Decision Report

Application for a Licence Amendment

Division 3, Part V *Environmental Protection Act 1986*

Licence Number	L9132/2018/1
Applicant	The Beer Farm Pty Ltd
ACN	606 046 306
File Number	DER2018/000586
Premises	The Beer Farm 133 Gale Road, METRICUP WA 6280 Lot 131 on Deposited Plan 32067 Certificate of Title Volume 2223 Folio 345
Date of Report	13/05/2019

1. Overview of Premises

1.1 Purpose and Scope of Assessment

This decision report sets out the assessment and decision on the application for an amendment to Licence L9132/2018/1 (the Application) submitted by The Beer Farm Pty Ltd (licence holder). The Application is for the on-site discharge of liquid waste to land (to Lot 131 only) and the alteration of the existing brewery wastewater treatment system (WWS).

The Delegated Officer intends to grant the amendment to the Licence to allow the application of brewery treated wastewater to land and alterations to the existing WWS.

1.2 Existing Brewery Operations

The Beer Farm is a brewery which manufactures beer and cider. It is located 8km south west of Metricup. The brewery is currently licensed to manufacture up to 1,040 kilolitres of alcoholic beverages per year until 31/10/2038 (licence expiry) but does not allow the discharge of liquid waste to land or waters. The licence was issued on 1 November 2018.

Table 1 lists the prescribed premises categories on the existing Licence.

Table 1: Classification of Premises

Classification of Premises	**Description**	***Approved Premises production or design capacity or throughput***
Category 25	Alcoholic beverage manufacturing: premises on which an alcoholic beverage is manufactured and from which liquid waste is or is to be discharged onto land or into waters.	<1,040 kilolitres of beer and cider produced per year

1.3 Amendment Application

The licence holder has applied to amend the licence to include the disposal of treated brewery wastewater to land via irrigation within Lot 131. The amendment includes the modification of the existing wastewater treatment system (WWS) that receives wastewater from the brewery processes. The WWS is proposed to be modified with the addition of settling, blending, and balance tanks, a clarifier, geo-bags and connection to an irrigation pump, pipelines and sprinkler system.

The wastewater to be disposed of to land contains nutrients such as nitrogen and phosphorus. This form of irrigation (with nutrient rich wastewater) is called fertigation.

The Application indicates that 3,023 kilolitres (kL) of wastewater will be produced each year. The wastewater (once treated in the WWS) will be applied to land using a low pressure transportable pod sprinkler system, known as a K-Line effluent system. The effluent system will apply the treated wastewater to 10 hectares (ha) of land made up of pasture areas and mature tree plantation.

The Premises infrastructure, as it relates to Category 25 activities, is detailed in Table 2 and with reference to the site plan in Appendix 1. Details of ancillary buildings and infrastructure at the Premises have not been included.

Table 2 lists infrastructure associated with the prescribed premises category.

Table 2: The Beer Farm brewery facility Category 25 infrastructure

Infrastructure		Site Layout Plan Reference
Prescribed Activity Category 25		
	Wastewater Treatment System including disposal system to land	
	Existing	
	Below ground wastewater collection sump connected via drainage to the brewery and packaging shed– 2,000L	Figure 4
	Brewery wastewater system consisting of: 1800mm precast concrete septic tank (3,657L) 1520mm precast concrete septic tank (1,933L) 7kL concrete pump tank (with connecting pipelines and/or fittings)	
	Proposed – the following to be added to the existing WWS infrastructure	
	Infrastructure and connecting HDPE pipelines and/or fittings for: • 1520mm septic tank to 15kL settling tank (polyvinyl chloride (PVC)) • 15kL settling tank (PVC) to 2 x Geo-bag • 15kL settling tank (PVC) to 50kL blending tank (PVC) • 50kL blending tank (PVC) to 7kL concrete aeration tank • 4kL clarifier tank (PVC) to 2 x 50kL balance/settling tanks (PVC) • Balance line between 50kL balance/settling tanks (PVC) to the irrigation pump then pipelines to irrigation areas	Figure 4
	Irrigation system over 10 hectares (ha) of pasture (consisting of Areas A(1) and A(2)) and plantation trees (consisting of Area B). K-Line effluent system (low pressure transportable pod sprinkler system) to irrigate Areas A(1), A(2) and B	Figure 3

2. Environmental Setting and Sensitive Receptors

Refer to Premises maps in Appendix 1.

2.1 Climate

The Delegated Officer considered climate types in Australia using the Koeppen system (M. C. Peel. et, al) to determine the location of an appropriate bureau station and climate statistics for the Premises. The Koeppen-Geiger climate classification for the closest residential area, Cowaramup, is Csb, a moderate Mediterranean-type climate with warm, dry summers and cool, wet winters.

The closest Bureau of Meteorology (BoM) station within the Csb climate is the Witchcliffe WA bureau station number 009746 (BoM 2017) located approximately 27km south of the Premises and is considered to be a suitable rainfall and evaporation dataset.

The Delegated Officer notes the following regarding the effects of climate at the site:

The characteristics of the climate near the site have the potential to constrain the extent to which wastewater application to ground could take place at the site to limit the risks of impacts on sensitive receptors.

The Premises is located in an area where rainfall may exceed evaporation for more than 5 months each year.

As the moisture content of soils in the region is generally at or close to their field capacity during the winter months, there is a risk that irrigation at this time of the year will lead to seepage of nutrients beyond the root zone where they become inaccessible to plants.

Consequently, there is a high risk of groundwater becoming contaminated if wastewater is applied to land in winter months.

2.2 Soil Characteristics

The brewery wastewater irrigation areas are underlain by regolith materials of the Yelverton System (Marnham *et al*., 2000). These materials consist of surface sands which are underlain by lateritic duricrusts and pisolitic gravels that form a colluvial mantle on hillslopes in the area (Marnham *et al*., 2000).

The Delegated Officer notes the following regarding the soil characteristics of the site:

The properties of soils on the site have the potential to constrain the extent to which wastewater application to ground could take place at the site to limit the risks of impacts on sensitive receptors.

Areas underlain by thick sandy soil horizons are likely to be suitable for wastewater irrigation in the area, but this activity may be difficult to manage in parts of the site where the sand is thin or absent and where lateritic duricrusts or pisolitic gravels are exposed at the land surface. This is because the applied wastewater could be rapidly transported along preferred pathways within or on the surface of vuggy duricrusts and through pisolitic gravels, limiting the extent to which nutrients can be attenuated by biogeochemical processes within soils.

It is not known how thick the soil cover over lateritic duricrust or pisolitic gravel is at the brewery site, so it is not yet known what proportion of the proposed 10 ha area is suitable for wastewater application.

Consequently, it is important that a soil survey and investigation is undertaken at the site before the proposed irrigation scheme commences.

2.3 Residential and Sensitive Receptors

The distances to residential and sensitive receptors are detailed in Table 3 and the distances to environmental receptors are detailed in Table 4.

Table 3: Residential and sensitive receptors and distance from activity boundary

Residential and sensitive premises	Distance from Prescribed Premises
Rural residential premises	The closest building is 200m north north-east and the building that appears to be a house is 300m from the brewery buildings. It is approximately 180m east of the irrigation area.
Town of Cowaramup	8km to the south west (measured from the Premises boundary)
Surface water users	A private water supply dam is located along the premises boundary on the top most eastern portion (downstream of the watercourse on site). Three properties located downstream of the site (north east) have surface water licences for Carbunup River. They are approximately 1km, 2km and 3.4 km from the site boundary
Groundwater users	10 privately owned bores are located within 1km of the site boundary (DWER GIS – WIN Groundwater Sites) Closest located 145m south and 160m north east of the site

Table 4: Environmental receptors and distance from activity boundary

Environmental receptors	Distance from Prescribed Premises
Groundwater Resource	The site is underlain by sediments of the Vasse Shelf in the western part of the Perth Basin. At shallow depth near the site, these sediments are likely to consist of a thin cover of sandy materials of probable Eocene age (Marnham et al., 2000) which is underlain by highly weather (lateritised) silty and sandy sediments of the Leederville Formation which is Cretaceous in age. The Leederville Formation in the area is a multilayered aquifer that consists of interbedded siltstones, sandstones and coal units which contains fresh groundwater that is a regionally important water source. The licence holder indicated that the groundwater level in two monitoring bores* on site was 2.71m and 2.3m below ground level in October 2018. *Note: * The licence holder has not demonstrated how the two bores meet the requirements of Minimum Construction Requirements for Water Bores in Australia (AIH 2012) and are sited with regard to the Department of Water Quality Protection Note 30 Groundwater Monitoring Bores (DoW 2009).*
Non-perennial watercourse (tributary of Carbunup River)	Within the boundary of the premises Irrigation area is approximately 80 m west of the watercourse
Carbunup River, major perennial river	The Premises is located within the Carbunup River catchment. The Carbunup River is 3km downstream of the tributary running through the Premises or approximately 2km east of the Premises boundary overland.

EPBC Act Threatened Ecological Community – Banksia Woodlands of the Swan Coastal Plain (also listed as a Priority 1 West Whicher Scarp Banksia attenuata woodland)	The Premises is within the buffer zone for an adjacent Federally listed TEC The Premises is within the Buffer zone for a priority 1 ecological community Other threatened and priority ecological community buffer zones are located 500-1000m to the northeast of the Premises boundary.

The Delegated Officer notes the following regarding the hydrogeology of the site and the importance of the underlying groundwater resource:

As noted above in Table 4, the Leederville Formation in the area of the premises is a multilayered aquifer that consists of interbedded siltstones, sandstones and coal units which contains fresh groundwater that is a regionally important water resource.

Therefore, the protection of groundwater quality is an important consideration when assessing wastewater application to land at the site.

It is likely that some groundwater flow takes place in the weathered upper-part of the Leederville Formation and in overlying sandy sediments (Department of Water, 2009) which discharges to and forms baseflow for nearby creeks.

Groundwater flow in this superficial aquifer is likely to be an important pathway for transporting contaminants from wastewater on the site into nearby creeks and water supply dams.

It is therefore important that seepage through the root zone in the irrigation areas is minimised to limit nutrient export to the environment.

An assessment of satellite imagery for the site indicates that both surface runoff and shallow groundwater are likely to flow in an easterly direction from the proposed irrigation areas to a nearby creek which contains two dams. The southernmost dam is a water supply for the brewery. The northern dam is on the neighbouring organic farming property that could be used for crop irrigation.

Consequently, both these dams are likely to be sensitive receptors for nutrients and other contaminants that may be discharged in surface runoff and shallow groundwater flow from the proposed wastewater irrigation areas.

3. Legislative Context and Other Approvals

3.1 Existing Licence L9132/2018/1 - Background

As noted in section 1.2, the licence holder operates the brewery under existing licence L9132/2018/1 that was issued on 1 November 2018. At the time of making the licence application with DWER (3 April 2018), the licence holder proposed to manufacture beer and cider and to discharge (irrigate) liquid waste (from the brewery process) to two separate lots (Lot 130 and 131).

During the assessment of the existing licence application, the Delegated Officer made a number of findings that were relevant to consider in the issuing of a licence:

It was identified that there were discrepancies in operations at the site and planning approvals, an absence of DOH approval for the WWS and that DOH advised that the discharge of sewage (wastewater) onto another lot (Lot 130) other than the lot on which it is generated (Lot 131) does not meet the requirements of the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*.

The licence holder did not demonstrate that planning approval for the irrigation of wastewater over Lot 130 or Lot 131 was in place. Given this, the Delegated Officer determined that a formal

decision on the discharge of waste to Lots 130 and 131 would be made following the LGA's planning decision relating to the irrigation of wastewater on the lots. This approach to the decision making process aligns with DWER's Guidance Statement: Land Use Planning.

In the absence of the licence holder demonstrating that planning approval was in place for the irrigation of brewery waste, the licence to manufacture beer and cider was issued with the specific exclusion to the discharge of brewery waste to land.

The licence holder was advised to apply for a licence amendment at such a time when they could provide evidence of LGA planning approval for wastewater irrigation.

3.2 Existing Licence L9132/2018/1 - Submission of Amendment Application

Prior to submitting the application to amend the existing licence, the licence holder met with representatives from DWER, DOH and the LGA on 20 November 2018 to discuss the irrigation of brewery wastewater and the WWS at the site.

Requirements for the submission of applications to DWER, DOH and the LGA were discussed. Prior to the meeting, the licence holder had submitted a development application (DA) (planning application) to the LGA for irrigation of wastewater over Lot 130 and 131.

The DOH highlighted at the meeting that should the licence holder wish to irrigate to Lot 130 and 131 with the treated wastewater, that an amalgamation of the lots would be required in order to comply with Regulation 39 (3) of the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974* (the Health Regulations). The Health Regulations require that effluent from the WWS must be disposed of within the boundary of the premises on which the WWS is located. The WWS is located on Lot 131, hence under the Health Regulations irrigation would only be permitted on Lot 131.

Given this advice, the licence holder amended its DA application to only irrigate effluent on Lot 131 and submitted a licence amendment application to DWER to only irrigate to Lot 131 as described in section 1.3 of this report.

The Delegated Officer notes the following regarding the submission of the application to amend the current licence:

a) DWER is supportive of a larger irrigation area (both Lots) as an improved environmental outcome and would accept an amended application being submitted that included both Lots. The issuing of the amended licence over both Lots would be subject to an amended DA being granted and occupancy over Lot 130 being demonstrated.

b) The licence granted on 1/11/2018 excluded the irrigation of wastewater to land in accordance with DWER's Guidance Statement: Land Use Planning, given the licence holder was unable to provide evidence of planning approval for irrigation of wastewater.

Table 5 summarises the relevant approvals history for the premises, Table 6 summarises the works approval and licence history for the premises, and

Table 7 summarises the compliance history for the premises.

Table 5: Relevant Approvals

Legislation	Reference	Subsidiary	Approval
Rights in Water and Irrigation Act 1914	SWL 176131	Julia Helen Atkins	Surface water licence for 32,600kL per annum from the Carbunup River The approval authorises taking of water from Lot

			131 for: c) horticultural purposes; d) irrigation of pasture; and e) storage of surface water.
Planning and Development Act 2005	DA14/0220	Julia Helen Atkins	City of Busselton Planning Approval to establish a Tavern (inclusive of a brewery with a capacity of <350kL/year and exclusive of irrigation of wastewater)
	DA18/0793	Submitted by M Levinson on behalf of Julia Helen Atkins	City of Busselton Planning Approval for irrigation of treated wastewater on lot - Lot 131
Health Act 1911 *Health (Treatment of sewage and disposal of effluent and liquid waste) Regulations 1974*	229.14	AC Forster & Son	Department of Health Approval to construct or install an apparatus for the treatment of sewage issued on 10 October 2014. The approval was for brewery wastewater system capable of receiving and treating up to 3.1kL/day, comprising of 1800mm and 1520mm septic tanks to alternating 8 x 21.5m inverted leach drains.[1]
	HA18/0110	The Applicant	Approval outstanding[2]. No approval in place to construct or install an apparatus for the treatment of sewage - brewery wastewater treatment and disposal (irrigation) system.

Table Note:
1. The licence holder altered the design of the treatment system as was approved. In 2017 the leach drains were removed and replaced with a 7kLwastewater pump tank to allow irrigation to land via a single high impact sprinkler.
2. The licence holder has submitted an application to construct the wastewater system for the brewery for assessment by the LGA and DOH. To date no approval has been granted.

The Delegated Officer notes the following regarding the surface water licence for irrigation purposes to Lot 131 and the application of wastewater to land at the site:

As the site has been assessed as being hydraulically limited for the purposes of wastewater disposal (irrigation), the further irrigation of the site using surface water may overly saturate the soils beyond that of the plantation and pastures needs, potentially resulting in the leaching of contaminates into groundwater and surface water or causing ponding resulting in odour or run-off into surface water.

Table 6: Licence and Works Approval History

Instrument	Issued	Nature and extent of licence or amendment
Works Approval N/A	N/A	The premises was constructed without a works approval.

Instrument	Issued	Nature and extent of licence or amendment
L9132/2018/1	1/11/2018	Licence issue. Excluded the discharge of treated brewery wastewater to land.
L9132/2018/1	13/05/2019	Amendment of licence to authorise discharge of treated brewery wastewater to land via irrigation and alterations to the WWS.

Table 7: Compliance Inspections and Compliance History

Instrument	Event	Findings
NA – the application for the licence was under assessment and not issued at the time	Site visit and issue of EFR	The Department's records show that the licence holder was issued an Environmental Field Report (EFR #06755) on 19 March 2018, requesting: • the immediate cessation of the discharge of brewery effluent; • removal of brewery effluent in accordance with the *Environmental Protection (Controlled Waste) Regulations 2004*; and • weekly updates be provided to DWER detailing the volume of brewery effluent removed and controlled waste tracking information. Following the issue of the EFR, the licence holder has to date not provided weekly updates to DWER with details of the volume of brewery effluent removed or controlled waste tracking information.

The Delegated Officer notes the following regarding historical application of wastewater to land at the site:

1. The application of wastewater to land (irrigation) has not been previously authorised under an EP Act licence, LGA or DOH approval.
2. The Applicant advised DWER on 27 March 2018 that since the DWER visit to the site on 15 March 2018, that brewery production had ceased.
3. There is potential that that the historical application of untreated wastewater to land has resulted in the leaching of contaminates into groundwater and surface water.

4. Exclusions to Assessment

The Premises includes an existing tavern/restaurant and public sales outlet with associated car parking, storage and ablution facilities (with a separate septic and leach drain sewage treatment system). Functions and events are held at the Premises and general farming practices are undertaken on site. These activities do not meet the description of Prescribed Premises therefore this Decision Report does not consider emissions such as light, odour, noise or dust associated with these activities or from associated traffic movements.

5. Risk Assessment – Screening

Where potential source, pathway and receptor linkages have been identified (refer to Table 8,

Table 9 and Table 10) a detailed risk assessment has been completed. The risk rating was determined for risk events in accordance with the risk rating matrix in Table 11 and risk criteria in Table 13. DWER determines the acceptability of risk events in accordance with Table 12.

Table 8 and 9 below relates to construction activities and noise and odour from operations. Table 10 relates to wastewater emissions. Sections 6 and 7 outlines odour and wastewater emissions. These emissions have been taken through a detailed risk assessment.

5.1 Risk Assessment: Construction Activities

Table 8: Risk Assessment – Construction

Risk Events					Applicant controls	Detailed Risk Assessment Required	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities	**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential impact**				
Installation of interconnecting pipelines, fixtures, tanks, geo-bag, and irrigation system	Noise associated with construction activities	Rural residential dwelling located approximately 310m NNE of the brewery	Air/wind dispersion	Amenity	The application does not specifically refer to noise from the construction activities. It notes that noise generating activities will occur during the day	No	The limited construction works will generate low quantities of noise. The Delegated Officer considers the levels of noise emissions likely to be generated will not impact on the nearest receptor due to separation distance. No further risk assessment is required. The *Environmental Protection (Noise) Regulations 1997* apply	N/A

5.2 Risk Assessment: Operations - Noise and Odour

Table 9: Risk Assessment: Operation – Noise and Odour

Risk Events					Applicant controls	Detailed Risk Assessment Required	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities	**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential impact**				
Wastewater treatment: Storage and movement of un/treated brewery wastewater	Fugitive odour emissions from the WWS	Rural residential dwelling approximately 160m E of the irrigation area and 300m NNE of the brewery	Air/wind dispersion	Amenity	Siting	Yes	The neighbouring landholder's residence and associated buildings is approximately 300m and 200m north east of the WWS and the. See section 5.3.	Refer to summary of regulatory controls in Table 17
Wastewater treatment: **Direct discharge to land (fertigation)** (Disposal of treated wastewater brewery liquid (effluent) to Lot 131 via irrigation)	Noise generated from operation of pump/s and irrigation equipment and its movement				Noise generating activities to occur during the day	No	The closest sensitive receptor is located less than 500m from the WWS however the Delegated Officer considers noise emissions from the WWS will be minimal. This is due to noise generating activity being confined to small pumps used to transfer wastewater through the system and to the irrigation field areas. The *Environmental Protection (Noise) Regulations 1997* are applicable for the operation of the Premises.	N/A

Risk Events					Applicant controls	Detailed Risk Assessment Required	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities	**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential impact**				
	Odour from irrigation of treated wastewater				Siting	Yes	The neighbouring landholder's residence is approximately 180m east of the irrigation area. See section 5.3.	Refer to summary of regulatory controls in Table 17

5.3 Risk Assessment: Operations - Wastewater Emissions to Groundwater

5.3.1 Assessment Approach

Wastewater has the potential to harm human health and the environment through its application to land and its discharge to the environment via breach of containment (spills).

Wastewater from the site is characterised by elevated organic content, biological oxygen demand (BOD), nitrogen and phosphorus as well as trace amounts of cleaning chemicals sodium hydroxide (2% solution is used) and pericetic acid.

The risk assessment is detailed in section 7.1 and is supported by the assessments of source-pathway-receptor linkages below in Table 10.

Table 10: Wastewater emission source-pathway-receptor linkage identification

Potential Receptors	Pathway Assessment	Potential Impact
Beneficial uses of groundwater in Superficial and Leederville Aquifer Identified beneficial uses: domestic use, horticultural purposes, irrigation and stock watering	Seepage of wastewater through the soil profile into groundwater aquifers	Amenity and health impacts to groundwater users, contamination of water or deterioration of local/regional groundwater quality Deterioration of water quality rendering it unsuitable for its current uses
Leederville Aquifer	The depth of the Leederville Aquifer ranges from 15–200 m below the superficial aquifer (Department of Water, 2009). Migration of contaminants in the permeable superficial aquifers to the Leederville Aquifer.	Deterioration of a regionally important water resource
Superficial aquifer	Groundwater flow in superficial aquifer is likely to be a pathway for transporting contaminates from wastewater application areas into the nearby creek and dams. The flow is most likely in the weathered upper-part of the Leederville formation and in overlying sandy sediments (Department of Water, 2009) which discharges to and forms baseflow for nearby creeks.	Contamination of water or deterioration of surface water quality, amenity and health impacts to users
Beneficial uses of surface water Identified beneficial uses: Stock/agricultural uses	Migration of contaminants along groundwater flow paths (in the weathered upper part of the Leederville Formation and in overlying sandy sediments) towards the creek and dams	Contamination of water or deterioration of surface water quality, amenity and health impacts to users.

Potential Receptors	Pathway Assessment	Potential Impact
Surface water	Direct entry from irrigation pipeline that transverses creek (leaks and spills)	Contamination of water within creek and associated impacts on flora and fauna.
Threatened Ecological Community – Banksia Woodlands of the Swan Coastal Plain (also listed as a Priority 1 West Whicher Scarp Banksia attenuata woodland)	Migration of contaminants in the superficial aquifers within the buffer zone of the TEC	Vegetation death or degradation in the TEC

5.4 Risk Assessment

Risk ratings have been determined for risk events in accordance with the risk rating matrix in Table 11 and risk criteria in Table 13. DWER determines the acceptability of risk events in accordance with Table 12.

Table 11: Risk rating matrix

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

Table 12: Risk treatment table

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk Event will not be tolerated. DWER may refuse application.
High	May be acceptable subject to multiple regulatory controls.	Risk Event may be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk Event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled beyond the proponent's controls.	Risk Event is acceptable and will generally not be subject to regulatory controls.

Table 13: Risk criteria table

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		**The following criteria has been used to determine the consequences of a Risk Event occurring:**		
			Environment	**Public health* and amenity (such as air and water quality, noise, and odour)**
Almost Certain	The risk event is expected to occur in most circumstances	Severe	• **onsite impacts**: catastrophic • **offsite impacts local scale**: high level or above • **offsite impacts wider scale:** mid-level or above • Mid to long-term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	• **onsite impacts**: high level • **offsite impacts local scale**: mid-level • **offsite impacts wider scale**: low level • Short-term impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are exceeded	• **Adverse health effects:** mid-level or frequent medical treatment • Specific Consequence Criteria (for public health) are exceeded • **Local scale impacts**: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	• **onsite impacts**: mid-level • **offsite impacts local scale**: low level • **offsite impacts wider scale**: minimal • Specific Consequence Criteria (for environment) are at risk of not being met	• **Adverse health effects:** low level or occasional medical treatment • Specific Consequence Criteria (for public health) are at risk of not being met • **Local scale impacts:** mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	• **onsite impacts**: low level • **offsite impacts local scale**: minimal • **offsite impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• Specific Consequence Criteria (for public health) are likely to be met • **Local scale impacts:** low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	• **onsite impact**: minimal • Specific Consequence Criteria (for environment) met	• **Local scale**: minimal to amenity • Specific Consequence Criteria (for public health) met

^ Determination of areas of high conservation value or special significance should be informed by the *Guidance Statement: Environmental Siting.* * In applying public health criteria, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines.* **"**onsite**"** means within the Prescribed Premises boundary.

6. Detailed Risk Assessment: Operations - Odour Emissions

6.1 Odour Emissions

Potential odour emissions generated from the WWS, including handling and temporary storage of sludge and the irrigation of wastewater. Wastewater with higher biochemical oxygen demand (BOD) loads may contribute to odour emissions.

Unpleasant odour can impact on nearby receptors by causing an annoyance and/or loss of amenity. Repeated exposure to such odour can become a nuisance for nearby receptors.

The Premises has been operational prior to the date of submission of the licence application. DWER is not aware of odour complaints associated with the Premises.

There are no set threshold or concentration criteria for odour assessment. Under section 49(5) of the EP Act, it is an offence to emit or cause to be emitted, an unreasonable emission from any premises. An unreasonable emission is defined in section 49(1)) as an emission or transmission of noise, odour or electromagnetic radiation which unreasonably interferes with the health, welfare, convenience, comfort or amenity of any person.

The risk rating was determined for risk odour emissions in accordance with the risk rating matrix in Table 11 and risk criteria in Table 13.

Table 14: Risk Assessment: Odour Emissions

LICENCE HOLDER CONTROLS	ASSESSMENT OF RISK	RISK RATING	REGULATORY CONTROLS
Siting	Odour impact to amenity by may be experienced for short periods by a small population. Therefore the Delegated Officer considers the consequence to be **Minor.** Minor consequence could occur at some time. Therefore, the Delegated Officer considers the likelihood to be **Possible**.	**Medium**	Refer to summary of regulatory controls in Table 17

7. Detailed Risk Assessment: Operations - Wastewater Treatment and Disposal

The risk posed by wastewater emissions from the site has been assessed. The site management and controls proposed by the licence holder have been considered in determining the final risk ratings and prior to making a determination on the Application.

7.1 Breach of Containment

7.1.1 Wastewater Emissions - Breach of Containment

Wastewater emissions from breach of containment of the WWS is a reasonably foreseeable risk event. Breach of containment may occur due to mechanical fault such as loss of electrical power, broken or blocked pipes or containment failure.

Overflow, leakage or spillage from the proposed brewery wastewater treatment areas could include untreated wastewater containing brew remnants and residual cleaning chemicals,

wastewater or sludge from the WWS, and un/treated wastewater from the tanks or transfer pipelines.

Entry of spills and discharges into the environment (land, water and groundwater) could impact on sensitive receptors through the identified source-pathway-receptor linkages in Table 10.

ANZECC Guidelines for Fresh and Marine Water quality (2000) are considered appropriate to assess potential impacts on groundwater or surface water quality.

The *Environmental Protection (Unauthorised Discharge) Regulations 2004* apply to the discharge of any materials (such as food waste) from the activities carried out at the Premises.

Table 15 below assesses the risk of wastewater emissions from breach of containment.

7.2 Risk Assessment: Risk Ratings

Table 15: Risk Assessment – Breach of Containment

LICENCE HOLDER CONTROLS	ASSESSMENT OF RISK	RISK RATING	REGULATORY CONTROLS
Siting WWS located 90 m from creek line A tank monitoring system calibrated to the 2 x 50 kL balance tanks. The system will be accessible through mobile devices and give alerts 24hrs a day to issues with the system. Sludge in the 15kL settling tank and clarifier will be monitored weekly	The Application provides limited information on how the proposal will minimise the risk of wastewater emissions from breach of containment of wastewater infrastructure. There is no secondary containment infrastructure around the WWS therefore untreated, partially treated, treated wastewater or sludge may be released directly to the environment (land, water and groundwater) in the event of an overflow, leakage, spillage or failure of the WWS including transfer pipelines. The irrigation pipeline transverses the tributary of Carbunup River which poses a risk of rupture and direct entry into surface water. If breach of containment of the WWS and associated infrastructure occurs, then the Delegated Officer has determined that consequence (criteria are at risk of not being met and the impact of contamination of surface or groundwater could cause local scale off site impacts and mid-level onsite impact. Therefore, the Delegated Officer considers the consequence of the risk event to be **Moderate**. The Delegated Officer has determined that the likelihood of discharge of waste products from the WWS and associated infrastructure causing surface or groundwater contamination is that it will probably occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of the risk event to be **Likely**.	**High** Criteria are at risk of not being met Close proximity to surface water Likely surface and subsurface flow of contaminates in groundwater	Refer to summary of regulatory controls in Table 17

7.3 Wastewater Application to Land

7.3.1 Wastewater Emissions - Wastewater Application to Land

Up to 3,300kL of wastewater is to be irrigated to land each year to the 10ha irrigation area consisting of pasture and mature tree plantations (refer to map in Appendix 1). The licence holder proposes that wastewater will be applied at a rate of not more than 1mm per day.

The Application includes a calculation that details that there will be a total of 38 days each year where the irrigation of wastewater will not occur. This period falls over the winter months, June to August. This is an estimate and is based on assumptions including an average of 19 days with rainfall events in excess of 10mm, and a 24 hour drying period (following rainfall event).

The licence holder assessed the nutrient inputs into wastewater and derived an estimate of expected concentrations of nutrients and loading rates for the irrigation areas receiving the wastewater as per Figure 1 below (as provided in the Application).

Table 4. Nutrient application criteria to control eutrophication risk.

	Nitrogen		Phosphorus		BOD		TSS	
	kg/ha/yr	mg/L	kg/ha/yr	mg/L	kg/ha/day	mg/L	kg/ha/yr	mg/L
DWER	140	-	10	-	30			
DoH	-	30	-	10		20		30
Estimated Results	52	18	5	1.5	1	20	8	25

Figure 1: Predicted nutrient concentrations and loading rates (from Application)

The Delegated Officer notes the following regarding the quality of the wastewater:

1. The Application indicates that the WWS will achieve wastewater with expected concentrations of 18mg/L nitrogen and 1.5mg/L phosphorous, refer to Figure 1 above. An analysis of the chemical inputs was undertaken to establish these values.
2. The likelihood of the nutrient values of the wastewater consistently aligning with those predicted by the licence holder is unclear.
3. It is not clear if the alterations to the WWS will achieve the estimated nutrient concentrations. There is a need to establish the nitrogen and phosphorus concentrations of the wastewater by laboratory analysis.
4. In addition to the above comments, the following is noted:

Historical data provided by the licence holder for the existing WWS indicates that nitrogen and phosphorus concentrations in the wastewater are highly variable, with the most recent chemical analysis (in April 2018) indicating that the nitrogen and phosphorus concentrations in the wastewater were respectively 190 and 55 mg/L. These values greatly exceed the ANZECC short term irrigation values, and present a risk of impacts on plant health and to soil structure if irrigation takes place with wastewater of this quality.

7.3.2 Proposed Controls for Wastewater Application to Land

A Nutrient irrigation Management Plan (NIMP) included in the Application outlines how irrigation of wastewater will be managed at the Premises.

The licence holder proposes the following controls to minimise impacts from the irrigation of wastewater (from Application):

1) Locating the irrigation area outside of the Yelverton wet valleys phase associated with

the watercourse;

2) Rotation of irrigation areas and the even application of irrigated wastewater;
3) Daily checks of the irrigation area[1];
4) Allowing irrigation areas to dry for 24 hours between wastewater applications;
5) No irrigation on days with rainfall events in excess of 10mm or onto flooded areas and a 24 hour drying period following rainfall events greater than 10mm;
6) Two cuts and removal of hay per year from Irrigation Area A;
7) Coppice the plantation trees within Irrigation Area B regularly in accordance with standard forestry practice;
8) Irrigation using a transportable, low pressure sprinkler system with an application rate of not more than 1mm per day;
9) Movement[2] of the transportable irrigation system on a weekly basis;
10) Rain gauges will be installed onsite and monitored daily throughout June to August;
11) Confinement of irrigation of wastewater to the irrigation areas[3];
12) 40m setback of irrigation from watercourses;
13) 20m setback of irrigation from the property boundary;
14) 30m setback of irrigation from the TEC; and
15) Vegetation cover will be maintained in the irrigation areas.

Notes:

1. The Application does not provide details outlining what the checks will involve.

2. The Application does not outlined how the transportable pods will be moved over the paddock areas or within the tree plantations.

3. The Application does not outline the details on how this will be achieved. Reference is made to irrigating 1mm per day.

7.4 Risk Assessment: Risk Ratings

As noted in section 2, a number of factors have the potential to constrain the extent to which wastewater application to land can take place to limit the risk of impacts on sensitive receptors. These factors have been considered in the assessment of risk.

As identified in section 2.3 and Table 10, groundwater flow in the superficial aquifer is likely to be an important pathway for transporting contaminates from wastewater on the site (that have seeped through the soil profile into groundwater) into the nearby creek and dams.

Risk ratings have been determined for each sensitive receptor for which a source, pathway, receptor linkage has been identified (refer to Table 10).

The risk to the surface water users has been assessed as '**high**' as the wastewater irrigation areas are located immediately up gradient of the creek and water supply dams. Given this, it is important that nutrients are maintained within the root zone of crops to prevent impacts on these water supplies through shallow groundwater flow.

The risk to the creek system is also considered to be **'high'** due to moderate consequence (criteria are at risk of not being met), the close proximity to the irrigation areas, and the likely surface and subsurface flow of contaminates in groundwater.

Section 8 outlines the proposed regulatory controls to address the identified risk events.

Table 16: Risk Assessment – Wastewater Emissions

CONSEQUENCE				LIKELIHOOD OF CONSEQUENCE OCCURRING		RISK[5]
Beneficial use	Location	Consequence Rating		Likelihood Rating		
		Rating[5]	Rationale	Rating[5]	Rationale	
Known and potential uses of groundwater:						
Drinking water, non-potable and irrigation	Superficial aquifer	**Moderate**	Abstraction for domestic use, horticultural purposes, irrigation and stock watering by a property about 200m north east from the irrigation area. The bore about is about 780m. Groundwater salinity of <500 mg/L (potable) Consequence criteria[2, 3, 4] are at risk of not being met. Offsite local scale impacts could occur.	**Possible**	Potential pathway due to abstraction bore being potentially down-hydraulic gradient of irrigation area in a highly permeable shallow sand aquifer. Shallow bores near the site are at risk of groundwater contamination by elevated nitrogen concentrations.	**Medium**
	Leederville aquifer	**Moderate**	Contains fresh groundwater that is a regionally important water resource.	**Unlikely**	It is expected that groundwater users are unlikely to be directly affected as abstraction takes place from the sandstone units at depth in the Leederville Formation.	**Medium**
Known and potential uses of surface water:						
Creek that passes through the site and associated dams used for agricultural purposes/irrigation	Three properties located downstream of the site (north east) have surface water licences Dam located along the premises boundary (downstream of the watercourse)	**Moderate**	Consequence criteria[1] are at risk of not being met. Offsite local scale impacts could occur.	**Almost certain**	The watercourses and dams are located down-hydraulic gradient of the irrigation area (approximately 80m at the closest point). Contaminant migration to the creek and dams is considered to be likely in the permeable sand aquifer with limited contaminant attenuation capacity. These aspects, together with the close proximity to the irrigation area indicate a high potential for contaminants to reach the creek and dams.	**High**

Freshwater ecosystems:						
Tributary to Carbunup River	80m east of irrigation area	**Moderate**	Consequence criteria[1] are at risk of not being met. Offsite local scale impacts could occur.	**Almost certain**	Surface runoff and shallow groundwater are likely to flow in an easterly direction towards the creek from the irrigation area. Contaminant migration to the creek is considered to be likely in the permeable sand aquifer with limited contaminant attenuation capacity. These aspects, together with the close proximity to the irrigation area indicate a high potential for contaminants to reach the creek.	**High**
Carbunup River	3km downstream	**Moderate**	Consequence criteria[1] are at risk of not being met. Offsite local impacts could occur.	**Possible**	The irrigation area is a significant distance from the Carbunup River, however it is located next to a watercourse that flows into the river. Nutrients and contaminates that reach the creek may then degrade the water quality and ecological condition of the Carbunup River.	**Medium**
Threatened Ecological Community						
Federally protected vegetation	Proposed irrigation areas located within buffer zone for TEC	**Moderate**	Offsite local impacts could occur.	**Unlikely**	The buffer zone is important for protecting the integrity of the TEC. Contaminates from wastewater irrigation areas that reach groundwater will llikely flow in an easterly direction away from the TEC.	**Medium**

Table Notes:

1. Consequence criteria based on Australian Water Quality Guidelines for Fresh and Marine Water Quality ANZECC & ARMCANZ (2000) for slightly–moderately disturbed ecosystems (95% protection level trigger values)
2. Consequence criteria based on Australian Drinking Water Guidelines (NHMRC & ARMCANZ (2011)).
3. Consequence criteria based on Non-Potable Groundwater Use DOH (2014) Contaminated Sites Ground and Surface Water Chemical Screening Guidelines Department of Health
4. Consequence criteria based on Long Term Irrigation Water ANZECC & ARMCANZ (2000)
5. The risk rating was determined for risk events in accordance with the risk rating matrix and risk criteria set out in Table 11 and Table 13.

8. Determined Regulatory Controls

A summary of the risks with corresponding controls are set out in Table 17. The risks are set out in the assessment in section 5.3 and the controls are detailed in this section 8. Controls will form the basis of conditions in the Amended Licence.

Table 17: Summary of regulatory controls to be applied

		Controls									
		Works - Construction Requirements	Soil Survey and Detailed Soil Investigations	Production limit	Infrastructure and Equipment – Operational Controls	Operational Controls (Irrigation)	Emissions to Land Loading Limits	Waste Containment and Disposal	Soil Monitoring	Groundwater Monitoring Bore Monitoring	Surface Water Monitoring
Risk Item (see risk analysis in section 5.3)	Wastewater emissions to groundwater	●	●	●	●	●	●	●	●	●	●
	Odour emissions	●		●		●	●	●			

8.1 Works - Construction Requirements

The Licence authorises the licence holder to construct / install infrastructure / equipment. It outlines specific requirements of the works including the location and timeframes in which the works shall be completed.

The Licence requires that the licence holder provides written confirmation and reports from suitability qualified professionals relating the completion and construction of the works.

8.1.1 Liquid Waste and Leachate Impact Controls

The licence requires that the WWS infrastructure and equipment is constructed onsite for liquid waste and leachate management. The licence outlines that overfill prevention controls (high level alarms) shall be installed on each tank.

A requirement that the geo-bags are located within a dedicated hardstand area with bunding and a collection sump that meet a hydraulic conductivity of less than 1.0 x 10-9 m/s has been included.

Setbacks from surface water and indicators/alarms on the system are within the licence.

Note: Delegated Officer derived requirements in addition to licence holder controls. The licence holder controls outline that the WWS will be able to give alerts about issues 24 hours a day. Limited information about the alarm system was provided by the licence holder. The installation of high level alarms on tanks has been included on the licence along with a requirement that system is capable of providing indicators during fault conditions.

Grounds: The risk posed to sensitive receptors from groundwater and surface water contamination associated with breach of containment of the WWS been assessed as 'high'. The Premises is located in close proximity to environmental receptors that are affected by groundwater discharge. The controls proposed by the licence holder are minimal. Additional controls are necessary to manage the risk to sensitive receptors.

Adequate construction and installation of wastewater infrastructure is necessary for the mitigation of liquid waste and leachate impacts to groundwater and surface water. The requirement for high level alarms will ensure the risk of wastewater escape or spillage to the environment and consequently groundwater and surface water contamination from the WWS tanks is adequately controlled.

The specification of a dedicated hardstand and sump with a hydraulic conductivity of less than 1.0 x 10^{-9} m/s will ensure that the risk of seepage of leachate and consequently groundwater and surface water contamination from the geo-bags is adequately controlled. The licence outlines the needs for appropriate grading of the hardstand that prevents pooling, thus reducing the risk of seepage and controlling odour. The licence outlines that all leachate, liquid waste and contaminated stormwater from the collection sump must be pumped or fed via gravity to the wastewater collection sump (cooling pit).

8.1.2 Irrigation System and Area/s

The Licence requires that an irrigation pump with an associated flow meter is installed.

Note: Delegated Officer derived requirement for installation of a flow meter.

Grounds: The installation of a volumetric flow meter on the irrigation pipeline has been included to monitor the volume of wastewater discharged from the WWS to the irrigation area/s. This requirement is necessary in order to measure the volume of wastewater applied to the individual irrigation areas, to allow accurate nutrient loading calculations to be carried out, and to validate predictions made by the licence holder about the expected volumes of wastewater irrigated.

8.1.3 Groundwater Monitoring Bores

The licence requires that four new groundwater monitoring bores are constructed and that a bore log for each is submitted.

Note: Delegated Officer derived requirements.

Grounds: The operation of the Premises poses risks to sensitive receptors and groundwater flow in the superficial aquifer is likely to be an important pathway for transporting contaminates from wastewater on the site (that have seeped through the soil profile into groundwater) into the nearby creek and dams.

The installation of four monitoring bores will enable assessment of potential impacts on groundwater quality from wastewater irrigation at the Premises to be assessed. Refer to section 8.9 relating to monitoring requirements for the bores.

The existing groundwater monitoring bores at the Premises (referred to in Table 4) are not considered to be suitable for the purposes of monitoring groundwater at the site. The licence holder has not demonstrated how the two bores meet the requirements of Minimum Construction Requirements for Water Bores in Australia (AIH 2012) and are sited with regard to the Department of Water Quality Protection Note 30 Groundwater Monitoring Bores (DoW 2009).

8.2 Soil Survey and Detailed Soil Investigations

8.2.1 Soil Assessment – Physical and Chemical Features

Soil investigation is required in each of the wastewater irrigation areas to determine the physical and chemical properties of soil materials to assess their suitability for the long-term application of wastewater.

The licence requires that the licence holder complete soil investigations in the form of a Soil Survey and Detailed Soil Investigation and for them to be undertaken by a Certified Professional Soil Scientist or equivalent. The soil investigations and the submission of the results of the assessments to the Department must be completed prior to the commencement of irrigation.

Note: Delegated Officer derived requirements. The Licence Holder provided soil sampling results and a geotechnical investigation report on 3 April 2019 during the consultation process. The requirement for a Soil Survey and Detailed Soil Investigation remains on the licence. Appendix 2 of this document outlines how the sampling results and report have been considered by the Delegated Officer and why the requirement for a Soil Survey and Detailed Soil Investigation is still required.

Grounds: The risk posed to sensitive receptors from groundwater contamination associated with wastewater irrigation have been assessed as ‘high’ and ‘medium’. The Premises is located in close proximity to environmental receptors that are affected by groundwater discharge.

The Delegated Officer considers that obtaining site-specific soil information is a fundamental step in determining the suitability of the irrigation area, identification of soil limitations and to establish a baseline for a soil monitoring program. It is essential in determining the level of planning and management of the wastewater irrigation scheme to protect sensitive receptors.

The physical and chemical properties of the soil in each soil horizon of all of the irrigation areas is necessary as these factors have the potential to affect the viability of the wastewater irrigation scheme.

Guidance prepared by the South Australian EPA (SA EPA, 2009) and NSW effluent irrigation guidelines (NSW DEC, 2003) has been referred to for the recommended key physical and chemical properties that should be identified during the soil investigations.

The soil assessment shall take place using a 100 x 100 metre grid (SA EPA, 2009). This sampling intensity is recommended for sites with moderate uniformity of soils across irrigation areas and is considered a conservative approach to sampling at this Premises.

Due to the identified risks to sensitive receptors and the uncertainty of the soil properties within the irrigation areas, the Delegated Officer considers that wastewater irrigation should not commence until soil investigations have been completed. The requirement for the submission of the results of soil investigations has been added to the licence to allow for the identification of what portion of the proposed 10 hectares is suitable for wastewater application.

The licence holder will need to provide the soil investigation results along with a report that outlines management responses to any identified soil property limitations prior to authorisation of wastewater irrigation under the licence.

8.3 Production Limit

The licence limits the production of alcoholic beverages produced at the Premises to a maximum of 1,040kL each year.

Note: Requirements are Delegated Officer specifications derived from the licence holder's supporting information.

Grounds: The volume restriction for the amount of alcoholic beverages has been based on the licence holder's supporting information that indicates that the WWS is designed to accommodate production of a maximum of 1,040kL of product each year.

The volume of wastewater generated each year is determined by the volume of alcoholic beverages produced, so the production limit will ensure that the WWS receives no more wastewater then it is designed to accept and treat (3,023kL each year). The Delegated Officer considers it is necessary to include a production limit to restrict increases in production without undergoing assessment.

8.4 Infrastructure and Equipment – Operational Controls

8.4.1 Liquid Waste and Leachate Impact Controls

The Licence outlines operational requirements that must be undertaken for the management of liquid waste, leachate and sludge.

Note: Requirements are Delegated Officer specifications along with the licence holder control to monitor sludge in the 15kL tank on a weekly basis. The operational controls build on the construction/installation requirements outlined in section 8.1.1

Grounds: As noted in section 8.1.1, the Delegated Officer has determined that based on the outcomes of the risk assessment detailed in this report, additional regulatory controls are required to mitigate the high liquid waste and leachate impact risk.

The high level alarms and hardstand area for the geo-bags are essential in the operation of the infrastructure to control emissions of liquid waste, leachate and sludge (refer to grounds in section 8.1.1). It is therefore necessary that this infrastructure is maintained in good working condition to ensure ongoing protection of sensitive receptors.

The licence requires that the tanks and pump, pipelines and associated infrastructure are routinely inspected to check for rupture or leaks.

8.4.2 Irrigation System and Area/s

The Licence outlines operational requirements that must be undertaken for the management of the irrigation system relating to the irrigation pump and flow meter.

Note: Requirements are Delegated Officer specifications. The operational controls build on the construction/installation requirements outlined in section 8.1.1

Grounds: Conditions require that the irrigation pump and flow meter are fit for purpose. The conditions require that the irrigation pump has the ability to pump wastewater to the irrigation areas and that the flow meter is able to accurately monitor the volume of wastewater sent from the WWS to the irrigation areas. Refer to grounds in section 8.1.2.

8.4.3 Groundwater Monitoring Bores

The Licence outlines that the groundwater monitoring bores shall be maintained and are fit for purpose.

Note: Requirements are Delegated Officer specifications.

Grounds: The four monitoring bores will allow effects of wastewater irrigation on groundwater quality at the Premises to be assessed (refer to grounds in section 8.1.3), therefore it is necessary that the bores are maintained such that they allow access to measure groundwater and its properties and allow groundwater samples to be taken.

8.5 Operational Controls (Irrigation)

8.5.1 Requirements prior to irrigation occurring

The licence requires that soil investigations in each irrigation area is undertaken prior to any irrigation occurring. This includes the requirement to submit the results of soil investigations to the CEO for review.

Note: Requirements are Delegated Officer specifications.

Grounds: Refer to grounds in section 8.2.1.

In addition to the desk-top assessment which identified the generic soil information for the site, further site-specific information is required to assess the risks that the operation of irrigation scheme poses to sensitive receptors.

The Delegated Officer note in section 2.2 highlighted the importance of identifying areas within the irrigation areas where sand may be is thin or is absent. This is because if wastewater were to be applied in these areas, the wastewater could be rapidly transported along preferred pathways, limiting the extent to which nutrients could be attenuated by biogeochemical processes within soils. Nutrients would then likely reach groundwater and transport contaminates in the shallow aquifer to surface water.

The identification of how thick the soil cover over lateritic duricrust or pisolitic gravel is within the irrigation areas, will inform what proportion of the proposed irrigation areas is suitable for wastewater application. Given the high risk posed to sensitive receptors from wastewater irrigation at the site, it is essential that the soil investigations that are undertaken prior to any irrigation taking place.

8.5.2 Irrigation Requirements and Scheduling

The licence requires that wastewater is irrigated only within the identified irrigation areas and that wastewater is discharged from the irrigation pipeline that receives treated wastewater from the WWS.

Irrigation methods and the scheduling of irrigation over the annual period is specified.

Monitoring requirements for wastewater applied to the land is specified, including the requirement for maintaining a flow meter.

Note: Requirements are Delegated Officer specifications in addition to licence holder controls.

The licence holder will need to ensure that wastewater is stored on site or have alternative arrangements to remove the treated wastewater offsite for disposal during months when irrigation is not permitted.

Grounds: The irrigation areas proposed by the licence holder have been used as discharge point locations (irrigation areas A1, A2 and B) as these locations were used as the basis of the assessment. The requirement for irrigation to occur via a low pressure transportable pod sprinkler system is a licence holder control and the restriction of irrigation to specific months is a Delegated Officer requirement.

The restriction of the scheduling of wastewater irrigation over each year is necessary as the wastewater irrigation areas are located immediately up gradient of water supply dams and surface water, and therefore it is important that nutrients are maintained within the root zone of the vegetation to prevent impacts on these receptors through shallow groundwater flow. No irrigation over the 5-month period each year (June, July, August, September and October) will protect the fresh groundwater beneath the site and surface water in close proximity to the irrigation areas. The 5-month period (during winter and spring) when irrigation is not permitted, is the time of the year when rainfall exceeds evaporation and the soils have a high moisture content. Leakage of nutrients and contaminates beyond the root zone into groundwater would occur if irrigation was to occur during these months. The risk assessment (refer to Table 16) outlined the likely pathway from the irrigation areas to sensitive receptors, identifying that wastewater irrigation poses high and medium risks to sensitive receptors. Consequently, wastewater irrigation throughout the year is not permissible and should not occur. The licence addresses the risk posed by wastewater irrigation by restricting the months of application, minimising the risk of nutrients and other contaminates leaking into groundwater and being transported in shallow groundwater flow to surface water.

The licence outlines standard management practices to occur when irrigating treated wastewater. This includes requirements such as no occurrence of soil erosion, no runoff or spray drift, even distribution of wastewater application and that vegetation cover is maintained. These are considered as standard operation and management practices to ensure sustainability of the irrigation scheme. Licence holder controls are specified on the licence and include daily checks of the irrigation area, movement of the transportable irrigation system on a weekly basis, and defined setbacks from property boundaries, watercourses and the TEC. The licence holder outlined that plantation trees will be coppiced regularly in accordance with standard forestry practice. It is not clear what coppice interval is recommended in standard forestry practice, given this the requirement to coppice every 12 months has been included.

8.5.3 Irrigation Monitoring

The licence requires that emissions of brewery treated wastewater is monitored to determine the volume of wastewater applied to land and its quality.

Note: Requirements are Delegated Officer specifications.

Grounds: The Delegated Officer considers that irrigation of treated wastewater at the Premises may impact groundwater and surface water quality. The main factors affecting environmental impacts are considered to be the quality of the treated wastewater (particularly nutrient concentrations) and the volume of the waste water discharged. Monitoring parameters, together with annual reporting, will allow loading and concentration limits to be observed. Regular monitoring of the treated wastewater will provide more certainty around the treatment capability of the system overtime. Appropriate quality control of the sampling and analysis undertaken is an important aspect and conditions for sampling to be carried out in accordance with Australian Standards and tested by a NATA accredited laboratory has been included.

The Application did not include any proposed monitoring of the wastewater emissions. Monitoring emissions will allow comparison of the nutrient and loading concentrations proposed

by the licence holder.

8.6 Emissions to Land Loading Limits

The licence requires that emissions of brewery treated wastewater does not exceed monthly loading rates for nitrogen, phosphorus and BOD.

Note: Requirements are Delegated Officer specifications.

Grounds: The inclusion of monthly loading rates is necessary to manage the risks of potential environmental impacts caused by the wastewater irrigation scheme. It addresses the risks posed to sensitive receptors, including groundwater and to plant health and soil structure in the irrigation area.

Loading rate limits, rather than nutrient concentration limits is considered appropriate given the lack of data and information about the expected concentrations of TN, TP, and BOD in treated wastewater[1] (from the altered WWS). This approach will allow the licence holder to look at the water quality being achieved by the WWS and ensure that the amount of wastewater applied meets the specified loading rate. The quality of the wastewater will determine how much wastewater can be sustainably applied each month.

The loading limits are based on achieving wastewater nutrient concentrations that does not exceed 34 mg/L of nitrogen and 4 mg/L of phosphorus. These concentrations are considered appropriate to limit potential adverse impacts of the irrigation scheme which includes impacts on plant-health and soil-structure and of leakage of nutrients into groundwater.

The BOD daily limit is considered appropriate to prevent soil clogging taking place in the irrigation areas and to limit the generation of odour.

Note: 1. There is uncertainty around what nutrient concentrations of wastewater will be achieved by the WWS (with the proposed alterations). Results from the sampling of treated wastewater from the existing WWS indicates that nitrogen and phosphorus concentrations in the wastewater are highly variable. The most recent chemical analysis (in April 2018) indicated that the nitrogen and phosphorus concentrations in the wastewater were respectively 190 and 55 mg/L. It should be noted that both the nitrogen and phosphorus concentrations in the wastewater greatly exceed their respective ANZECC short-term irrigation values (STVs) and would consequently pose a risk to plant health and soil structure in the irrigation area.

8.7 Waste Containment and Disposal

The licence specifies the storage of wastewater shall be in fully enclosed infrastructure, including tanks with operational high level alarms prior to disposal.

Waste disposal specifications, including disposal strategies have been included in the licence for treated effluent, untreated effluent and spent grain and sediment.

Specified requirements for the storage of brewery wastewater has been specified if the licence holder chooses to store brewery wastewater (rather than disposal offsite) generated over the period when irrigation is not permitted (between June to October).

Note: Requirements are derived in part from the licence holder controls and Delegated Officer requirements.

Grounds: The conditions are required to ensure appropriate storage and disposal of liquid wastes, sludges and spent grain to protect groundwater and surface water from potential contamination impacts.

8.8 Soil Monitoring

The licence requires that operational soil monitoring of the irrigation areas is carried out

annually.

Note: Requirements are Delegated Officer specifications.

Grounds: Soil monitoring during the life of the wastewater irrigation scheme is necessary to determine the fate of nutrients and other contaminants that are applied to land and to assess whether the irrigation is causing adverse impacts on soil structure.

The soil sampling requirements has been adapted from the NSW effluent irrigation guidelines (NSW DEC, 2003) and includes composite surface soil and composite deep soil sampling.

The licence specifies that sampling is to be carried out on an annual basis for three years and thereafter once every three years. The results can be reviewed following the three years of annual monitoring to determine the appropriate frequency of sampling and the range of test constituents for future monitoring to monitor slow and rapidly changing chemical properties.

8.9 Groundwater Monitoring Bore Monitoring

The licence requires that the four groundwater monitoring bores are monitored annually for nutrients, standard physical and chemical water quality parameters, and standing water levels.

All groundwater samples are required to be sampled in accordance with Australian Standards and analysed by a NATA accredited laboratory.

Note: Delegated Officer derived requirements.

Grounds: The Delegated Officer has considered the risk assessment for impacts to groundwater in determining appropriate groundwater monitoring requirements. Groundwater monitoring will determine the extent to which groundwater beneath the irrigation area is being contaminated by wastewater constituents, and whether there are likely to be offsite effects. The monitoring will allow trends to be monitored and whether additional controls need to be implemented to ensure that wastewater irrigation impacts on water users and the environment are effectively managed.

The selected suite of analytes is considered appropriate for the characterisation and detection of groundwater contamination caused by nutrient-rich leachates derived from organic materials. The requirement to have the samples taken using a specified method and analysed in a specified laboratory is considered appropriate in ensuring the quality of the data submitted.

The intent of specifying sampling to occur in the month of October is to have the bore sampled when groundwater levels are at their annual peak (in Spring).

Following review of the groundwater monitoring results, compliance concentrations of nitrogen, phosphorus and TDS may be set for down gradient monitoring bores.

8.10 Surface Water Monitoring

The licence requires that the each of the dams onsite are sampled annually, aligning with groundwater monitoring sampling events.

All surface water samples are required to be sampled in accordance with Australian Standards and analysed by a NATA accredited laboratory.

Note: Delegated Officer derived requirements.

Grounds: The risk assessment identified that wastewater emissions (irrigation) poses a high risk to surface water and surface water users. The watercourses and dams are located down-hydraulic gradient of the irrigation area (approximately 80m at the closest point). Contaminant migration (via surface runoff and shallow groundwater flow) to the creek and dams is considered

to be likely in the permeable sand aquifer.

Surface water monitoring will determine the extent to which wastewater constituents from wastewater irrigation are reaching and impacting on surface water. The monitoring will allow trends to be monitored and whether additional controls need to be implemented to ensure that wastewater irrigation impacts on water users and the environment are effectively managed.

The selected suite of analytes is considered appropriate for the characterisation and detection of surface water contamination caused by nutrient-rich leachates derived from organic materials. The requirement to have the samples taken using a specified method and analysed in a specified laboratory is considered appropriate in ensuring the quality of the data submitted.

8.11 Reporting

The licence requires annual reporting of disposal of wastes (including the volume of irrigation and wastes disposed of offsite), production/throughput data, groundwater, surface water, soil monitoring, and complaints and monthly reporting of loading limits to land.

Note: Delegated Officer derived requirements.

Grounds: The Delegated Officer considers that the reporting will provide information to identify potential impacts, trends, and emerging risks.

This annual reporting is appropriate to monitor groundwater, surface water and soil impacts at the Premises, and the specification of the reporting requirements is sufficient to enable DWER to analyse the data. The data will be used to determine the adequacy of infrastructure and operational controls and assess for impacts resulting from operations, infrastructure defects, failure, or malfunction. The Delegated Office may review the appropriateness and adequacy of the licence controls based on the review of the monitoring data.

The monthly reporting frequency for monthly load limits provides a mechanism for the CEO to be informed of issues and respond to an exceedance of licence limits within a shorter timeframe than if the exceedance was only reported annually.

9. Consultation

DWER notified the Licence Holder and direct interest stakeholders of the proposed licence amendment. Appendix 2 provides a summary of consultation comments and how they were considered by the Delegated Officer.

10. Conclusion

This assessment of the risks of activities on the premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this decision report (summarised in Appendix 3).

Based on this assessment, it has been determined that the Amended Issued Licence will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

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

Caron Goodbourn

MANAGER, PROCESS INDUSTRIES

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

Appendix 1
Premises maps

Figure 2: Premises map. The yellow line depicts the premises boundary.

Figure 3: Irrigation area made up of Area A(1), A(2) and B. Total size of 10ha

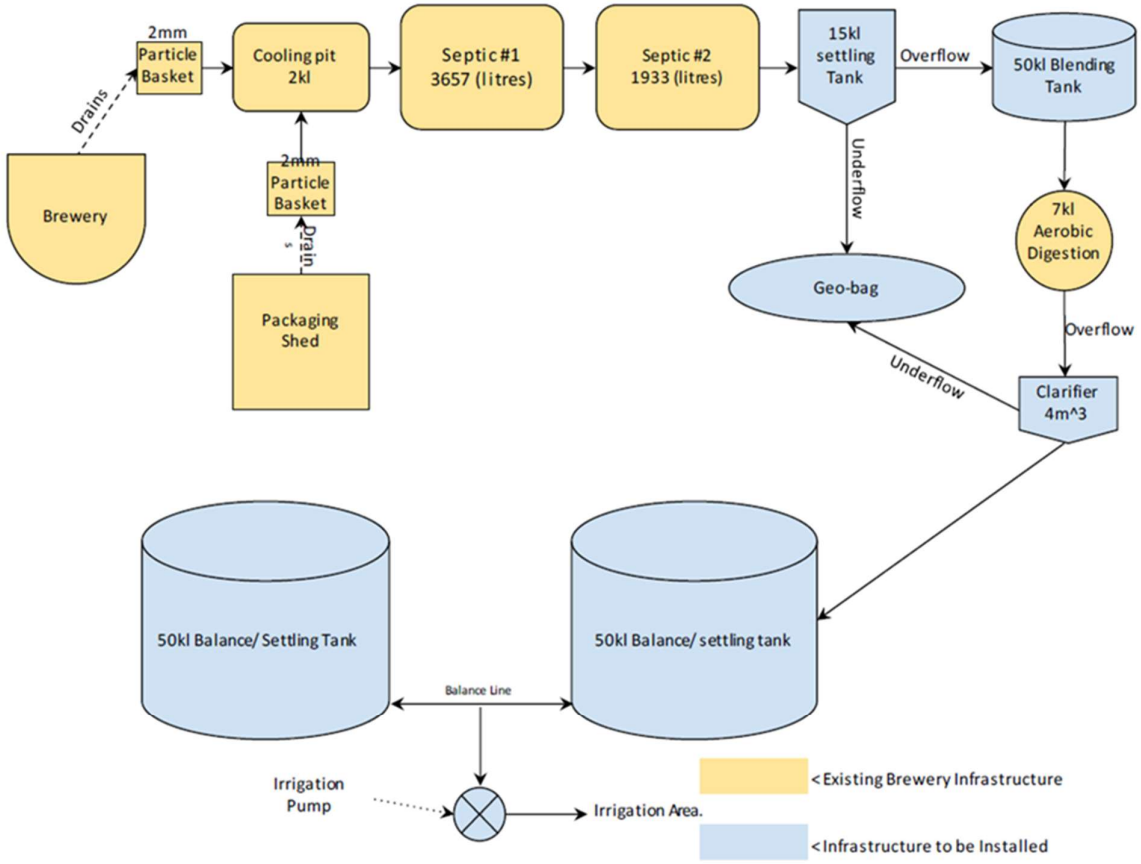

Plate 1. Schematic of proposed wastewater treatment system

Figure 4: WWS schematic

Appendix 2: Summary of consultation comments

Application consultation

Direct interest stakeholder	Comment	DWER response
DOH	In the process of assessing an application to construct or install an apparatus for the treatment of sewage under the *Health Act 1911* and the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*. Waiting for submission of engineering certification for the proposed wastewater system design. Unable to proceed with application without a certification of the design.	Noted
LGA	Planning approval for irrigation on Lot 131 granted on 18/02/2019.	Noted

Applicant consultation

Condition/ reference	Applicant Comment	DWER response
Licence		
Conditions 4 and 5	Reject conditions given that a soil survey and geotechnical report have already been undertaken. Soil sampling results (from sampling undertaken on 12/04/2018) and a geotechnical report (10/12/2018) supplied to support comments provided on conditions.	No changes made to licence conditions. The Delegated Officer has determined that the soil sampling results and geotechnical report provided are not sufficient. The results from the soil sampling undertaken are not considered to be equivalent of a soil survey and do not provide the information necessary to determine the key physical features of soil materials within each irrigation area. The report titled Geotechnical Investigation 177 Gale Road, Metricup WA, 10 December 2018 does not confirm the physical and chemical properties of the soil in each soil horizon of all of the irrigation areas. It is noted that the field works carried out as a part of the investigations included the excavation of four test pits. Each of these test pits were in locations outside of the irrigation areas. The number of the locations of the test pits are not considered to be sufficient or representative of the irrigation areas. It is necessary that soil assessment is undertaken within each of the irrigation areas using a conservative sampling intensity such as a 100 x 100 grid, as discussed in section 8.2 of this document. The Delegated Officer does not consider that the soil sampling results and geotechnical survey provides sufficient information about the properties of soil materials in order to assess their suitability for the long-term application of wastewater.

Condition/ reference	Applicant Comment	DWER response
		A soil survey and detailed soil investigation of each irrigation area to the specified requirements of conditions 4 and 5 is necessary prior the irrigation at the Premises. Refer to sections 2.2, 8.2, and 8.5.1 of this document that address the reasons for the Soil Survey and Detailed Soil Investigation.
Condition 9 – 9(a), 9(b), and 9(c) (linked to Condition 8)	The licence holder rejects the need to submit a report that audits their compliance with the requirements specified for the works. The licence holder outlined that: a) a licensed plumber would not be able to cover items in the design; b) certification by a third party suitably qualified expert is not achievable and no such candidate exists; and c) bores have already been installed by a qualified driller.	9(a) The planting and establishment of vegetation requirements have been separated from irrigation infrastructure requirements in Schedule 2. The submission of an audit report is necessary for the licence holder to demonstrate that construction of works have been completed in accordance with the relevant conditions. a) the Delegated Officer considers that a licensed plumber is an appropriate professional to construct and/or install and certify the specified items listed in Schedule 2, which includes items such as WWS tanks, pumps, fixtures, alarms and irrigation system. Plumbers install and maintain a range of plumbing products, including items specified in Schedule 2 for the WWS. The planting and establishment of pasture grasses has been placed in a separate row in the licence (Item 10.1 of Schedule 2) from the irrigation system infrastructure and does not require certification by a licenced plumber. b) The Delegated Officer considers that certification of the geo-bag hardstand and collection sump area by a third party suitably qualified expert is achievable. The licence defines a third party suitably qualified expert as an independent third party geotechnical or structural engineer. The services of geotechnical or structural engineers is available in Western Australia. c) It is understood that two groundwater monitoring bores were installed at the premises in October 2018. Information about the driller and their qualifications has not been provided. The application did not include bore logs or construction details of these bores. Evidence to demonstrate how the bores meet the requirements of *Minimum Construction Requirements for Water Bores in Australia (AIH 2012)* or the *Department of Water Quality Protection Note 30 Groundwater Monitoring Bores (DoW 2009)* was not provided by the licence holder. On this basis, the suitability of the two existing bores is uncertain and new

Condition/ reference	Applicant Comment	DWER response
		bores (total of four new bores) for monitoring groundwater are required. Refer to section 8.1.3 of this document.
Condition 10	The licence holder rejects the condition and advising that two existing bores were installed by a qualified driller.	No changes made to licence conditions. The installation of four new groundwater monitoring bores is a Delegated Officer derived requirement. Refer to the responses for condition 9(c) above and schedule 2, table 14 below.
Condition 14 (14(a), 14(b) and 14(c))	The licence holder rejects the conditions based on the submission of the soil sampling results and geotechnical survey.	No changes made to licence conditions. Refer to response for conditions 4 and 5 above.
Condition 15	The licence holder rejects condition 15 (which includes Table 4) as they would like to irrigate over 12 months of the year except for during rainfall events.	No changes made to licence conditions. Section 8.5.2 of this document details why irrigation is restricted and is not permitted to occur during the 5-month period during winter and spring.
Conditions 16(i) and 16(k)	The licence holder rejects conditions: 16(i) noting that plantation trees take 12 years to grow and be harvested; and 16(k) noting that weekly checks of the irrigation area will occur.	Condition 16(i) has been amended. Noting that coppicing is not complete harvesting, but rather a means of trimming the mature trees to stimulate branch and leaf growth, with resultant increased nutrient and water update. The application stated that the plantation trees are existing and that no new trees will be planted. Based on this the Delegated Officer will set a new coppice period of 5-7 years, outlining that this short rotation is considered suitable given the absence of details about the design and management of the plantation. It will also assist to ensure that effects on groundwater, soils and vegetation are maintained. Condition 16(k) has been amended to require weekly checks rather than daily checks. Condition 16(k) – the requirement for daily checks of the irrigation area is a licence holder derived requirement. The licence holder committed to daily checks of the irrigation area in the amendment application. The change to weekly has been changed as per the licence holder's request.
Condition 19	The licence holder rejects condition 19, making reference that that there is no bunding, hardstand, fall or collection sump.	No changes made to licence conditions. Further details added to section 8.7 of this document. Condition 19 outlines how wastes must be contained and disposed with corresponding requirements. The licence holder is correct in the comment that there is no bunding, hardstand, fall or collection sump at present at the premises. The

Condition/ reference	Applicant Comment	DWER response
		installation of a dedicated containment area (which includes bunding, hardstand etc) is a Delegated Officer derived requirement. The condition is structured to give the licence holder the option for the offsite disposal or onsite storage of brewery wastewater that is not irrigated to land in accordance with licence requirements. If the licence holder chooses to store the wastewater onsite, it must be in accordance with the specified requirements including bunding, hardstands and sumps. These controls are necessary to address the high risk posed to surface and groundwater by breach of containment of wastewater infrastructure.
Condition 28	The licence holder rejects condition 28, stating that it is onerous on a small business.	No changes made to licence conditions. Sections 8.6 and 8.11 of this document outline why it is considered necessary for monthly reporting.
Condition 29	The licence holder rejects condition 29, stating that it is onerous on a small business and monthly monitoring will not be undertaken.	No changes made to licence conditions. Condition 29 outlines the requirement to submit an annual report. It requires that results from monthly monitoring of irrigated wastewater throughout the year is reported. Sections 8.5.3, 8.6 and 8.11 of this document outlines the reasoning why monthly testing of irrigated wastewater is necessary.
Map 5	The licence holder rejects Map 5, stating that there are two groundwater monitoring bores, not four.	No changes made to licence conditions. It is understood that there are two existing groundwater monitoring bores. The installation of four new groundwater monitoring bores is a Delegated Officer derived requirement. Refer to section 8.1.3 of this document that outlines why groundwater monitoring bores are required to be installed. Refer to response for condition 9(c) above.
Schedule 2 Table 14: Items 7, 9, and 11 Table 15: Items 14 and 17	The licence holder rejects items of Schedule 2 noting: Item 7: geobags are not located on a hardstand area; Item 9: there is no flow meter installed, flow will be determined from the subtraction of input flow meter into the brewery less product produced; Item 11: there are two bores not four;	Item 7: No changes made. It is understood that the application did not propose to store the geo-bags within a contained hardstand area. The controls proposed by the licence holder are minimal. The contained area is a Delegated Officer derived requirement. The requirement to have the geo-bags located within a dedicated hardstand area was added to the licence requirements based on the risk assessment outcome. It was identified that the risk posed to sensitive receptors from groundwater and surface water contamination associated with breach of containment of the WWS was ‘high’. The additional

Condition/ reference	Applicant Comment	DWER response
	Item 14: there is no additional flow meter, two are installed on input of brewery and input of venue; and Item 17: all tanks are PVC.	control for the geo-bags to be stored in a contained area are necessary to manage the risk to sensitive receptors. Item 9: No changes made. It is understood that the application did not propose to install a flow meter on the pipeline that transports wastewater from the WWS to the irrigation area. The installation of the flow meter is a Delegated Officer derived requirement. The subtraction of brewery inputs less the product produced is not an acceptable way to measure the volume of wastewater applied to the irrigation area. Refer to section 8.1.2 of this document that outlines why the flow meter is required to be installed. Item 11: No changes made. Refer to response for Map 5 and condition 9(c) above. Item 14: No changes made. Refer to the response to Item 9 above. A flow meter on the input to the brewery is not sufficient to measure the volume of wastewater applied to the irrigation area. Water inputs into the brewery is not representative of the volume of wastewater irrigated which is needed to allow accurate contaminate load calculations to be carried out. Item 17: Noted. PVC description added to infrastructure table (Table 2) and Schedule 2 of the licence.
Decision Report		
Table 2	All tanks are PVC and certified	Noted. PVC description added to infrastructure table (Table 2) and Schedule 2 of the licence.
Section 2.2	Geotechnical report provided (with comments via email on 3/4/19)	The grounds in section 8.2.1 of this document has been updated to reflect the submission of soil sampling results and a geotechnical investigation report by the licence holder. Refer to response for conditions 4 and 5 above.
Section 2.3 (Table 4)	The licence holder questioned that if the premises is located in a sensitive area, why have DWER and the LGA approved extractive industry licences on the adjoining property.	A search of DWER records of active and pending licences and works approvals does not show a licence or works approval for extractive processes such as oil and gas extraction or mining from any of the properties that share a boundary with the premises.

Appendix 3: Key documents

Document title	In text ref	Availability
Department of Water, 2009. Busselton-Capel Groundwater Area: Plan companion for the South West groundwater areas allocation plan.	Department of Water, 2009	Available from web site: https://www.water.wa.gov.au/__data/assets/pdf_file/0019/4870/84015.pdf
Marnham, J.R., Hall, G.J. and Langford, R.L., 2000. Regolith-Landform Resources of the Cowaramup-Mentelle 1:50 000 Sheet. Geological Survey of Western Australia Record No 2000/18.	Marnham et al., 2000	Available in PDF format from web site: www.dmp.wa.gov.au
M. C. Peel, B. L. Finlayson, T. A. Mcmahon Updated world map of the Koppen-Geiger climate classification October 2007	M. C. Peel. et, al	Available from web site: https://hal.archivesouvertes.fr/hal-00305098/document
NSW DEC, 2003. Use of Effluent for Irrigation.	NSW DEC, 2003	Available from web site: http://www.environment.nsw.gov.au/resources/water/effguide.pdf.
SA EPA, 2009. Wastewater irrigation management plan – a drafting guide for wastewater irrigators.	SA EPA, 2009	Available from web site: www.epa.sa.gov.au
US EPA, 2005. Process Design Manual: Land Treatment of Municipal Wastewater Effluents. US EPA technical guidance document.	US EPA, 2005	Available from web site: www.epa.gov
DER, February 2017. Guidance Statement: Decision Making. Department of Water and Environmental Regulation	NA	Accessed at www.dwer.wa.gov.au
DER, February 2017. Guidance Statement: Risk Assessments. Department of Water and Environmental Regulation		
DER, October 2015. Guidance Statement: Setting Conditions. Department of Water and Environmental Regulation		
DER, October 2015. Guidance Statement: Land Use Planning. Department of Water and Environmental Regulation		