Amendment Report

Application for Licence Amendment

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

Licence Number	L9094/2017/1
Licence Holder	Water Corporation
File Number	DER2017/001655-1
Premises	Broome North Water Resource Recovery Facility Lot 1502 Crab Creek Road ROEBUCK WA 6725 Legal description – Lot 1502 on Deposited Plan 75036 Certificate of Title Volume 2805 Folio 367
Date of Report	22 December 2021
Proposed Decision	Revised licence granted

Jarrod Abrahams
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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 L9094/2017/1 is held by Water Corporation (Licence Holder) for the Broome North Water Resource Recovery Facility (the Premises), located at Lot 1502 of Deposited Plan 75036, Roebuck. The Premises comprises a wastewater treatment plant (WWTP) and treated wastewater reuse irrigation areas.

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 L9094/2017/1 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.

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 10 June 2021, the Licence Holder submitted an application to the department to amend Licence L9094/2017/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are being sought:

- Amendment of existing pond freeboard conditions to more accurately reflect the manner in which the sewage treatment ponds and treated wastewater storage dam function; and
- Amendment of the groundwater monitoring program to require only monitoring of the Pindan Sands aquifer and to reduce the number of bores requiring sampling from 30 to 14. The 14 proposed monitoring wells also comprise some newly drilled bores not currently listed in the existing licence.

This amendment is limited only to changes of regulatory conditions relating to Category 54 and 61 activities from the Existing Licence. No changes to the design or throughput capacity of the Existing Licence have been requested by the Licence Holder.

2.2.1 Pond freeboard

Condition 1.3.5(b) of L9094/2017/1 requires a freeboard height of at least 500 mm to be maintained across all wastewater treatment ponds at the Premises. The Licence Holder has stated that treatment ponds are operated with at least a 500 mm top of pond embankment freeboard, however this doesn't account for the design freeboard level of spillways that connect the treatment ponds or the storage dam spillway to the environment. The spillways connecting the primary pond to the maturation pond and the maturation pond to the storage dam have a design freeboard of 200 mm. The storage dam spillway to the environment has a design freeboard of 470 mm.

The spillways enable wastewater to flow downstream through the system at a higher rate during significant rainfall events. This allows the freeboard to the external pond embankments to be maintained at 500 mm and requires all ponds to be filled before discharge to the environment can occur. As the storage dam is the only containment infrastructure with a spillway to the environment, this is considered to be the critical point at which freeboard must be maintained to prevent discharges to the environment.

Spillways also provide an asset protection function during extreme rainfall events where overtopping of embankments can cause significant erosion and impact the integrity of containment infrastructure. Spillways are constructed using concrete and are purpose built to tolerate high velocity water flows during these events.

2.2.2 Groundwater monitoring

Condition 3.4.1 of L9094/2017/1 requires the Licence Holder to undertake quarterly monitoring of 30 groundwater bores located upgradient, within and downgradient of the Premises. Most of the monitoring sites are comprised of clustered groundwater bores targeting the shallow Pindan Sands and the deeper Broome Sandstone aquifers. An additional nine groundwater bores are also part of the monitoring network, however these are not currently required to be monitored through Condition 3.4.1.

The proposed amendments to the groundwater monitoring program are to monitor only the Pindan Sands aquifer and to reduce the number of bores requiring sampling from the 30 listed on the Existing Licence to 14 bores at locations specified by the Licence Holder. Most of the bores proposed for removal are screened within the Broome Sandstone aquifer, however some bores screened within the Pindan Sands are proposed to be replaced with newly drilled wells in alternate locations. A summary of the Licence Holder's justification for the amendment is provided below:

- Monitoring of the Broome Sandstone aquifer is proposed for removal as it's considered hydraulicly connected to the Pindan Sands aquifer and provides limited value above monitoring only the Pindan Sands.
- A reduction in the number of locations requiring monitoring is proposed, due to groundwater monitoring conducted to date observing stable trends in contaminant concentrations and a general consistency between background and downgradient concentrations across both aquifers.
- Bores 21/10 and 23/10, located approximately 2.5 km down hydraulic gradient from the Premises, are proposed for removal as existing on-site (4/20 and 5/20) and off-site bores (15/10 and 19/10) already provide sufficient coverage to monitor any potential downgradient impacts to groundwater.

Excluding one monitoring well located at the site of future irrigation infrastructure, the Licence Holder will retain the removed bores as a contingency for future sampling events. The existing and proposed changes to the groundwater monitoring network are shown in Figure 1 below and specific explanation for the monitoring bores to be removed from the licence are contained in Table 1.

Table 1: Justification for specific monitoring bore locations

Bore ID	Aquifer	Location	Justification for removal
BH4/06	Broome Sandstone	Offsite and south of the WWTP	Fugitive emissions resulting from WWTP operations will be captured through the monitoring of onsite bores 9/10, 11/10, 13/10, 3/20, 4/20 and 5/20, located down-hydraulic gradient of the treatment ponds and irrigation pivot 3. Bore 19/10 located offsite and further down-hydraulic gradient would also detect fugitive wastewater emissions.

Bore ID	Aquifer	Location	Justification for removal
BH5/06 BH6/06	Broome Sandstone	Offsite and south of the WWTP and tree plantation	Bores BH5/06 and BH6/06 are located down-hydraulic gradient of the MAC tree plantation. The plantation accounts for approximately 1% of irrigated treated wastewater at the Premises and would be unlikely to impact groundwater quality. Any fugitive emissions resulting from MAC plantation operation will be captured through the monitoring of offsite down-hydraulic gradient bores 17/10 and 19/10.
BH7/06 04/10	Broome Sandstone	Eastern Premises boundary	Bore 3/10 located on the eastern boundary of the site and bore 1/20 located north of pivot 2 will monitor background groundwater quality entering the Premises.
BH8/06 BH9/06	Broome Sandstone	Offsite and north of the WWTP	Bore 3/10 located on the eastern boundary of the Premises and bore 1/20 located north of pivot 2 will monitor background groundwater quality.
2/10 6/10 8/10	Broome Sandstone	Southwest of pivot 1	Fugitive emissions from pivot 1 will be captured through the monitoring of bores 1/10, 5/10 and 7/10 screened within the Pindan Sands.
10/10 12/10 14/10	Broome Sandstone	Southwest of the treatment ponds	Monitoring of bores 9/10, 13/10 and 3/20 will capture any potential fugitive emissions from operation of the treatment ponds.
11/10	Pindan Sands	Southwest of the treatment ponds	The bore is likely to be destroyed in the near future during the construction of irrigation pivot 3. Monitoring of bores 9/10, 13/10 and 3/20 will capture any fugitive emissions from operation of the treatment ponds.
16/10	Broome Sandstone	Offsite and 1.4 km west of the treatment ponds	Any fugitive emissions from the operation of the WWTP will be captured through the monitoring of on-site bores 1/10, 5/10, 7/10, 4/20 and 5/20, and off-site bores 15/10, 17/10 and 19/10.
18/10 20/10	Broome Sandstone	Offsite south and southwest of the Premises	
21/10 22/10 23/10 24/10	Pindan Sands (21/10, 23/10) Broome Sandstone (22/10, 24/10)	Offsite and 2.5km southwest of the treatment ponds	Any fugitive emissions from the operation of the WWTP will be captured through monitoring of bores screened within the Pindan Sands through existing onsite bores 4/20 and 5/20, and closer offsite bores 15/10 and 19/10, that are located down hydraulic gradient of the WWTP.

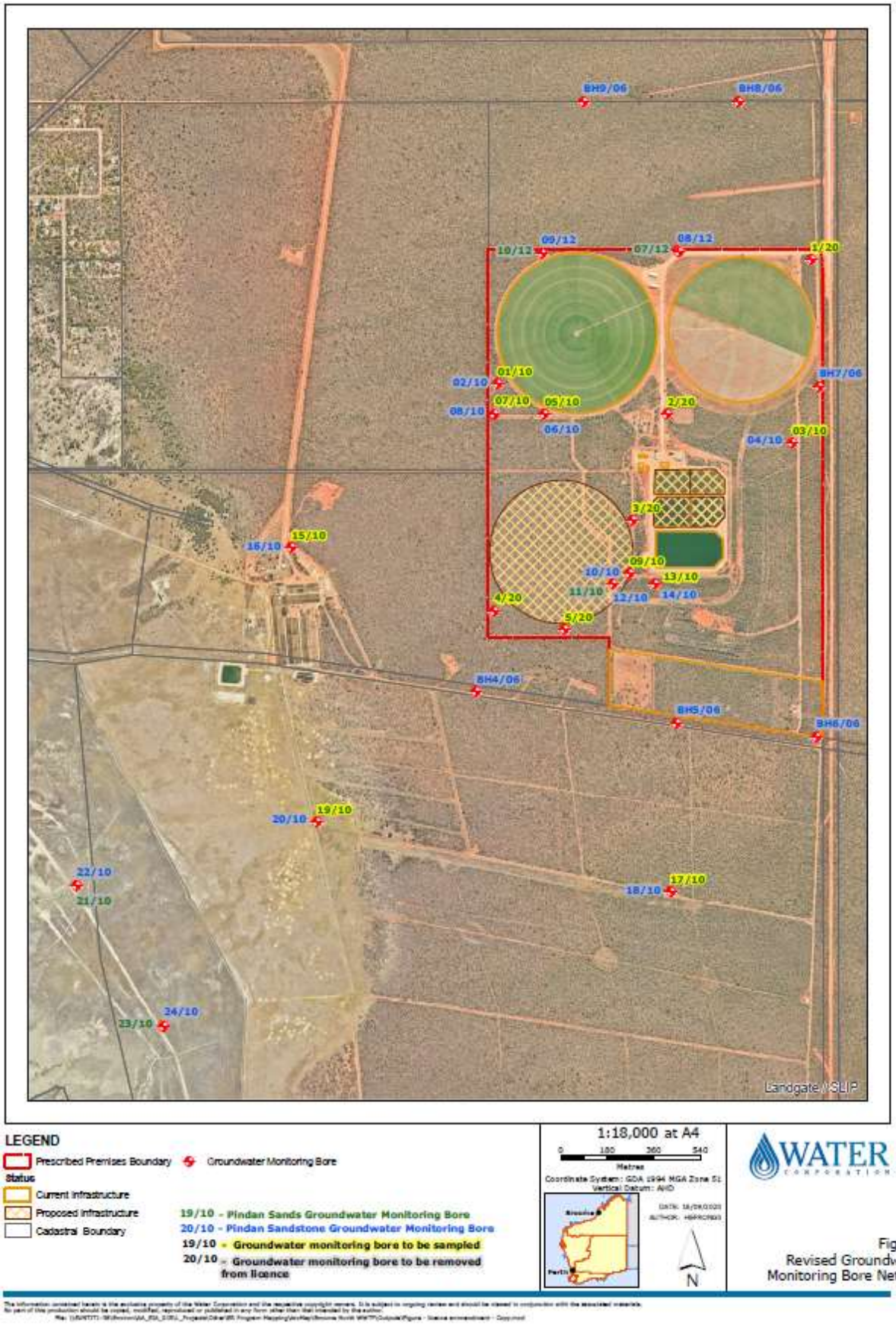

Figure 1: Existing and proposed monitoring network

3. 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.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathways during Premises operation which have been considered relevant to the scope of the amendment application are detailed in Table 2 below.

Table 2 also details the control measures the Licence Holder has proposed to assist in controlling these emissions, that are relevant to the amendment scope. Emissions and controls not considered relevant to the scope of the application have been excluded.

Table 2: Licence Holder controls

Emission	Sources	Potential pathways	Proposed controls
Sewage and treated wastewater containing contaminants (e.g. nutrients, pathogens, metals, POPs)	Containment loss from wastewater treatment and storage infrastructure	Surface runoff via pond overflow	Treatment ponds and storage dam operated to a minimum top of embankment freeboard height of 500 mm. Spillways connecting treatment ponds and storage dam operated to a minimum freeboard height of 200 mm. Storage dam spillway to the environment operated to a minimum freeboard height of 470 mm.
		Seepage through pond liners	Detection of impacts via monitoring groundwater at bores 1/20, 2/20, 3/20, 4/20 5/20, 1/10, 3/10, 5/10, 7/10, 9/10, 13/10, 15/10, 17/10 and 19/10.
Treated wastewater containing contaminants (e.g. nutrients, pathogens, metals, POPs)	Discharge of treated wastewater via irrigation	Subsurface seepage	Detection of impacts via monitoring groundwater at bores 1/20, 2/20, 3/20, 4/20 5/20, 1/10, 3/10, 5/10, 7/10, 9/10, 13/10, 15/10, 17/10 and 19/10.

3.1.2 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 3 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 3: Sensitive human and environmental receptors and distance from prescribed activity

Receptors	Distance from prescribed activity
Human receptors	
Sensitive receptor – Morrell Park aboriginal community homestead	1.4 km west of the Premises boundary and 1.5 km west of the nearest irrigation area.
Industrial receptor – Cattle saleyard office/sheds	800 m west of the Premises boundary and 1.4 km west of the nearest pond infrastructure.
Environmental receptors	
Underlying groundwater – Pindan Sands aquifer Broome Sandstone aquifer	Groundwater monitoring conducted by the Licence Holder indicates that the two aquifers are hydraulically connected in the area, as the lower part of the Pindan Sands is difficult to distinguish from the upper Broome Sandstone (GHD 2020a). This is consistent with the existing regional interpretation that the Pindan Sands and Broome Sandstone are hydraulically continuous and considered to be a single unconfined groundwater resource in the Broome area (DOW 2012). Annual reporting for the 2019/2020 period recorded the following depths to groundwater at the Premises and offsite monitoring network: • Pindan Sands aquifer: 5.90 – 6.05 mbgl (3.1 – 5.95 m AHD) • Broome Sandstone aquifer: 5.75 - 17.80 mbgl (2.49 – 4.95 m AHD) Regional information indicates that groundwater flow is in a southwesterly direction towards Roebuck Bay and Dampier Creek, with a hydraulic gradient of approximately 0.001. No licensed/registered groundwater abstraction bores are located within 1 km of the Premises (based on available GIS dataset –WIN Groundwater Sites).

Receptors	Distance from prescribed activity
Important wetlands – Roebuck Bay	The Roebuck Bay wetland area is approximately 850 m southwest of the Premises boundary, 1.1 km southwest of the nearest irrigation area and 1.5 km southwest of the treated wastewater storage pond. Dampier Creek is considered part of the Roebuck Bay wetland.
Surface water – Dampier Creek	Permanent surface water of Dampier Creek is located approximately 2 km southwest of the Premises boundary, 2.4 km southwest of the nearest irrigation area and 2.75 km southwest of the treated wastewater storage pond.
Department of Biodiversity, Conservation and Attractions legislated tenure – Yawuru Birragun Conservation Park	1.3 km west of the Premises boundary and 1.45 km west of the nearest irrigation area.
RAMSAR Wetland - Roebuck Bay Site ID: 479	The defined area of the Roebuck Bay RAMSAR wetland is located approximately 5.5 km southeast of the Premises boundary.
Threatened Ecological Communities (TEC) - Species-rich faunal community of the intertidal mudflats of Roebuck Bay	The Premises is situated within the buffer area of the TEC. The TEC is listed as vulnerable under the *Biodiversity Conservation Act 2016* (WA) (BC Act).
Threatened Ecological Communities (TEC) - Monsoon (vine) thickets on coastal sand dunes of the Dampier Peninsula	The TEC includes the coastal inundation areas surrounding Dampier Creek, the upper reaches of which are approximately 900 m southwest from the Premises boundary, 1.1 km southwest of the nearest irrigation area and 1.5 km southwest of the treated wastewater storage pond. The TEC is listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act).
Public Drinking Water Source Area - Broome Water Reserve (P1)	2.4 km north and upgradient of the Premises boundary.

3.1.3 Pathways

Table 4 below provides a summary of the characteristics of potential pathways that are considered relevant to emissions and discharges from the prescribed premises (*Guidance Statement: Risk Assessment* (DER 2017)).

Table 4: Pathways and site characteristics at the Premises

Aspect	Details
Geology	Investigations at the Premises have identified the following soil profile: • Topsoil (0.1 - 0.2 mbgl) - Fine to medium grain, generally loose and dry containing organic matter (particularly grass roots). • Alluvium (4.5 - 5.1 mbgl) - Gravelly sands: gravel sub rounded to rounded particles of Broome Sandstone. • Pindan Sands (4.5 - 9.8 mbgl) - Silty sand: red brown, fine to medium grained silty sands, with minor clay. • Broome Sandstone (9.8 – 30 mbgl) - Variably lithified silts and siltstone, with minor coarse quartz sand, feldspar and heavy minerals.
Meteorology	The Bureau of Meteorology weather station No. 003003 Broome Airport provided the following information, based on records from 1991 to 2020: • The majority of annual rainfall occurs between December and March, driven by cyclonic weather patterns when temperatures and humidity are high. • The annual average rainfall is approximately 746.9 mm but is highly variable and has ranged from 132 mm to 1599 mm per year. • Average minimum and maximum temperatures over the year vary from 21.4º C to 32.4º C. • Average pan evaporation rates are very high, greatly exceeding rainfall and average about 2950 mm per annum.
Topography	The Premises is located on an extensive Pindan Sand plain that slopes from approximately 20 mAHD in the north-east to 12 mAHD in west.

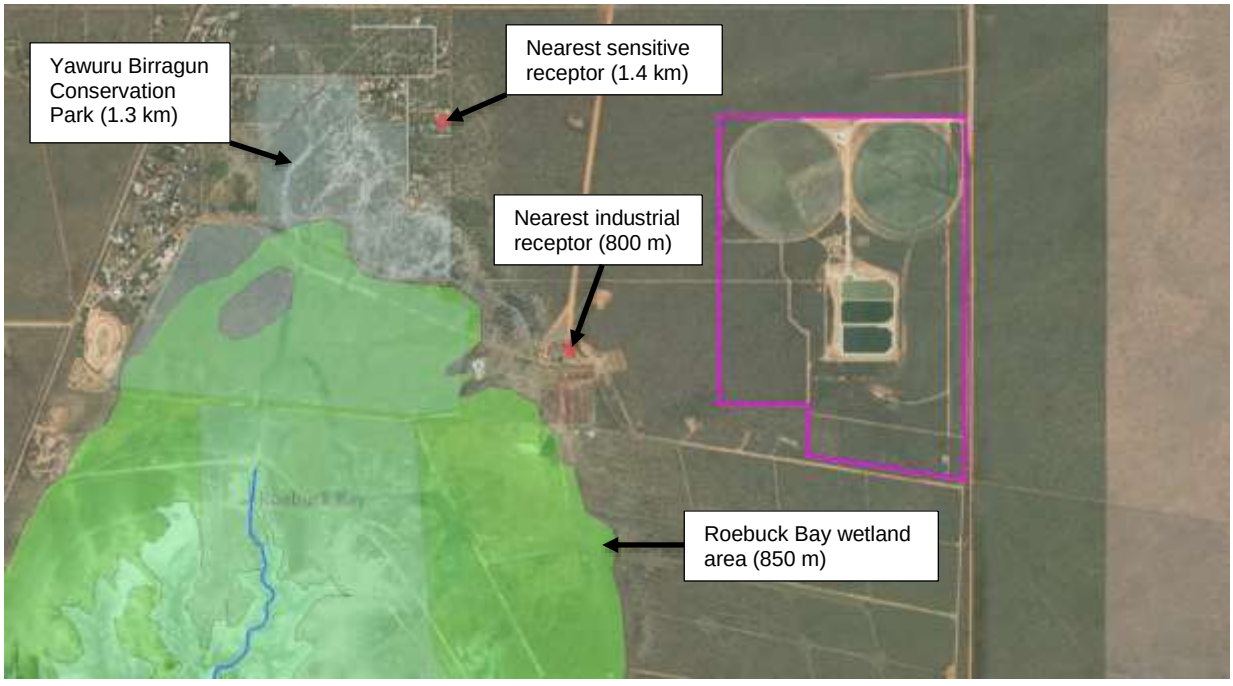

Figure 2: Distance to sensitive receptors. The Premises boundary is shown in pink.

3.2 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 3.1. 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 3.1), 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 L9094/2017/1 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. Category 54 and 61 activities.

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[1] C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions[2] of licence	Justification
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence Holder's controls**				
Operation								
Containment loss from wastewater treatment and storage infrastructure	Sewage and treated wastewater containing contaminants (e.g. nutrients, pathogens, metals, POPs)	Surface runoff via pond overflow causing impacts to terrestrial and aquatic ecosystems	Species-rich faunal community of the intertidal mudflats of Roebuck Bay Monsoon (vine) thickets on coastal sand dunes of the Dampier Peninsula (1.5 km from source) Roebuck Bay (1.5 km from source)	Refer to Section 3.1.1	C = Minor L = Rare **Low Risk**	Y	Condition 1.2.6(c) **Condition 1.2.6(b)**	The Delegated Officer does not consider that the proposed change to the pond freeboard condition (1.3.5(b)) listed in the Existing Licence will have a material effect on the risk of pond overflow events. The proposed changes reflect the operating conditions for the ponds since their initial construction and seek to clarify condition wording. The ponds have a designed top of embankment freeboard of 500 mm that, when reached, is maintained by directing flows through connecting spillways towards the final pond (treated wastewater storage dam). The final pond has a spillway to the environment that is maintained at 470 mm freeboard. The spillways protect the structural integrity of the ponds and allow for discharge to the environment to occur in a somewhat controlled manner. Overflow events may cause low level on-site impacts and minimal off-site impacts at a local scale. Offsite impacts at a wider scale, such as at Roebuck Bay, are not likely to be detected. Overflow events are only likely to occur in exceptional circumstances, associated with extreme rainfall where effluent discharging to the environment would be substantially diluted.
		Seepage through pond liners and soil causing impacts to groundwater, including downgradient receptors	Underlying groundwater (5.90 – 6.05 mbgl) Species-rich faunal community of the intertidal mudflats of Roebuck Bay Monsoon (vine) thickets on coastal sand dunes of the Dampier Peninsula (1.5 km from source) Roebuck Bay (1.5 km from source)	Refer to Section 3.1.1	C = Major L = Rare **Medium Risk**	Y	Table 3.4.2: monitoring bores 1/10, 3/10, 5/10, 7/10, 9/10, 13/10, 15/10, 17/10, 19/10, 1/20, 2/20, 3/20, 4/20, and 5/20. **Table 3.4.2: monitoring bore 10/12**	Seepage of sewage and treated wastewater to groundwater may cause low level off-site impacts at a local scale and short-term impact to an area of high conservation significance. The discharge point for groundwater potentially impacted by Premises operations is Dampier Creek. Seepage of sewage and treated wastewater to groundwater, including impacts at the Dampier Creek receptors, is only likely to occur in exceptional circumstances. This is due to the existing Licence Holder controls, distance to the receptor and aquifer conditions. Previous assessments conducted by the Licence Holder have considered that the Pindan Sands and Broome Sandstone aquifers are hydraulically connected at the Premises and surrounding area. This is consistent with the existing regional interpretation that the aquifers are considered a single unconfined groundwater resource due to their hydraulic continuity. In consideration of the monitoring data previously submitted by the Licence Holder, the Delegated Officer considers that the proposed removal of monitoring for the Broome Sandstone aquifer is unlikely to result in potential impacts to groundwater being undetected at the Premises. A summary of the groundwater monitoring conducted by the Licence Holder is contained in the Decision Report for W6451/2020/1 issued on 23 April 2021 (DWER 2021). The removal of downgradient Pindan Sands bores 21/10 and 23/10 (located at Dampier Creek) is acceptable, as impacts to groundwater should first be detected within sentinel bores and other off-site downgradient bores located closer to the Premises. The Delegated Officer also considers that the bores are not suitably located for monitoring conducted through the conditions of a licence, where the objective is to detect impacts caused by operation of that specific premises. Bore 21/10 is located downgradient of another prescribed premises, the Broome Commons cattle saleyard (L7864/2003/4), which is also a suspected contaminated site classified as *potentially contaminated – investigation required*. Bore 23/10 is located downgradient of an historical animal carcass trench and landfill. The 14 monitoring bores proposed for inclusion or retention in the Licence are either; • located upgradient of pivot 2 or the containment infrastructure; • located immediately downgradient of TWW discharge points and containment infrastructure for sewage or TWW; or • located downgradient of the Premises, at approximately half of the distance to potential environmental receptors for groundwater discharge. The Delegated Officer considers that the revised monitoring network is generally commensurate with the determined risk rating (Medium) for the risk event. However, the proposed changes do not include a sufficient number of upgradient monitoring locations. The monitoring of bore 10/12, located cross-gradient of pivot 1 and screened within the Pindan Sands has been specified as an additional regulatory control. This will provide a total of three upgradient bores which is considered to be sufficient to characterise background groundwater quality at the premises.
Discharge of treated wastewater via irrigation	Treated wastewater (TWW) containing contaminants (e.g. nutrients, pathogens, metals, POPs)	Subsurface seepage causing impacts to soil and groundwater, including downgradient receptors	Underlying groundwater (5.90 – 6.05 mbgl) Species-rich faunal community of the intertidal mudflats of Roebuck Bay Monsoon (vine) thickets on coastal sand dunes of the Dampier Peninsula (1.1 km from source) Roebuck Bay (1.1 km from source)	Refer to Section 3.1.1	C = Major L = Rare **Medium Risk**	N		

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. Consultation

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

Table 6: Consultation

Consultation method	Comments received	Department response
Local Government Authority advised of proposal (26 July 2021)	None received.	N/A
Licence Holder was provided with draft amendment on 11 October 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 does not consider that the proposed change to the pond freeboard condition (1.3.5(b)) listed in the Existing Licence will have a material effect on the risk of pond overflow events.

The Delegated Officer considers that the proposed removal of groundwater monitoring for the Broome Sandstone aquifer is unlikely to result in potential impacts to groundwater being undetected at the Premises. The revised monitoring network is considered to be commensurate with the determined risk rating (Medium) for potential impacts to groundwater and downgradient receptors. The monitoring of bore 10/12, located cross-gradient of pivot 1 and screened within the Pindan Sands has been specified as an additional regulatory control.

The Delegated Officer has elected to not update the Revised Licence into the current licensing format used by the department. This is due to the Licence Holder undertaking substantial works at the Premises in the near future, through instrument W6451/2020/1. Licence L9094/2017/1 will be updated into the new format when an amendment to include the works completed under W6451/2020/1 is received.

5.1 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.

The Delegated Officer has additionally realigned condition numbers for numerical consistency, corrected conflicting terminology, clerical mistakes and unintentional errors, updated the CEO notification address and replaced the term *Licensee* with the term *Licence Holder*.

Table 7: Summary of licence amendments

Condition no.	Proposed amendments
1.1.2 – Definitions	The definition of *freeboard* has been changed from: *means the distance between the maximum water surface elevations and the top of retaining banks or structures at their lowest point* to *means the distance between the maximum water surface elevations and the top of retaining embankments or spillways at their lowest point* The definition for *Stage 1 Irrigation Area* has been removed and replaced with a definition for the *Pivot Irrigation Area* as follows: *means irrigation area comprising Pivot 1 and Pivot 2 as depicted in Schedule 1* A definition for the *Guideline: Assessment and management of contaminated sites* has been added. Clerical errors in the definitions for AS/NZS 4439.1 and AS/NZS 4482.1 have been corrected.
Previous conditions 1.2.2 – 1.2.5	The conditions have been removed from the Revised Licence as the works have been previously completed and the department confirmed compliance on 27 August 2018.
Table 1.2.2 (previous Table 1.3.3)	Reference to the *Irrigation Area* in the fourth row has been amended to *Pivot Irrigation Area* to distinguish the requirements in this row from the requirements for the Seedling Irrigation Area in the row below.
1.2.6 (previous condition 1.3.5)	The condition has been changed from: *The Licensee shall manage all wastewater treatment ponds such that:* *(a) overtopping of the ponds does not occur;* *(b) a freeboard equal to, or greater than, 500 mm is maintained;* *(c) the integrity of the containment infrastructure is maintained;* *(d) trapped overflows are maintained on the outlet of ponds to prevent carry-over of surface floating matter; and* *(e) vegetation and floating debris (emergent or otherwise) is prevented from encroaching onto pond surfaces or inner pond embankments.* to *The Licence Holder shall manage all wastewater treatment ponds such that:* *(a) overtopping of the ponds does not occur;* *(b) a top of embankment freeboard equal to, or greater than, 500 mm is maintained;* *(c) a spillway freeboard equal to, or greater than, 470 mm is maintained at the storage pond;* *(d) the integrity of the containment infrastructure is maintained;* *(e) trapped overflows are maintained on the outlet of ponds to prevent carry-over of surface floating matter; and* *(f) vegetation and floating debris (emergent or otherwise) is prevented from encroaching onto pond surfaces or inner pond embankments.*
1.2.7 (previous condition 1.3.6)	Reference to the *Stage 1 Irrigation Area* in part (a) has been amended to *Pivot Irrigation Area* to clarify that this condition applies to the entire Pivot Irrigation Area, comprising both Pivots 1 and 2, as per the definition for the *Pivot Irrigation Area* under condition 1.1.2.
2.1.1 and Table 2.1.1	Reference to the *map of emission points* has been updated to the *Premises map* to reflect changes in the maps of Schedule 1.

Condition no.	Proposed amendments
	Reference to the *Stage 1 Irrigation Area* in the first row of the table has been amended to *Pivot Irrigation Area* to clarify that this condition applies to the entire Pivot Irrigation Area, comprising both Pivots 1 and 2, as per the definition for the *Pivot Irrigation Area* under condition 1.1.2. The emission point reference in the second row of the table has been amended to refer to the *Seedling Irrigation Area* for clarity. References to emission monitoring points S3002405 and S3002406 have been removed. The emission points are more clearly described by the name of the designated emission area, i.e. Pivots 1 and 2, and the Seedling Irrigation Area, rather than the identification codes for the emission monitoring points.
3.1.1	A clerical error in the reference to AS/NZS 4482.1 has been corrected.
Table 3.3.1	Reference to the *Stage 1 Irrigation Area* in the second row has been amended to *Pivot Irrigation Area* to clarify that this condition applies to the entire Pivot Irrigation Area, comprising both Pivots 1 and 2, as per the definition for the *Pivot Irrigation Area* under condition 1.1.2.
Table 3.4.2	The following monitoring bores have been removed from the *Monitoring point reference and location* column of Table 3.4.2: *2/10, 4/10, 6/10. 8/10, 10/10, 11/10, 12/10, 14/10, 16/10, 18/10, 20/10, 21/10, 22/10, 23/10, 24/10, BH4, BH5, BH6, BH7, BH8 and BH9* The following monitoring bores have been added to the *Monitoring point reference and location* column of Table 3.4.2: *10/12, 1/20, 2/20, 3/20, 4/20 and 5/20*
4.2.1	The due date for the Annual Environmental Report has been amended from 63 days to 93 days after the end of the annual period, following a request from the Licence Holder.
Table 4.2.1 and Condition 4.2.2	Reference to *pivots 1 and 2* has been removed from the fifth row of the table because this is not considered to be an appropriate descriptor for emission monitoring point S3002406. Additional specifications relating to the monitoring of ambient groundwater quality have been added as requirements to be provided with the Premises' Annual Environmental Report. The specifications reflect the current standard of groundwater reporting information required by the department. Reference to the *Stage 1 Irrigation Area* in parts (b) and (c) of condition 4.2.2 have been amended to *Pivot Irrigation Area* to clarify that these conditions apply to the entire Pivot Irrigation Area, comprising both Pivots 1 and 2, as per the definition for the *Pivot Irrigation Area* under condition 1.1.2.
Schedule 1	The *Premises map* has been updated to depict the premises boundary and the locations of current emissions points more accurately. The descriptive text for this map has been amended to reflect that this map shows the locations of emission points defined in Table 2.1.1. The title of the first *Map of emission points* has been amended to the *Map of emission monitoring points.* The descriptive text for this map has been amended to reflect that this map only shows the locations of emission monitoring points defined in Table 3.2.1. The second *Map of emission points* has been removed as the information shown in this map is adequately depicted in the updated *Premises map.* The titles of the two *Map of monitoring locations* have been amended to clarify which map shows soil monitoring locations and which map shows groundwater monitoring locations. The *Map of groundwater monitoring locations* has been updated to reflect the changes in the licence groundwater monitoring network specified in condition 3.4.1 and Table 3.4.2 which have resulted from this amendment.

References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water (DOW) 2012, *Groundwater resource review: Dampier Peninsula*, Hydrogeological record series report no. HG57, Perth, Western Australia.
3. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
4. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
5. DWER 2021, *Decision Report W6451/2020/1*. Issued 23 April 2021. accessed at: https://www.der.wa.gov.au/images/documents/our-work/licences-and-works-approvals/Decisions_/W6451-2020-1%20DR.pdf
6. GHD 2020a, *Water Corporation Broome North Wastewater Treatment Plant. Baseline Assessment*, Unpublished report. (A1946747).
7. GHD 2020b, *Water Corporation Broome North Wastewater Treatment Plant. Environmental Site Assessment,* Unpublished report. (A1940775)

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

Condition	Summary of Licence Holder's comment	Department's response
Premises name	Premises name requested to change to Broome North Water Resource Recovery Facility. The Corporation has undergone a project to rename those Wastewater Treatment Plants (WWTPs) which recover resources to recycle as part of the treatment process to Water Resource Recovery Facilities (WRRFs) to reflect the true functionality of these facilities.	The Delegated Officer considers that the requested change is reasonable and has implemented this change in the revised licence.
1.2.6	As stated in our supporting documentation the critical freeboard measure is at the storage dam, as this is the point at which wastewater would be released to the environment. The storage dam maintains a freeboard at the spillway (to the environment), (i.e. 470mm). The primary and secondary ponds have been designed incorporating asset protection measures (spillways) to manage levels between ponds and ensure compliance with 1.3.5 (a). It is requested that DWER amend Condition 1.2.6 as follows: (a) overtopping of the ponds does not occur; (b) a freeboard equal to, or greater than, 470 mm is maintained at the storage pond; (c) the integrity of the containment infrastructure is maintained; (d) trapped overflows are maintained on the outlet of ponds to prevent carry-over of surface floating matter; and (e) vegetation and floating debris (emergent or otherwise) is prevented from encroaching onto pond surfaces or inner pond embankments.	The Delegated Officer considers that a minimum freeboard requirement at the storage pond is not an adequate regulatory control to mitigate potential overtopping of the primary and secondary ponds. The licence amendment application indicated that maintaining an appropriate freeboard level at the external embankments is a key control which mitigates the overtopping risk for the primary and secondary ponds and a 500 mm freeboard is already achieved at the top of the external embankments on these ponds. The minimum top of embankment freeboard has therefore been retained as a regulatory control in the revised licence for the primary and secondary ponds.
3.4.1, Table 3.4.2	Changes noted. Further discussion regarding Bore 7/12 and 10/12 provided below. The Corporation does not consider Bore 7/12 representative of background concentrations in the aquifer over Bore 10/12. Is the department amenable to replacing bore 7/12 for bore 10/12? This is Water Corporation's preferred	The Delegated Officer considers that monitoring bore 7/12 is well-positioned to assess groundwater quality upgradient from pivot 1. The siting of monitoring bore 10/12 is not as well-suited for this purpose because it is cross-gradient from pivot 1, within about 30 m of the pivot irrigation area and could potentially be affected by irrigation. Both 7/12 and 10/12 are screened across the water table

Condition	Summary of Licence Holder's comment	Department's response
	option. *In response to a department request for clarification, the Licence Holder provide the following supplementary information on 7 December 2021:* Water Corporation didn't originally recommend 7/12 to be put on the licence as it was thought monitoring bores 1/20 and 3/10 were enough to assess background concentrations. Groundwater concentrations were found to be elevated in bore 7/12 compared to other up-hydraulic gradient bores in the area. The concentration measured does not fit in with the regional expectations and in addition the bore has only been sampled once by GHD, so this concentration also hasn't been verified with further sampling. Further, there are 4 bores installed in the Pindan sands that are considered up-hydraulic gradient (03/10, 07/12, 10/12 and 01/20). The TN results from 03/10, 10/12 and 01/20 ranged between 0.2-3.4 mg/L, where the TN results from 07/12 was 19.3 mg/L. It is unclear why this result is so much higher than the other background bores, therefore the Corporation consider that it is not suitable to use as representative of background based on this. Adopting this result as background could potentially impact site interpretation and determination of down-gradient groundwater impacts.	so are suitably designed to monitor shallow groundwater quality in the Pindan Sands aquifer. The department only has access to monitoring results from 7/12 and 10/12 for a sampling event completed in May 2020. Some key findings from this monitoring event include: Monitoring bore 7/12 recorded higher total nitrogen concentrations than other background monitoring bores (1/20, 3/10 and 10/12) – as summarised in the Licence Holder's comments. Monitoring bores 7/12 and 10/12 both recorded low concentrations of total phosphorus, either equal to or below the limit of reporting. Monitoring bore 10/12 recorded higher total dissolved solids concentrations than other background monitoring bores (1/20, 3/10 and 7/12). Total nitrogen is one of the key contaminants of concern for environmental receptors in the vicinity of the premises. The elevated concentrations of total nitrogen recorded at monitoring bore 7/12 mean it may not be a suitable background monitoring bore for assessing potential changes in concentrations of this parameter in groundwater downgradient of pivot 1. The Delegated Officer considers that 10/12 is the preferable monitoring bore for inclusion in the licence monitoring network, rather than 7/12. The Delegated Officer considers that ongoing monitoring of bores 1/20, 3/10 and 10/12 will be suitable to characterise background groundwater quality at the premises.
4.2.1 and 4.2.2, Table 4.2.1	The assessment report details "additional specifications relating to the monitoring of ambient groundwater quality have been added as requirements to be provided with the Premises' Annual Environmental Report. The specifications reflect the current standard of groundwater reporting information required by the department." Water Corporation requests a copy of DWER's current standard for groundwater reporting. The Corporation will review this standard in line with current internal water quality monitoring and sampling procedures and compliance reporting requirements. Further comment will be provided regarding the inclusion of this condition when the Corporation has had the	Groundwater is a valuable resource in WA, with shallow groundwater being particularly vulnerable to impacts from surface and near-surface sources of contamination. The current approach to setting environmental monitoring conditions takes several factors into consideration including the environmental setting, scope and scale of existing and/or proposed activities, related emissions and discharges and potential risk to the environment. The intent of the department is to set monitoring conditions commensurate to these factors. Given the scope of scale of the premises operations and related

Condition	Summary of Licence Holder's comment	Department's response
	opportunity to review the standard.	emissions (treated wastewater irrigation via Pivot 1 and 2), the Delegated Officer has elected to impose additional regulatory requirements in relation to groundwater monitoring and reporting. This will ensure that robust and reliable data is collected and presented (reported) in a manner that is beneficial to Water Corporation as the operator and to the department as the regulator. It will also provide confidence to the general public and other interested stakeholders that an appropriate level of rigour is being applied to ongoing environmental monitoring requirements at this premises. The Delegated Officer notes that separate to this amendment process, that the Licence Holder and department have agreed to have a broader discussion of groundwater monitoring reporting requirements under Part V licences. However, these discussions are separate to the current assessment and do not alter the Delegated Officer's intended approach for groundwater monitoring reporting requirements under L9094/2017/1.
4.1.3 and 4.2.1, Table 4.2.1	Please could you change the submission date for submission of the AACR from 1 September to 1 October (or 93 days). This is Water Corporation's preferred time allowance for submission of these reports as it better suits the year-end collection and verification process of sampling and flow data. We have a recent precedent for this with the recently issued renewed licence for Pingelly WRRF L6328.	The Delegated Officer considers that the requested change is reasonable and has implemented this change in the revised licence. The due date for the Annual Environmental Report and Annual Audit Compliance Report have both been extended until 93 days after the end of the annual period (1 October).
Schedule 1	As per department requests, the Licence Holder provided an updated groundwater monitoring locations map for inclusion in Schedule 1 of the revised licence.	The groundwater monitoring locations map in Schedule 1 of the licence has been updated using the provided map.

Appendix 2: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)					
Application type					
Works approval	☐				
Licence	☐	Relevant works approval number:		None	☐
		Has the works approval been complied with?		Yes ☐ No ☐	
		Has time limited operations under the works approval demonstrated acceptable operations?		Yes ☐ No ☐ N/A ☐	
		Environmental Compliance Report / Critical Containment Infrastructure Report submitted?		Yes ☐ No ☐	
		Date Report received:			
Renewal	☐	Current licence number:			
Amendment to works approval	☐	Current works approval number:			
Amendment to licence	☒	Current licence number:	L9094/2017/1		
		Relevant works approval number:		N/A	☐
Registration	☐	Current works approval number:		None	☐
Date application received		10 June 2021			
Applicant and Premises details					
Applicant name/s (full legal name/s)		Water Corporation			
Premises name		Broome North Wastewater Treatment Plant			
Premises location		Lot 1502 On Deposited Plan 75036 Certificate of Title Volume 2805 Folio 367			
Local Government Authority		Shire of Broome			
Application documents					
HPCM file reference number:		DER2017/001655-1			
Key application documents (additional to application form):		Cover letter Broome North WWTP Amendment Supporting Information			
Scope of application/assessment					
Summary of proposed activities or changes to existing operations.		*Licence amendment* Amendment of the pond freeboard conditions to more accurately reflect the manner in which the sewage treatment ponds and treated wastewater storage dam function. • The current freeboard requirement is listed as 500 mm. 500 mm is the top of embankment freeboard, however it doesn't account for the design freeboard level of spillways that connect the ponds and dam or the storage dam spillway to the environment. • The spillways connecting the primary pond to the maturation pond and the maturation pond to the storage			

	dam have a design freeboard of 200 mm. • The storage dam spillway to the environment has a design freeboard of 470 mm. • The spillways enable wastewater to flow downstream through both treatment ponds to the storage dam at a greater velocity in the event of a significant rainfall event and allows the freeboard to the external pond embankments to be maintained at 500 mm. As the storage dam is the only containment infrastructure with a spillway to the environment, this is considered to be the critical point at which freeboard must be maintained to prevent discharges to the environment. • Spillways are provided for asset protection purposes and management of high inflows during extreme rainfall events so that discharges occur through the spillway rather than overtopping pond embankments. Overtopping of embankments can cause significant erosion and impact the integrity of containment infrastructure. Spillways are constructed using concrete and are purpose built to tolerate high velocity water flows. Amendment of the groundwater monitoring program to require only monitoring of the Pindan Sands aquifer and to reduce the number of bores requiring sampling from 30 to 14. The 14 proposed monitoring wells also comprise some newly drilled bores not currently listed in the existing licence. • Monitoring of the Broome Sandstone aquifer is proposed for removal as it's considered hydraulicly connected to the Pindan Sands aquifer and provides limited value above monitoring only the Pindan Sands. • A reduction in the number of locations requiring monitoring is proposed due to groundwater monitoring conducted to date observing stable trends in contaminant concentrations and a general consistency between background and downgradient concentrations. • Excluding one monitoring well located at the site of future irrigation infrastructure, the Licence Holder does not intend to decommission or destroy any of the removed bores. The bores will remain as a contingency, in the event that additional sampling is once again required. The application would require amendment of the following licence conditions: • Modification to the freeboard height would require an amendment to condition 1.3.5(b) and possibly 1.3.5(a). Either the freeboard height of the storage dam spillway should be listed or the current 500 mm should be further specified as the top of embankment freeboard. • Modification to the groundwater monitoring requirements would require an amendment to Table 3.4.2

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

Table 1: Prescribed premises categories

Prescribed premises category and description	Assessed design capacity	Proposed changes to the design capacity (amendments only)
Category 54: sewage facility	3,500 m^3/day	N/A
Category 61: liquid waste facility	1,200 tonnes per annual period	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 ☐ No ☒	Referral decision No: Managed under Part V ☐ Assessed under Part IV ☐
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes ☐ No ☒	Ministerial statement No: EPA Report No:
Has the proposal been referred and/or assessed under the EPBC Act?	Yes ☐ No ☒	Reference No:
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes ☒ No ☐	Certificate of title ☒ General lease ☐ Expiry: Mining lease / tenement ☐ Expiry: Other evidence ☐ Expiry:
Has the applicant obtained all relevant planning approvals?	Yes ☐ No ☐ N/A ☒	Approval: Expiry date: If N/A explain why? Not relevant to amendment proposal
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes ☐ No ☒	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 ☐ No ☒	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 ☐ No ☒	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 ☐ No ☒	Name: N/A Type: N/A Has Regulatory Services (Water) been consulted? Yes ☐ No ☐ N/A ☒ Regional office: N/A
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes ☐ No ☒	Name: N/A Priority: N/A Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)? Yes ☐ No ☐ N/A ☒

Is the Premises subject to any other Acts or subsidiary regulations (e.g. *Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx*)	Yes ☒ No ☐	*Environmental Protection (Controlled Waste) Regulations* – Acceptance of K130 and K210 *Dangerous Goods Safety Act 2004* – Chlorine storage
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes ☐ No ☒	N/A
Is the Premises subject to any EPP requirements?	Yes ☐ No ☒	N/A
Is the Premises a known or suspected contaminated site under the *Contaminated Sites Act 2003*?	Yes ☐ No ☒	Classification: N/A Date of classification: N/A Premises adjacent to the west (Broome Commons: L7864/2003/4) is classified as PC-IR