill in the nature reserve (Leeuwin-Naturaliste National Park), and the fact that drilling would be more difficult given the steeper/higher topography, resulting in a high likelihood that groundwater would be considerably deeper than at 5/20 where well establishment was not possible;
- The inferred groundwater flow direction is westerly towards the coast and this supports bore 4/17 being suitably representative of background groundwater conditions and unlikely to encounter impacts from the WWTP;
- Concentration ranges for nutrients observed at bore 4/17 have stabilised since early 2019 indicating that earlier samples collected from the bore may have been influenced by sediment present in the well post installation (similar to observations from bore 5/20 noted above); and
- Trends for nutrient concentrations at bore 4/17 compared to bore 2/17, which is located immediately downgradient of the WWTP infrastructure, indicate that bore 4/17 is suitable to infer background conditions at the site and not indicative of WWTP impacts.

The locations of the newly installed bores, including bore 5/20, are outlined in Figure 1 below.

The Licence Holder has concluded that the extended data set and additional information obtained regarding groundwater flow beneath the Premises has discounted the previous assumption that bore 4/17 is installed too close to the WWTP to characterize background groundwater concentrations as previously suggested in the 2018/2019 AER and AACR submissions. The Licence Holder now considers that 4/17 is suitable to represent background groundwater concentrations at the site.



Figure 1: Groundwater monitoring bore locations

Key Findings:

- (2) The new groundwater bores 2/17, 3/17 and 4/17 were constructed to a suitable specification and at an appropriate depth to monitor potential impacts to shallow groundwater in the vicinity and downgradient of the Premises.
- (3) The main sources of potential groundwater contamination at the Premises are the two northern infiltration basins. Based on the inferred groundwater flow direction being westerly towards the coast, the Delegated Officer considers that the new groundwater bores 2/17 and 3/17 are suitably located to monitor groundwater quality downgradient of this infrastructure.
- (4) The new bores are not situated directly downgradient of the southern infiltration basin. The southern infiltration basin is only permitted to be used during maintenance or emergency situations and therefore presents a lower risk of causing groundwater contamination compared to the northern basins.
- (5) The Delegated Officer accepts the Licence Holder's justification for the selection of 4/17 as the background monitoring bore on the basis that there were limitations preventing installation of a background bore in an alternative location. However, there is some uncertainty about whether 4/17 is upgradient from the Premises and whether it is truly representative of background groundwater quality. The Delegated Officer considers that the regional groundwater flow direction is likely to be to the west,

towards the coast but has identified that the influence of bedrock elevation may lead to more complex local groundwater flow directions in the eastern portion of the Premises. Due to these complexities, there is the potential that groundwater at 4/17 may be affected by activities at the Premises. Interpretation of monitoring data from 4/17 to assess potential groundwater impacts from the Premises should take into account these sources of uncertainty.

- (6) The Delegated Officer considers that the inclusion of monitoring bore 1/17 in the licence groundwater monitoring program would assist in an improved understanding of the groundwater flow direction and quality to the east of the Premises and allow a more reliable determination as to whether 4/17 is representative of background groundwater quality.
- (7) The Delegated Officer notes that in the event of future monitoring results providing evidence that the locations of the bores are unsuitable to monitor groundwater quality upgradient and downgradient of the Premises, changes to the groundwater monitoring program may be required.
- (8) Monitoring bores 1/99 and 2/99 should be decommissioned if the Licence Holder does not intend to use these bores for ongoing groundwater monitoring purposes. Appropriate decommissioning in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (NUDLC 2020) will remove the potential for the bores to act as a preferential pathway between the ground level and subsurface.

3.2 Monitoring data review

DWER conducted a review of recent groundwater and ocean shore water monitoring results to inform the assessment. This review is presented in the following sections.

As part of the review, sampling results were compared to water quality guidelines relevant to receptors from potential groundwater impacts identified within the vicinity of the Premises (Figure 2). Based on the inferred groundwater flow direction, groundwater from the Premises is likely to migrate downgradient and potentially discharge to the marine environment. As the marine environment and its recreational users are the key receptors of concern for migration of groundwater from the Premises, ocean shore water monitoring results have also been reviewed.

Generic screening criteria have been adopted to provide an initial indication of whether certain physical and chemical stressors and toxicants are exceeding harmful levels which may impact on the receiving environment. Further assessment may dictate that other screening criteria may be more appropriate however, for the purposes of this review the following guidelines values were used:

- default trigger values for physical and chemical stressors in inshore marine environments applicable to south-west Western Australia from the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ, 2000).
- default marine water guideline value for toxicants based on the 99% level of species protection from the revised *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Water Quality Australia, 2018). The 99% level of species protection is relevant to high conservation or ecological value systems and has been applied because the Gas Bay marine environment forms part of the Ngari Capes Marine Park; and
- guidelines for non-potable groundwater use (NPUG) (DOH, 2014) which are equivalent to 10x drinking water guideline values in accordance with the screening

approach for recreational exposure as outlined in the *Guidelines for Managing Risks in Recreational Water* (NHMRC, 2008).

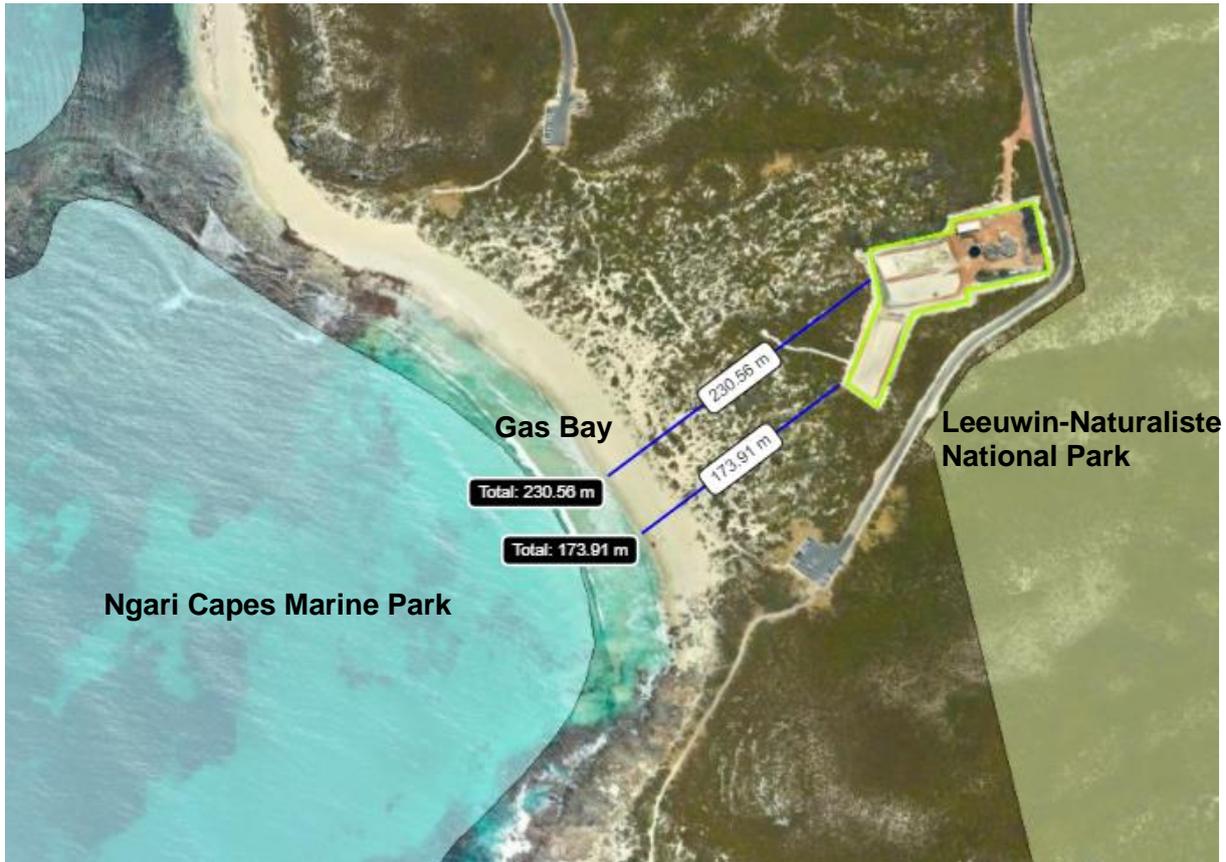


Figure 2: Distance to receptors

3.2.1 Groundwater

Recent groundwater monitoring data is not available for groundwater monitoring bores 1/99 and 2/99 as these bores were dry during quarterly monitoring events conducted from 2010 to 2017 and were then replaced in 2017.

Groundwater monitoring data for the Premises is provided to DWER in annual environmental reports (AERs). Recent licence groundwater monitoring data available to DWER at the time of this assessment comprises quarterly monitoring of 2/17 and 4/17 from July 2017 to April 2020 and 3/17 from October 2018 to April 2020. The parameters required to be analysed in groundwater samples under condition 2.3.1 of the existing licence comprise standing water level, pH, total dissolved solids (TDS), ammonium-nitrogen ($\text{NH}_4\text{-N}$), nitrate-nitrogen and nitrite-nitrogen (NOx-N), total nitrogen (TN), total phosphorus (TP) and *Escherichia coli* (*E. coli*).

General quality parameters

Groundwater at the three monitoring bores is neutral to slightly alkaline with pH in the range of 7.7 to 8.1. Groundwater salinity is fresh to marginal (470-710 mg/L TDS) in 2/17 immediately downgradient from the Premises, saline (16,740-31,740 mg/L) in 3/17 further downgradient from the Premises and marginal to brackish (650-1,430 mg/L TDS) in 4/17 north of the Premises. The higher salinity at 3/17 is likely due to interaction between fresh and saline groundwater along the seawater interface.

Nutrients

Nutrient concentrations detected in groundwater monitoring bores are summarized in Table 1 and TN and TP concentrations are shown in Figure 3 and Figure 4. The highest nutrient concentrations in groundwater were recorded at 2/17 which is immediately downgradient from infiltration basins at the Premises. The elevated nutrient concentrations at this bore are likely to be a result of treated wastewater migrating to groundwater from the infiltration basins. Monitoring bore 3/17 typically recorded lower TN concentrations and significantly lower TP concentrations than 2/17. These trends support that nutrient concentrations are attenuated within groundwater as it migrates downgradient from the Premises. The reduction of TP concentrations from about 2-5 mg/L at 2/17 to generally below the limit of reporting (LOR) at 3/17 (distance of about 90 metres) can be attributed to sorption of phosphorus on calcareous sediments within the aquifer during migration.

Oxidised nitrogen (NO_x-N) was the dominant form of nitrogen present in groundwater at the three bores. NH₄-N was generally recorded below the LOR with sporadic detections of concentrations above the LOR.

A summary of the results in comparison to water quality guidelines is provided as follows:

- TN and NO_x-N concentrations exceeded the default trigger value for the inshore marine environment in the three monitoring bores during all monitoring events.
- NO_x-N concentrations were below the recreational NPUG guidelines for nitrate and nitrite, with the exception of the NO_x-N concentration detected at 4/17 in January 2018 which exceeded the guideline value for nitrite. As the speciation of nitrate and nitrite in this sample was not reported, it is not known whether this sample is an exceedance of the recreational guideline (NPUG).
- Concentrations of NH₄-N detected in the three monitoring bores exceeded the default trigger value for the inshore marine environment during some monitoring events and the October 2019 result from 2/17 also exceeded the default marine water guideline value for 99% species protection. NH₄-N concentrations were below the recreational guideline (NPUG) for ammonia, with the exception of the October 2019 sample from 2/17.
- Concentrations of TP exceeded the default trigger value for the inshore marine environment at 2/17 and 4/17 during all monitoring events and at 3/17 in July 2019.
- The LORs for TP and NH₄-N analysis were above the default trigger values for the inshore marine environment and therefore it is not possible to assess whether the results reported as less than the LOR exceeded the default trigger values.

Table 1: Summary of nutrient concentrations at groundwater monitoring bores 2/17, 3/17 and 4/17 July 2017 to July 2020

Bore	TN	NO _x -N	NH ₄ -N	TP
Ecological – marine water guidelines	0.23 mg/L ¹	0.005 mg/L ¹	0.005 mg/L ¹ 0.5 mg/L ²	0.02 mg/L ¹
Human health – recreational guidelines (NPUG)	No guideline	113 mg/L (NO ₃ -N) 9 mg/L (NO ₂ -N)	0.4 mg/L ³	No guideline
2/17	Range of 2.7-11 mg/L Fluctuating concentrations; no consistent trend	Range of 2.2-9.6 mg/L Fluctuating concentrations; no consistent trend	Range of <LOR-2.8 mg/L Sporadically detected above the LOR; no consistent trend	Range of 1.5-5.1 mg/L Fluctuating concentrations; no consistent trend
3/17	Range of 1-6.2 mg/L Fluctuating concentrations following seasonal patterns (high concentrations in summer)	Range of 0.85-6.1 mg/L Fluctuating concentrations following seasonal patterns (high concentrations in summer)	Range of <LOR-0.06 mg/L Sporadically detected above the LOR; no consistent trend	Range of <LOR-0.063 mg/L Detected above the LOR once; no consistent trend
4/17	Range of 2.4-11 mg/L Fluctuating concentrations; peak concentration in January 2018 and subsequent decreasing trend	Range of 1.6-10.7 mg/L Fluctuating concentrations; peak concentration in January 2018, followed by a rapid decrease and gradual increasing trend	Range of <LOR-0.22 mg/L Sporadically detected above the LOR; no consistent trend	Range of 0.12-3.3 mg/L Fluctuating concentrations; no consistent trend

Note 1: Default trigger values for physical and chemical stressors in inshore marine environments applicable to south-western Australia (Table 3.3.6 in ANZECC and ARMCANZ, 2000)

Note 2: Default marine water guideline value for toxicants for ammonia, 99% species protection level at pH 8

Note 3: The NPUG guideline for ammonia is based on the aesthetic drinking water quality guideline.

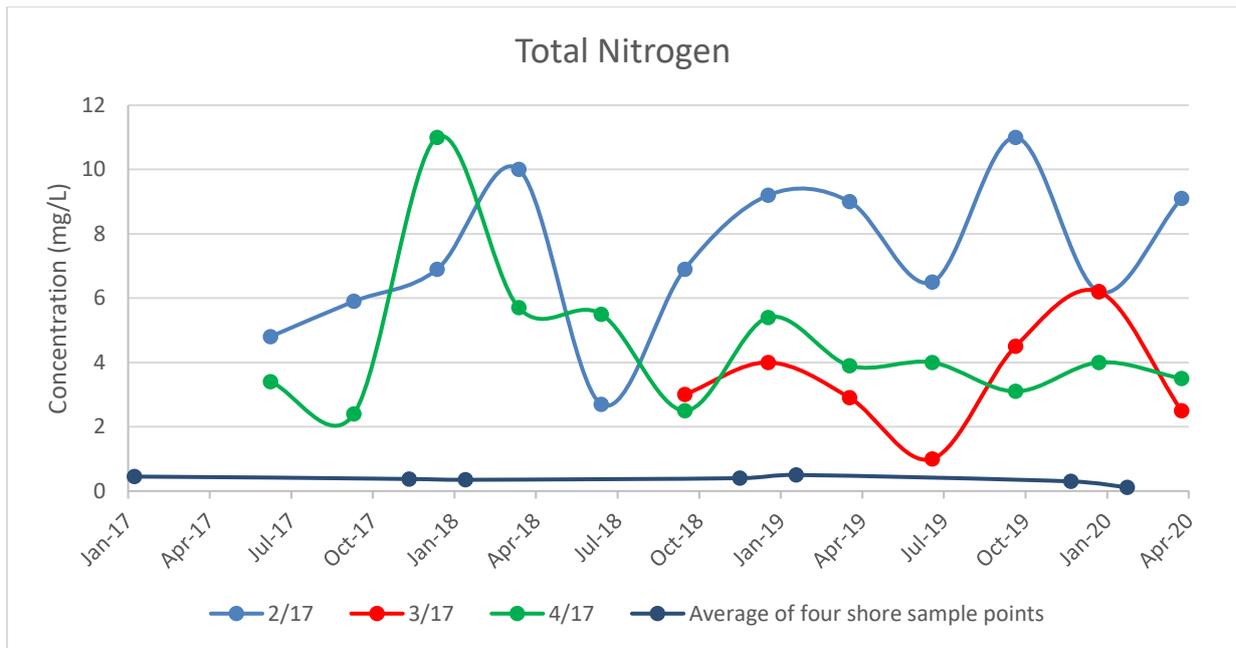


Figure 3: TN concentrations in groundwater monitoring bores 2/17, 3/17 and 4/17 and averaged across the four shore sample points July 2017 to July 2020

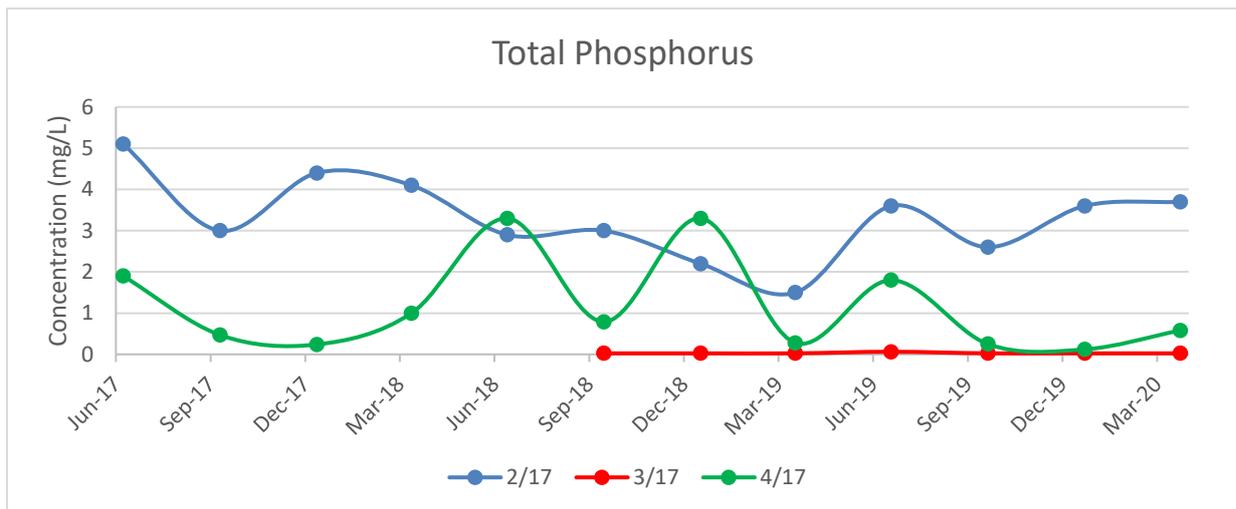


Figure 4: TP concentrations in groundwater monitoring bores 2/17, 3/17 and 4/17 July 2017 to July 2020

Faecal pathogens

E. coli was not detected above the LOR at 2/17 and 3/17 since monitoring commenced. Monitoring bore 4/17 recorded two detections of *E. coli* equal to the LOR of 10 most probable number (MPN)/100 mL in January and April 2018. Other samples from 4/17 did not record detections of *E. coli* above the LOR.

E. coli is a suitable indicator organism for monitoring at 2/17 and 4/17 because groundwater at these bores is of fresh to brackish salinity. Monitoring bore 2/17 is located immediately downgradient of the infiltration basins and the results from this bore do not indicate that faecal pathogens are migrating from the Premises via groundwater flow. The source of *E. coli* detections at 4/17 is uncertain and ongoing monitoring at this location is required to determine if the detections in 2018 were anomalous results, caused by residual contamination from bore installation or are evidence of impacts from the Premises.

E. coli may not be a suitable indicator organism for faecal contamination at 3/17 because it may not survive well in saline conditions. It therefore may not be appropriate to interpret the absence of *E. coli* in 3/17 as an indication that faecal pathogen contamination is absent at this location.

Metals

Metals are not included in the licence groundwater monitoring program and were not reported within AERs during the review period. Analysis of metals concentrations in groundwater was undertaken by the Licence Holder in January 2017. These results were reported to DWER when the Premises was reported under the *Contaminated Sites Act 2003*. The *Form 1 Report of a known or suspected contaminated site* submitted by the Licence Holder to DWER identified that groundwater monitoring at the Premises indicated elevated concentrations of arsenic, lead and manganese above marine ecological criteria and NPUG criteria. The Licence Holder did not attribute the elevated metals concentrations to wastewater treatment activities at the Premises.

3.2.2 Shore sampling data

Condition 2.3.1 in the existing licence requires the Licence Holder to undertake monitoring of four shore sample points in December and February each year. Samples are collected as grab samples of ocean water taken at the shoreline. Shore sampling data is provided to DWER in AERs and the locations of shore sample points are shown in Figure 5.

The locations shown in Figure 5 are not consistent with the map of shore sample points in the existing licence. However, the Licence Holder has advised that monitoring has occurred at the locations in Figure 5 for a long time and they also appear to be generally consistent with the map of shore sample points in an earlier version of the licence (L6640/1994/9 issued 1 November 2007). Based on this information, it appears that the shore sample point map in the existing licence is inaccurate and does not reflect monitoring locations implemented by the Licence Holder.

The Licence Holder has undertaken shore water sampling over a long-term period and monitoring data from December 2016 to February 2020 was reviewed to inform this assessment. The parameters required to be analysed in shore water samples under condition 2.3.1 of the existing licence comprise TN, NH₄-N, NO_x-N, filterable reactive phosphorus (FRP), chlorophyll a, cadmium, copper, lead, mercury, zinc and *E. coli*.



Figure 5: Shore sample point locations

Nutrients and condition indicators

TN concentrations fluctuated within the range of <0.1 to 0.5 mg/L at the four shore sample points during the review period and did not record consistent increasing or decreasing trends. Most of the detected concentrations of TN exceeded the default trigger value for inshore marine environments. The average TN concentration detected at the four shore sample points during the review period is shown in comparison to groundwater concentrations in Figure 3.

NO_x-N concentrations fluctuated at the four shore sample points but recorded an overall increasing trend during the review period. Concentrations ranged from <0.05 to 0.21 mg/L during the review period and peaked in December 2019 with concentrations of 0.18 to 0.21 mg/L across the four sample points. The detected concentrations of NO_x-N exceeded the default trigger value for inshore marine environments and, as the LOR was higher than this guideline, it was not possible to assess whether non-detections were exceedances or not. No exceedances of the recreational guideline (NPUG) for nitrate or nitrite were recorded in shore water samples during the review period.

NH₄-N was not detected above the LOR of 0.05 mg/L during the review period with the exception of one detection equal to the LOR at Point 1 in February 2020 which exceeded the default trigger value for inshore marine environments. As the LOR for NH₄-N was higher than the default trigger value for inshore marine environments, it was not possible to assess whether non-detections were exceedances or not. No exceedances of the recreational guideline (NPUG) or default marine water guideline (99% species protection level) for NH₄-N were recorded during the review period.

FRP was not detected above the LOR of 0.03 mg/L during the review period. This LOR was higher than the default trigger value of 0.005 mg/L for inshore marine environments and it was not possible to assess whether non-detections were exceedances or not.

Chlorophyll *a* is a condition indicator used to assess the presence of nuisance aquatic organisms such as phytoplankton, cyanobacteria and algae. Chlorophyll *a* concentrations fluctuated between the December and February monitoring events but generally recorded an overall increasing trend during the review period. Point 1 recorded the highest concentrations of the four shore sample points and the monitoring results from this location recorded in February 2019 and 2020 exceeded the default trigger value for inshore marine environments of 0.7 mg/L.

Faecal pathogens

There was only one detection of *E. coli* equal to or above the LOR of 10 MPN/100 mL in shore water samples collected during the review period; a detection equal to the LOR was recorded at Point 4 in February 2019. *E. coli* may not be a suitable indicator organism for faecal contamination in ocean water because this pathogen does not survive as well in saline conditions as other indicator organisms such as *Enterococci*. Therefore, the absence of *E. coli* in shore water samples may not be interpreted as a reliable indication that faecal pathogen contamination is absent.

Metals

Cadmium, copper, lead, mercury and zinc were not detected above the LORs from December 2018 to February 2020. The LORs for these metals were higher than the default marine water guidelines (99% species protection level), therefore it was not possible to assess whether non-detections were exceedances or not.

Lower LORs were used for the analysis conducted in February 2017 and the following detections of metals were recorded during this monitoring event: 0.003 mg/L copper and 0.06 mg/L zinc at Point 1 and 0.02 mg/L zinc at Points 3 and 4. These detections exceeded the default marine water guidelines (99% species protection level) for copper and zinc but were below the recreational guidelines (NPUG).

Key Findings:

- (9) Elevated nutrient concentrations in downgradient monitoring bores 2/17 and 3/17 provide evidence that these bores are suitably located to detect impacts to off-site groundwater from treated wastewater infiltration at the Premises. There is evidence that nutrients undergo attenuation as groundwater migrates away from the Premises from 2/17 to 3/17.
- (10) Monitoring bore 4/17 recorded concentrations of nutrients and *E. coli* which could indicate that groundwater at this location is affected by activities at the Premises. As observed in Key Finding (5), there is uncertainty about the direction of groundwater flow in the vicinity of 4/17. Further monitoring is required to assess whether this bore is representative of background groundwater quality or is downgradient of the Premises. There is currently insufficient information available to characterise background groundwater quality upgradient of the Premises.
- (11) Metals are a contaminant of potential concern associated with treated wastewater. Metals concentrations in groundwater remains a data gap as metals are not included in the monitoring program on the existing licence. Interpretation of metals concentrations in shore water samples was partially limited by the LORs used for the analysis. The Licence Holder should consider how chosen analytical methods may limit the interpretation of monitoring data against relevant guideline values when implementing monitoring programs at the Premises in the future.
- (12) Faecal pathogens are likely to be the most significant public health hazard associated with discharges from a wastewater treatment plant. The current monitoring program focusses on *E. coli* as an indicator for faecal contamination, however this may not be

the optimum indicator organism for saline environments. However, *E. coli* is considered to be a suitable indicator organism for the fresh groundwater conditions at 2/17 immediately downgradient of the infiltration basins and monitoring results at this bore do not provide evidence that faecal pathogens are migrating from the Premises via groundwater.

- (13) Concentrations of nutrients and metals in shore water samples and nutrients in groundwater at downgradient monitoring bore 3/17 did not exceed the guidelines relevant to assessing water quality for recreational purposes.
- (14) Concentrations of nutrients in groundwater downgradient of the Premises and nutrients, metals and chlorophyll a in shore water samples exceeded the default trigger values and guideline values relevant to assessing marine water quality for ecological purposes. Exceedance of these values does not necessarily demonstrate that there is a risk to marine ecosystems. Trigger values are concentrations that, if exceeded, would indicate a potential environmental problem and so trigger further investigation.
- (15) The Delegated Officer considers that further monitoring data is required to inform a review or updated assessment of the risks from treated wastewater infiltration at the Premises.

4. Consultation

Table 2 provides a summary of the consultation undertaken by the department.

Table 2: Consultation

Consultation method	Comments received	Department response
Shire of Augusta-Margaret River advised of proposal 12 February 2021	No comments received	N/A
Licence Holder provided with draft amendment 1 April 2021	Licence Holder responded on 14 May 2021 Refer to Appendix 1	Refer to Appendix 1

5. 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 considers that the placement of groundwater monitoring bores 3/17 and 2/17 is appropriate to monitor groundwater quality downgradient of the Premises. Given the uncertainty about whether 4/17 is suitably located to represent background groundwater quality, the Delegated Officer considers that monitoring bore 1/17 should be included in the monitoring program to improve the understanding of groundwater flow direction and quality on the eastern side of the Premises.

The Delegated Officer considers that additional parameters need to be included in the analytical suite for discharge quality, groundwater quality and shore water quality to address data gaps in the existing monitoring dataset. Updated annual reporting requirements for discharge,

groundwater and shore water monitoring are also required to provide DWER with adequate information to assess future monitoring results.

It is noted that the annual period of the Premises is 1 July to 30 June and the next AER is due for submission to DWER by 1 September 2021. As this amendment is being completed late in the 2020 to 2021 annual period, DWER considers that the Licence Holder should follow the annual reporting conditions on the existing licence when preparing the 2020 to 2021 AER. Subsequent AERs will need to comply with the annual reporting requirements in the revised licence.

The groundwater and shore water monitoring programs may be refined in the future based on the results of further monitoring conducted in accordance with the Revised Licence.

5.1 Summary of amendments

Table 3 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 4 provides a summary of the changes made as part of the licence format updates and consolidation process.

Table 3: Summary of licence amendments

Condition no.	Proposed amendments
Condition 1.1.1, 1.1.2, 1.1.3 and 1.1.4 (previous licence)	Redundant conditions removed and incorporated into other conditions.
Condition 1 (revised licence)	Waste acceptance criteria: replacement of previous condition 1.2.1 - change to condition wording to reflect updated wording in use by DWER.
Condition 2.2.1 (previous licence)	Monitoring of inputs and outputs: condition deleted and replaced by conditions 11 and 12 to reflect updated wording in use by DWER.
Condition 8 (revised licence)	Reference to annual monitoring frequency removed as no annual monitoring specified in the licence.
Conditions 11 and 12 (revised licence)	Monitoring of inputs and outputs: insertion of new conditions with updated wording for the monitoring of site inputs and outputs.
Condition 13 (revised licence)	<p>Environmental monitoring: removal of reference to redundant bores 1/99 and 2/99 and inclusion of reference to new bores 1/17, 2/17, 3/17 and 4/17.</p> <p>Addition of the following parameters to the discharge quality monitoring program:</p> <ul style="list-style-type: none"> • Metals – aluminium, arsenic, chromium, cobalt, manganese and nickel <p>Addition of the following parameters to the groundwater monitoring program:</p> <ul style="list-style-type: none"> • Field parameters – electrical conductivity, redox potential and dissolved oxygen (in field analysis permitted) • Faecal pathogens – <i>Enterococci</i> • Metals – aluminium, arsenic, cadmium, chromium, cobalt, copper, lead, manganese, nickel and zinc

Condition no.	Proposed amendments
	Changes to the shore water monitoring program parameters: <ul style="list-style-type: none"> • Replacement of <i>E. coli</i> with <i>Enterococci</i> • Addition of TP Addition of units (MPN/100 mL or CFU/100 mL) for reporting <i>E. coli</i> and <i>Enterococci</i> concentrations.
Condition 14 (revised licence)	Removal of reference to redundant bores 1/99 and 2/99 and inclusion of reference to new bores 1/17, 2/17, 3/17 and 4/17.
Conditions 3.1.1 and 3.1.2 (previous licence)	Improvement program removed as the scope of this program has been satisfied through a combination of: <ol style="list-style-type: none"> (i) information in the letter from the Licence Holder dated 27 February 2017; and (ii) information provided by the Licence Holder to support this application. DWER has addressed the information gaps identified in Key Finding (1) within the assessment in this Amendment Report.
Conditions 15 and 16 (revised licence)	Record keeping: replacement of previous condition 4.1.1 - change to condition wording to reflect updated wording in use by DWER.
Condition 17 (revised licence)	Annual Audit Compliance Report (AACR): replacement of previous condition 4.1.2 - change to condition wording to reflect updated wording in use by DWER.
Condition 18 (revised licence)	Complaints: replacement of previous condition 4.1.3 - change to condition wording to reflect updated wording in use by DWER.
Condition 19 (revised licence)	Annual Environmental Report: replacement of previous condition 4.2.1 with the following changes: <ul style="list-style-type: none"> • Updated reporting specifications for groundwater monitoring to align with DWER's current information requirements. • Addition of discharge and shore water quality monitoring reporting requirements.
N/A Schedule 1 - Maps	Premises map replaced with updated version. Shore sample point map replaced with updated version showing the correct location of monitoring points.
N/A Schedule 2 – Reporting and notification forms	Schedule 2 deleted – redundant AACR form deleted. New form is available on DWER's website.

Table 4: Consolidation of licence conditions in this amendment

Existing condition	Condition summary	Revised licence condition	Conversion notes
All relevant	Licensee	Licence Holder	Update to standard terminology and nomenclature
Condition 1.1.1 and 1.1.2	Definitions	N/A Definitions section – Table 8	Revised to current licensing formatting.
Condition 1.1.3 and 1.1.4	Reference to Australian standard, guidelines or codes of practice	N/A	Removed and incorporated into other conditions.
Condition 1.2.1 Table 1.2.1	Waste acceptance	Condition 1 Table 1	Updated to reflect current condition wording in use.
Condition 1.2.2 Table 1.2.2	Waste processing	Condition 2 Table 2	Reference changed and reformatted.
Condition 1.2.3 Table 1.2.3	Containment infrastructure	Condition 3 Table 3	Reference changed and reformatted.
Condition 1.2.4	Management of WWTP	Condition 4	Reference changed and reformatted.
Condition 1.2.5	Management of infiltration area	Condition 5	Reference changed and reformatted.
Condition 1.2.6	Security measures	Condition 6	Reference changed and reformatted.
Condition 2.1.1	Water sampling requirements	Condition 7	Reference changed and reformatted.
Condition 2.1.2	Quarterly and annual monitoring requirements	Condition 8	Reference changed and reformatted.
Condition 2.1.3	Calibration of monitoring equipment	Condition 9	Reference changed and reformatted.
Condition 2.1.4	CEO to be notified if calibration requirements cannot be met	Condition 10	Reference changed and reformatted.
Condition 2.2.1 Table 2.2.1	Monitoring of inputs and outputs	Conditions 11 and 12 Tables 4 and 5	Redundant condition. Updated to reflect current condition wording in use by splitting monitoring into two conditions and two tables.

Existing condition	Condition summary	Revised licence condition	Conversion notes
Condition 2.3.1 Table 2.3.1	Monitoring of ambient groundwater quality	Condition 13 Table 6	Reference changed and reformatted. Monitoring requirement changes as a result of this amendment (refer Table 3 above).
Condition 2.3.1	Monitoring bores to be maintained	Condition 14	Reference changed and reformatted. Monitoring requirement changes as a result of this amendment (refer Table 3 above).
Condition 3.1.1 and 3.1.2 Table 3.1.1	Improvements program	N/A	Conditions removed as program satisfied (refer Table 3 above).
Condition 4.1.1	Records	Conditions 15 and 16	Updated to reflect current condition wording in use.
Condition 4.1.2	AACR	Condition 17	Updated to reflect current condition wording in use.
Condition 4.1.3	Complaints management	Condition 18	Updated to reflect current condition wording in use.
Condition 4.2.1	AER	Condition 19	Reference changed and reformatted. Updated reporting requirements to align with current regulatory approach.
N/A Schedule 1	Premises maps	Premises map (Figure 1) Shore sample point map (Figure 2)	Premises map (Figure 1) replaced with updated version. Shore sample point map (Figure 2) replaced with updated version.
N/A Schedule 2	Reporting and notification forms	N/A	Redundant AACR form deleted from Licence – now available on DWER's website.

References

1. ANZECC and ARMCANZ 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australia.
2. Department of Environment and Conservation 2013, *Ngari Capes Marine Park Management Plan 74 2013-2023*, Perth, Western Australia.
3. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
4. DER 2017, *Guidance Statement: Risk Assessments*, Perth, Western Australia.
5. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
6. Department of Health (DOH) 2014, *Contaminated sites ground and surface water chemical screening guidelines*, Perth, Western Australia.
7. NHMRC 2008, *Guidelines for Managing Risks in Recreational Water*, Canberra, Australia.
8. NUDLC 2020, *Minimum Construction Requirements for Water Bores in Australia*.
9. Water Corporation 2016, *L6640/1994/11 – Gnarabup Wastewater Treatment Plant – Improvement Condition IR1*, letter from Bree Atkinson to Caron Goodbourn dated 27 July 2016. DWER reference: A1141087.
10. Water Corporation 2017, *L6640/1994/11 – Gnarabup Wastewater Treatment Plant – Improvement Condition IR1*, letter from Digby Short to Stephen Checker dated 27 February 2017. DWER reference: A1383969.
11. Water Quality Australia 2018, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Accessed: <https://www.waterquality.gov.au/anz-guidelines>

Appendix 1: Summary of Licence Holder's comments on draft conditions

Condition	Summary of Licence Holder's comment	Department's response
Licence cover page	It is requested that the amended licence be issued formally on or after 1 July 2021 so that the sampling and reporting regime becomes effective for the July 2021 to June 2022 annual period. This will allow time for Water Corporation to prepare for and/or effectively manage any relevant changes.	<p>The Delegated Officer has determined not to postpone the amendment of the licence to 1 July 2021.</p> <p>Section 5 of this Amendment Report has been edited to clarify that the annual reporting requirements in the revised licence are not expected to be implemented in the 2020-2021 AER. The Delegated Officer considers that the 2020-2021 AER can be prepared in accordance with the annual reporting conditions specified in the existing licence because they were in force for most of the annual period.</p> <p>The monitoring conditions in the revised licence come into force on the day this licence amendment is granted. The Delegated Officer understands that the Licence Holder typically conducts quarterly monitoring at the premises in July, October, January and April. Based on this timing, it is expected that the first monitoring event to be completed in accordance with the monitoring conditions in the revised licence is likely to be undertaken between 1 July and 30 September 2021.</p>
8 – Timing of annual monitoring	There are no parameters monitored annually, so we suggest condition 8(b) is removed.	Condition 8(b) removed.
14 and Schedule 1	The replacement map for Schedule 1 which includes monitoring bore 1/17 was provided to allow Figure 1 to be updated.	Figure 1 updated to premises map supplied by the Licence Holder.
Definitions	<p>Amend the definition for 'Quarterly' as follows so that the four periods align with the definition for 'annual period':</p> <p><i>'means the 4 inclusive periods from 1 July to 30 September, 1 October to 31 December and in the following year, 1 January to 31 March, 1 April to 30 June.'</i></p>	Requested edits made to the definition for quarterly.

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)				
Application type				
Works approval	<input type="checkbox"/>			
Licence	<input type="checkbox"/>	Relevant works approval number:		None <input type="checkbox"/>
		Has the works approval been complied with?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Has time limited operations under the works approval demonstrated acceptable operations?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	
		Environmental Compliance Report / Critical Containment Infrastructure Report submitted?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Date Report received:		
Renewal	<input type="checkbox"/>	Current licence number:		
Amendment to works approval	<input type="checkbox"/>	Current works approval number:		
Amendment to licence	<input checked="" type="checkbox"/>	Current licence number:	L6640/1994/11	
		Relevant works approval number:	N/A	<input checked="" type="checkbox"/>
Registration	<input type="checkbox"/>	Current works approval number:	None	<input type="checkbox"/>
Date application received	14 December 2020			
Applicant and Premises details				
Applicant name/s (full legal name/s)	Water Corporation			
Premises name	Gnarabup Wastewater Treatment Plant			
Premises location	Gas Bay Road, Gnarabup			
Local Government Authority	Shire of Augusta Margaret River			
Application documents				
HPCM file reference number:	SWB1993-05/1~1			
Key application documents (additional to application form):	N/A			
Scope of application/assessment				
Summary of proposed activities or changes to existing operations.	Amendment to remove reference to old groundwater monitoring bores and include new set of monitoring bores on the Licence.			

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

Table 1: Prescribed premises categories

Prescribed premises category and description	Assessed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 54: Sewage facility	356 cubic metres per day	N/A

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 checked="" type="checkbox"/> No <input type="checkbox"/>	Certificate of title <input checked="" type="checkbox"/> General lease <input type="checkbox"/> Expiry: Mining lease / tenement <input type="checkbox"/> Expiry: Other evidence <input type="checkbox"/> Expiry:
Has the applicant obtained all relevant planning approvals?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	Approval: P218116 and P216635 Expiry date: N/A
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.

<p>Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>Name: Cape to Cape South Surface Water area and Blackwood Groundwater area</p> <p>Type: Proclaimed Groundwater Area/Surface Water Area</p> <p>Has Regulatory Services (Water) been consulted?</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/></p> <p>Regional office: South West</p>
<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</p> <p>Priority: N/A</p> <p>Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)?</p> <p>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 xxx</i>)</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></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 checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>Classification: possibly contaminated – investigation required (PC–IR)</p> <p>Date of classification: 20/09/2017</p>