



## Application for Licence Amendment

### Division 3, Part V *Environmental Protection Act 1986*

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<b>Licence Number</b>	L6395/1993/16
<b>Applicant</b>	Harvey Industries Group Pty Ltd
<b>ACN</b>	117 597 985
<b>File Number</b>	DER2015/000553
<b>Premises</b>	Harvey Beef Abattoir Lot 3 on Diagram 70328; Lots 105, 106 and 113 on Plan 202106; Lots 115, 116, 117, 118, 119, 142, 143, 145, 147, 149, 172, 173, 174, 175, 177, 200, 201, 202, 203, 203, 205, 228, 229, 230, 231 and 232 on Plan 2492; Lots 235 and 236 on Plan 29898; and Lots 400 and 401 on Plan 302521, Seventh Street  HARVEY WA 6220
<b>Date of Report</b>	5 April 2019
<b>Status of Report</b>	Final

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# 1. Definitions of terms and acronyms

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

**Table 1: Definitions**

Term	Definition
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AER	Annual Environmental Report
AHD	Australian Height Datum
ANZECC & ARMCANZ	refers to the document <i>National Water Quality Management Strategy, Paper No. 4, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, The Guidelines (Chapters 1 – 7)</i> , Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, October 2000
BOD	biochemical oxygen demand
Category/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CEO	means Chief Executive Officer. CEO for the purposes of notification means:  Director General Department Administering the <i>Environmental Protection Act 1986</i> Locked Bag 10 JOONDALUP DC WA 6919 <a href="mailto:info@dwer.wa.gov.au">info@dwer.wa.gov.au</a>
Decision Report	refers to this document
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation
EC	Electrical conductivity
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EP Regulations	<i>Environmental Protection Regulations 1987 (WA)</i>
Existing Licence	L6395/1993/16 - the Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of and during this amendment.
ha	hectares

hd	head of livestock
Licence Holder	Harvey Industries Group Pty Ltd
m <sup>3</sup>	cubic metres
NIMP	Harvey Industries Group Pty Ltd, Harvey Beef Abattoir, Nutrient and Irrigation Management Plan, Version 4, November 2018
PBI	phosphorus buffering index
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Primary Activities	as defined in Schedule 2 of the Revised Licence
RENOIR	Removal of Nitrogen for Irrigation
Risk Event	as described in <i>Guidance Statement: Risk Assessment</i>
TDS	total dissolved solids
TN	total nitrogen
TP	total phosphorus
WQPN 22	Water Quality Protection Note – <i>Irrigation with nutrient-rich wastewater</i> , Department of water, July 2008
WQPN 30	Water Quality Protection Note – <i>Groundwater Monitoring Bores</i> , Department of Water, February 2006

## 2. Purpose and scope of assessment

An application was received from Harvey Industries Group Pty Ltd (the Licence Holder) on 12 November 2018 to amend the Harvey Beef Abattoir (the Premises) operating Licence L6395/1993/16 to allow for irrigation on an additional 21.85 hectares (see Figure 1), being lots 105 and 106 on Plan 202106, located on the south side of Uduc Rd and immediately south of the existing irrigation area. This Decision Report reviews emissions and discharges from the irrigation of treated wastewater to land at the Premises (current and proposed areas). The Revised Licence issued as a result of this review consolidates and supersedes all previously authorised licences and Amendment Notices previously issued in relation to the Premises. The Revised Licence has been issued in a new format with existing conditions being transferred, but not reassessed, to the new format.

### 2.1 Application details

Table 2 lists the documents submitted during the assessment process.

**Table 2: Documents and information submitted during the assessment process**

Document/information description	Date received
Application Form (Licence amendment), L6395, Harvey Beef Abattoir, Harvey Industries Group Pty Ltd (12 November 2018)	12 November 2018
Supporting information: Cover Letter, Licence Amendment Application – Harvey Beef (L6395/1993/16), KASA Consulting, 12 November 2018	
Supporting information: Harvey Industries Group Pty Ltd, Harvey Beef Abattoir, <i>Nutrient and Irrigation Management Plan</i> , Version 4, November 2018	
Supporting information: E-mail from KASA Consulting to DWER including attachments, Amendment Application – Request for information – HIG Response, 22 November 2018	22 November 2018

## 3. Background

Harvey Industries Group Pty Ltd (the Licence Holder) hold Licence, L6395/1993/16, for abattoir and rendering facilities at Harvey Beef Abattoir (the Premises) with processing facilities located approximately 2 km west of Harvey on the Swan Coastal Plain, approximately 120 km south of Perth.

Wastewater generated from the abattoir and rendering plant is directed through primary (solids removal) and secondary (anaerobic and RENOIR (Removal of Nitrogen for Irrigation) ponds. Treated wastewater is then stored in evaporation ponds until it is used to irrigate pastures and crops on the Premises as part of the Licence Holder's cropping program. Treated wastewater is currently irrigated over 28 paddocks totaling 122.2 hectares. The Licence Holder has applied to add an additional 21.85 hectares (see Figure 1), being lots 105 and 106 on Plan 202106, located on the south side of Uduc Rd and immediately south of the existing irrigation area.

The Licence Holder has submitted an updated NIMP to include the proposed irrigation area (Pheonix). This NIMP has been reviewed, along with the Application supporting information, as part of the risk assessment for irrigation of treated wastewater to the proposed irrigation area. As the Licence Holder has not provided separate data for the proposed irrigation area in the NIMP, DWER has assessed the risk of irrigating nutrient rich wastewater to the whole 144.05 ha (current and proposed areas).

It is noted that the Application indicates that the Licence Holder intends to increase the slaughter

throughput from 170,000 to 200,000 animals per year and intend to submit a works approval application in 2019. However, this Decision Report assesses the risk of the above amendments only and does not include an increase in throughput nor reviews any other conditions of the Existing Licence.



**Figure 1: Proposed irrigation area (shaded green) and existing premises boundary (red line)**

Additionally, for this Licence amendment, DWER has consolidated past Amendment Notices such that the amended Licence will include the changes that were authorised under the Notice of Amendment to extend the expiry date of the Licence (April 2016) and Amendment Notice 1. The Revised Licence has been issued in a new format with existing conditions being transferred, but not reassessed, to the new format. Therefore, the numbering, wording and format of existing conditions may have changed, but the intent remains the same.

Table 3 lists the prescribed premises categories in the Existing Licence.

**Table 3: Prescribed Premises Categories in the Existing Licence**

Classification of Premises	Description	Approved Premises production or design capacity or throughput	Description of amendment
Category15	Abattoir: premises on which animals are slaughtered	Not more than 220,000 tonnes (hot standard carcass weight) of beef cattle slaughtered per annual period	DWER initiated amendment to change the wording to specify that the throughput for the abattoir (category 15) is based on hot standard carcass weight (HSCW) as the beef cattle are not weighed prior to entering the abattoir.



Category 16	Rendering operations: premises on which substances from animal material are processed or extracted.	Not more than 120,000 tonnes of animal material rendered per annual period	DWER initiated amendment to change the wording to specify that the throughput for rendering operations (category 16) is based on the amount of animal material rendered.
Category 55	Livestock saleyard of holding pen: premises on which live animals are held pending their sale, shipment or slaughter.	Not more than 170,000 animals per year	DWER initiated amendment to change the wording to specify that the throughput for livestock holding pen (category 55) is based on the number of animals slaughtered at the Premises.

## 4. Overview of Premises

### 4.1 Operational aspects

Beef cattle are transported by truck to the property via an entrance on Eighth Street, Harvey, and unloaded in the stockyards and held in lairage pens or holding paddocks before slaughter.

Mortality is either processed within the rendering plant or denatured prior to transport to a licenced landfill facility. Faecal material recovered from the lairage yards is taken offsite.

Animals are slaughtered and processed in the abattoir building. The slaughter and boning floors operate 5 days a week all year round; however, this can reduce or increase depending on seasonal variation. The slaughter floor runs one shift per day and the boning room runs two shifts per day. Each shift can operate 8.5 to 12 hours.

Blood is collected in a dedicated sump prior to transfer to the rendering area. Paunch (undigested stomach contents) and hides are taken off site for disposal or further processing.

All renderable materials including offal and blood from the abattoir, and renderable material sourced from offsite, are processed in the rendering plant at the premises. The processing rate of renderable material is highly dependent on the drying rate of the products introduced to the cooker with dry products being processed faster than wetter products. The combined (wet and dry) rendering operations can process up to approximately 18 tonnes per hour (15 t/hr of dry products and 3 t/hr of wet (blood) products). Process water is sourced from the Harvey Pipeline Scheme. Rendering plant operations include the drying of blood; cooking, screening, pressing and milling raw material to produce meat bone meal; screening, polishing and settling material to produce tallow and cooking and decanting material from the kill floor to produce other products.

Extracted air (odour) emissions from the rendering facility is directed at low flows into the base of one of two biofilters where the air is diffused through wood chip filter media. Moisture content within the biofilters is maintained using scheme water to sustain microbial activity. Treated air is released over the surface of the biofilters.

Wastewater generated from the slaughter floor, boning room and rendering plant, along with some contribution from cleaning of chilling and freezing areas within the abattoir, is directed through primary (solids removal) and secondary (anaerobic and RENOIR (Removal of Nitrogen for Irrigation) ponds for treatment of the wastewater. Treated wastewater is then stored in

evaporation ponds until it is used to irrigate pastures and crops on the Premises as part of the Licence Holder's cropping program. Sludge wastes are currently removed offsite.

## 4.2 Infrastructure

The Harvey Beef Abattoir infrastructure, as it relates to Category 15, 16 and 55 activities, is detailed in Table 4 and with reference to the Monitoring Locations and Main Site Features map (attached in the Revised Licence).

**Table 4: Harvey Beef Abattoir Category 15, 16 and 55 infrastructure**

	Infrastructure	Site Plan Reference
<b>Prescribed Activity Category 15 and 16</b>		
Animals are processed on the abattoir floor to produce meat for human consumption. Renderable animal material, from the abattoir and received onsite, is rendered to produce products such as tallow and meat meal.		
1	Abattoir facility (animal processing including slaughter floor and boning room).	Site Layout map in the Revised Licence
<b>Prescribed Activity Category 16</b>		
2	Rendering of animal material (including offal and blood) in the rendering facility. Infrastructure includes the cooker, blood tank and drier, boiler and boiler stack.	Site Layout map in the Revised Licence
3	Two biofilters	Monitoring Locations and Main Site Features and Site Layout maps in the Revised Licence
4	Boiler (wall fired natural gas boilers rated under 29 MW)	Site Layout map in the Revised Licence
<b>Wastewater infrastructure</b>		
5	Save all	Site Layout map in the Revised Licence
6	Anaerobic pond	Monitoring Locations and Main Site Features map in the Revised Licence
7	RENOIR pond	
8	Wastewater storage ponds 3, 4, 5 and 6	Monitoring Locations and Main Site Features map in the Revised Licence
<b>Prescribed Activity Category 55</b>		
Animals are held in the livestock pens pending arrival at the abattoir floor.		
9	Livestock (beef cattle) holding pens (lairage yards)	Monitoring Locations and Main Site Features map in the Revised Licence
10	Yard pond	

## 5. Legislative context and Consultation

The Licence Holder indicated in their licence amendment application that they may require

approvals from the Shire of Harvey and Water Corporation for the irrigation of treated wastewater to the proposed irrigation area, Phoenix; therefore, DWER referred the application to the Shire of Harvey and Water Corporation on 27 November 2018.

A response was received from Water Corporation on 20 December 2018 that included the following comments:

- acknowledge that there was soil monitoring but no groundwater or surface water monitoring (within the drains); therefore, there is no available evidence to assess potential surface runoff or groundwater infiltration to the catchment and/or the drain (that Water Corporation have responsibility for); and
- DWER should consider groundwater and surface water monitoring requirements.

The Licence Holder has provided the following information relating to other approvals as outlined in Table 5.

**Table 5: Relevant approvals and tenure**

Legislation	Number	Approval
Local Government Authority – Shire of Harvey - Development approval	Shire Ref: P216/18/18/47021. File: A16130	For installation of new irrigation area and irrigation infrastructure.  Approval is subject to implementation of the Nutrient and Irrigation Management Plan (version 4, 2018).

The Licence Holder has also provided information to show that they have acquired Lots 105 and 106 on Plan 202106, Harvey.

## 5.1 Contaminated sites

Lot 3 on Diagram 70328, which includes the abattoir and rendering processing buildings, is classified as possibly contaminated – investigation required.

## 5.2 Part V of the EP Act

### 5.2.1 Applicable regulations, standards and guidelines

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

The guidance statements which inform this assessment are listed in Appendix 1.

### 5.2.2 Works approval and licence history

Table 6 summarises the licence history for the premises since September 2015.

**Table 6: Licence history**

Instrument	Issued	Nature and extent of works approval, licence or amendment
L6395/1993/16	10/09/2015	Licence renewal
L6395/1993/16	29/04/2016	Notice of Amendment of Licence Expiry Dates – extended Licence expiry date to 14 September 2030
L6395/1993/16	10/11/2016	Amendment Notice 1  Licence amendment to amend conditions relating to the management of treated wastewater within the irrigation area, nutrient loading rates, management of wastewater storage ponds, notification requirements, administrative changes, and update plan

		of premises.
L6395/1993/16	5 April 2019	Licence Amendment Licence amendment to include an additional irrigation area, administrative changes, update to new format licence and consolidate changes made in Notice of Amendment of Licence Expiry Dates and Amendment Notice 1.

## 6. Location and siting

### 6.1 Siting context

The Premises is located on the Swan Coastal Plain approximately 2 km west of Harvey and 120 km south of Perth. The land is zoned as intensive farming under the Shire of Harvey's Town Planning Scheme No. 1 (District Scheme) and includes restricted use area 6 (abattoir) and restricted use area 4 (abattoir and holding paddocks with 30 m of dense native vegetation between the buildings and Uduc Rd and around the wastewater lagoons). The surrounding land is zoned as intensive farming and includes land uses such as stock grazing, farm stay accommodation, fruit trees, viticulture and intensive horticulture.

### 6.2 Residential and sensitive Premises

Table 7 below lists the closest sensitive land uses to the Prescribed Premises which may be receptors relevant to the proposed amendment.

**Table 7: Receptors and distance from activity boundary**

Sensitive Uses	Land	Distance from Prescribed Premises
Residential premises (rural)		Seven residential premises located within 450 m S of existing irrigation area, with two being immediately on the south side of Uduc Rd. Nine and six residential premises located within 400 m E and N respectively of the existing irrigation area. Residential premises located 200 m west and east of the proposed irrigation area Five additional rural premises located within 600 m of the proposed irrigation area (SE, SSE, S, SW and W).
Residential area		Residential area located approximately 850 m and 2.3 km east of existing and proposed irrigation area respectively.
Accommodation		Farm stay accommodation is located approximately 300 m W and 880 m NW of the existing and proposed irrigation area respectively.

### 6.3 Specified ecosystems, groundwater and water sources

Specified ecosystems are areas of high conservation value and special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises. The distances to specified ecosystems are shown in Table 8. Table 8 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem and groundwater and water sources.

**Table 8: Environmental values**

Specified ecosystems and other environmental receptors	Distance from the Premises
Geomorphic wetlands Swan Coastal Plain (management)	Premises located within: Swan Coastal Plain – Semeniuk, Palusplain (seasonally waterlogged), flat, multiple use.
<i>Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992 (EPP)</i>	The Premises and proposed irrigation area are located approximately 550 m and 1.2 km south, respectively, of the area protected under the EPP.
Surface water	<p>The Premises is located within the Harvey Irrigation District proclaimed under the <i>Rights in Water and Irrigation Act 1914</i>.</p> <p>The Harvey Dam is located 4.8 km east and the Harvey Main Drain located 2.3 km NE of the Premises. The Harvey Diversion Drain is located 1.6 km S of the proposed irrigation area.</p> <p>A minor river is located 50 m NW of the premises boundary and current irrigation area.</p> <p>Existing agricultural drainage networks are located adjacent and through the Premises, along Seventh St, Uduc Rd and Government Rd (Wellesley River diversion drain). These drainage networks flow to the Harvey River Diversion Drain discharging into the ocean near Myalup, approximately 19 km downstream.</p> <p>Resource enhancement (sumpland and dampland) wetlands are located approximately 4.8 km west of the proposed irrigation area.</p>
Groundwater	<p>The South West Coastal Groundwater Area, proclaimed under the <i>Rights in Water and Irrigation Act 1914</i>, is located 4.7 km west of the proposed irrigation area.</p> <p>The Licence Holder has a production bore onsite; however, it is rarely used due to unsuitable water quality for processing purposes. The Licence Holder has advised that there are approximately 50 groundwater bores within a 3 km radius, most of which are for production purposes associated with livestock and domestic requirements.</p> <p>The nearest licence to take groundwater, for the Harvey Golf Club, is located approximately 5.8 km west of the proposed irrigation area.</p> <p>The Licence Holder has advised that depth to groundwater at the Premises is at least 1.5 m below ground level (based on a 1.5 m deep drainage ditch running along the proposed irrigation area showing no surface expression of groundwater).</p> <p>Information gathered by DWER in 2015 (DoW 2015) shows that depth to groundwater at the proposed irrigation area ranges from 1 to 2 metres below ground level.</p> <p>A groundwater monitoring bore, owned by DWER and located 500 m west of the proposed irrigation area, shows the maximum groundwater table to be approximately 1 m below ground level. It is noted that, according to the DoW 2015 information, this bore is located adjacent to an area that was found to have a depth to groundwater of 0.6 – 1 m below ground level.</p> <p>The Perth Groundwater Map shows that the groundwater salinity at the premises is 1,500 – 3,000 mg/L, which is considered brackish to saline.</p>

## 6.4 Soil type

Table 9 details soil types and characteristics relevant to the assessment.

**Table 9: Soil and sub-soil characteristics**

Soil and sub-soil characteristics	Description
Soil type classification	The Licence Holder has provided, with their application, a NIMP that includes information on soil type of the Premises. Soils at the proposed irrigation area are flat to very gently undulating with deep, imperfect to poorly drained acidic gradational yellow or grey-brown earths and mottled yellow duplex soils, with loam to clay loam surface horizons (NIMP, 2018). This is the same soil type as approximately half of the paddocks currently irrigated (see Figure 2).
Acid sulfate soil risk	Moderate to low acid sulfate soil disturbance risk (<3 m from surface)

The Licence Holder has conducted annual soil sampling at 72 sites across the irrigation area (see Soil Sampling Locations map in this Decision Report) since 2007. Soil sampling at the proposed irrigation area (Phoenix) was completed for the first time in 2018.

Soil sampling was conducted at 0-10 cm, 10-20 cm and 20-30 cm depths in 2007, and then annually at 0-10 cm with 10-20 cm and 20-30 cm at selected sites. Soil samples were tested for nitrate, ammonium, phosphorus, Phosphorus Buffering Index (PBI), potassium, sulfur, organic carbon, electrical conductivity (EC) and pH. Data from soil sampling in 2017 is provided in Appendix 2 of the NIMP.

The Licence holder has stated on page 10 of the NIMP that the vast majority of soils sampled at the Premises have very high PBI levels (>100). Table 10 and Table 11 show that average Generally, PBI levels in the soil are greater than 260 (and are greater than 198 in the Phoenix paddocks) indicating a large capacity for soil phosphorus sorption.

Soil data collected across the current irrigation area from soil sampling sites with similar soil type to the proposed irrigation area show that the concentration of phosphorus (measured as phosphorus (Colwell)) and nitrogen (measured as nitrate-nitrogen) in the soil decreases with increasing depth (measured at 0-10 cm, 10-20 cm and 20-30 cm).

However, when comparing 2015 to 2017 data, there appears to be a slight increase in soil phosphorus at each soil sample depth over time. However, soil nitrogen appears to have generally remained the same or decreased slightly at each soil depth over time.

Soil sampling results for the proposed irrigation area (Phoenix) can be seen in Table 12. Soil sampling was only conducted at 0-10 cm and 10-20 cm depths; however, the results show that all parameters, except conductivity that stayed the same, decrease with increasing depth.

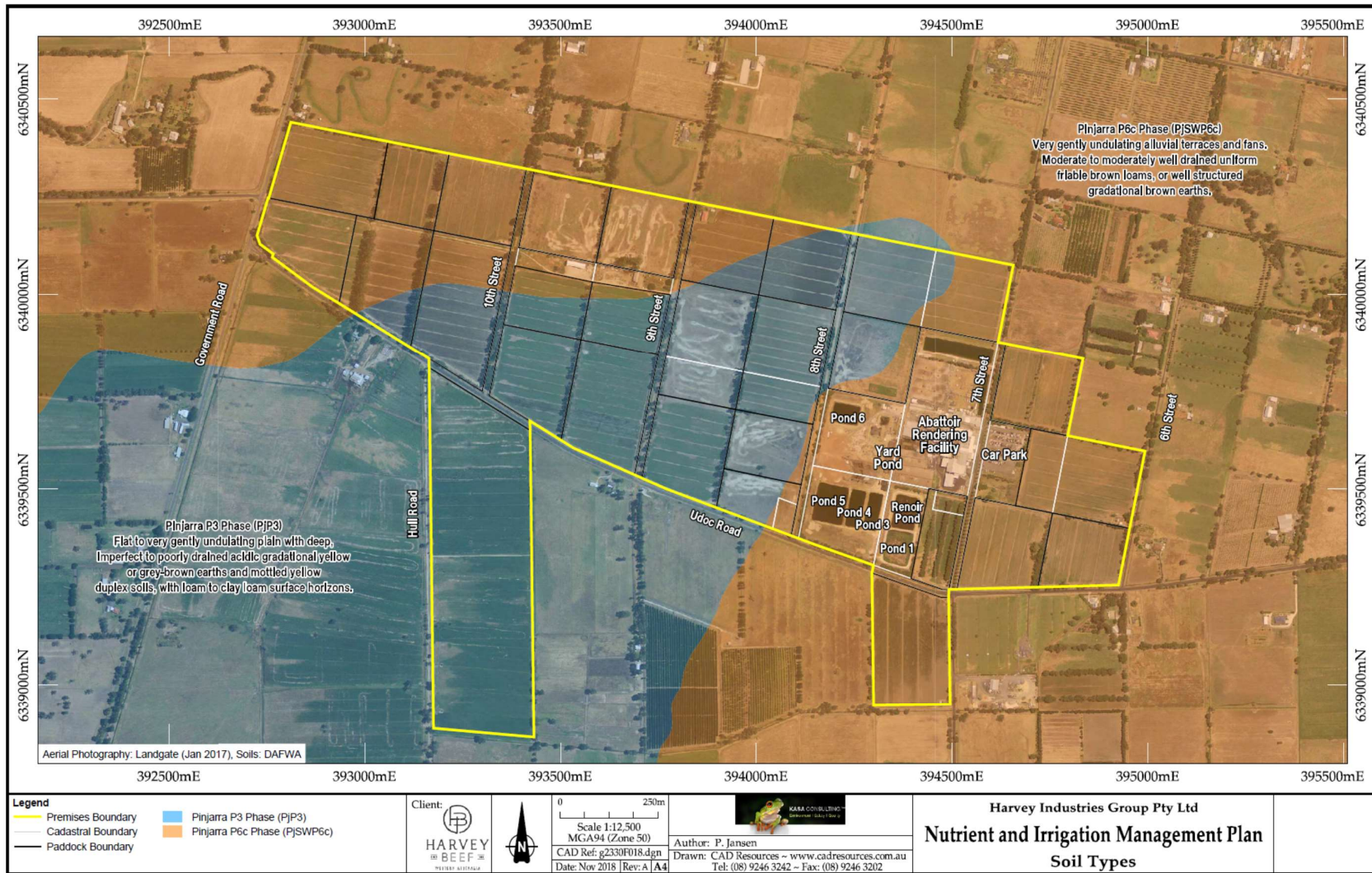


Figure 2: Map showing soil type across the Premises (map taken from page 8 of the NIMP, November 2018)

**Table 10: Average<sup>3</sup> soil sampling results from 2015-2017**

	Ammonium Nitrogen (mg/kg)	Nitrate Nitrogen (mg/kg)	Phosphorus (Colwell) (mg/kg)	Potassium (Colwell) (mg/kg)	Sulphur (mg/kg)	Organic carbon (%)	Conductivity (dS/m)	pH (CaCl <sub>2</sub> )	pH (H <sub>2</sub> O)	PBI
Soil sampling sites where soil type is similar to Phoenix <sup>1</sup>	7.31	8.18	141.24	300.9	33.03	3.17	0.26	5.67	6.53	267.18
Soil sampling sites where soil type is not similar to Phoenix <sup>2</sup>	9.81	7.21	181.73	316.6	23.16	3.06	0.189	5.56	6.52	356.42
Soil sampling – proposed irrigation area (Phoenix sampling sites) <sup>4</sup>	4.67	1.33	54.08	140.6	22.76	3.21	0.20	4.73	5.76	236.33

Note 1: Data is from soil sampling sites 7S1 (sites 2 and 3 only), 7S3 (sites 2 and 3 only), 8S1 (sites 1 and 2 only), 8S2, 8S3, 8S4, 8S5, 8S6, 9S2 (site 2 only), 9S3, 9S4, 9S5 (site 2 only) and 10S2 (sites 1 and 2 only).

Note 2: Data is from soil sampling sites 6S1, 6S2, 6S3, 6S4, 7S1 (site 1 only), 7S2, 7S3 (site 1 only), 8S1 (site 3 only), 8S7, 9S1, 9S2 (sites 1 only), 9S5 (site 1 only), 9S6, 10S1, 10S2 (site 3 only), 10S3, 10S4, 10S5 and 10S6.

Note 3: Data is taken from all soil sampling depths.

Note 4: Soil sampling for the proposed irrigation area (Phoenix) is from 2018 only.

**Table 11: Average 2015-2017 soil sampling results from soil sampling sites<sup>1</sup> where soil type is similar to the proposed irrigation area, at 0-10cm, 10-20cm and 20-30cm depths**

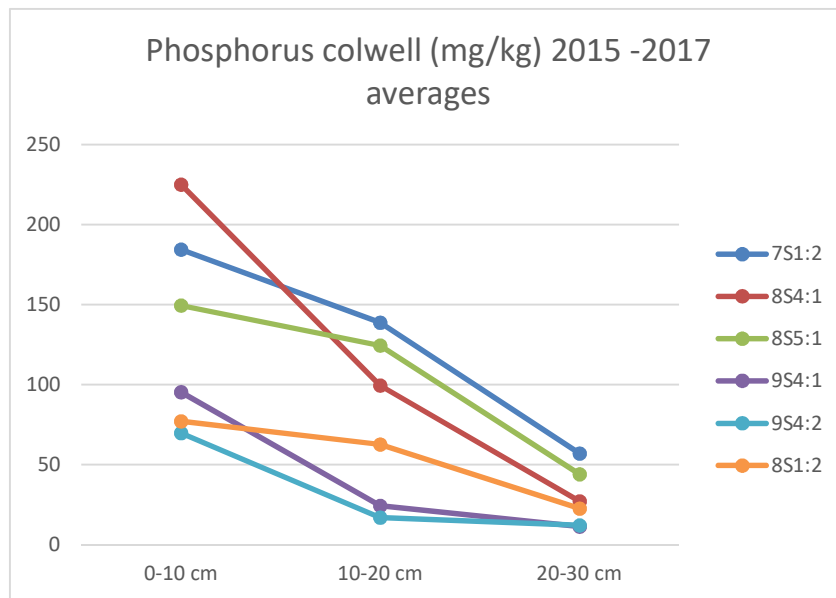
Soil sampling depth	Ammonium Nitrogen (mg/kg)	Nitrate Nitrogen (mg/kg)	Phosphorus (Colwell) (mg/kg)	Potassium (Colwell) (mg/kg)	Sulphur (mg/kg)	Organic carbon (%)	Conductivity (dS/m)	pH (CaCl <sub>2</sub> )	pH (H <sub>2</sub> O)	PBI
0-10 cm	9.3	12	152.7	194.4	25.3	3.1	0.2	5.6	6.5	278.3
10-20cm	6.4	4.5	88.1	127.9	25.6	2.1	0.2	5.7	6.6	262.5
20-30 cm	3.8	4.1	32.7	91.6	41.3	1.1	0.2	5.8	6.7	291.7

Note 1: Data from soil sampling sites: 7S1 (site 2 only), 8S1 (site 2 only in for 2015-2016 and site 1 only for 2017), 8S2 (site 3 only), 8S4 (site 1 only), 8S5 (site 1 only) and 9S4 (sites 1 and 2 only).

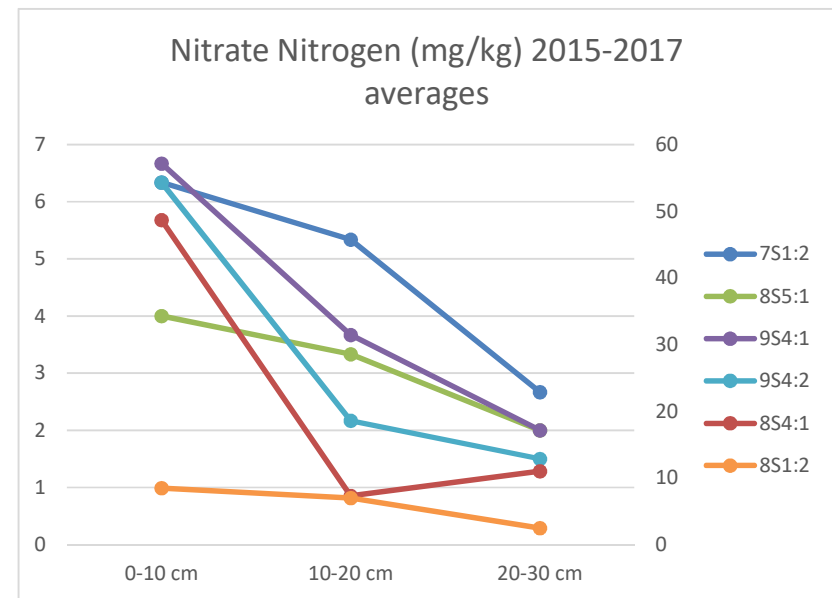


**Table 12: Average 2018 soils sampling results from Phoenix paddock at 0-10 cm and 10-20 cm depths**

Soil sampling depth	Ammonium Nitrogen (mg/kg)	Nitrate Nitrogen (mg/kg)	Phosphorus (Colwell) (mg/kg)	Potassium (Colwell) (mg/kg)	Sulphur (mg/kg)	Organic carbon (%)	Conductivity (dS/m)	pH (CaCl <sub>2</sub> )	pH (H <sub>2</sub> O)	PBI
0-10 cm	5.7	1.7	89.7	203.2	22.7	3.3	0.2	4.9	5.9	273.7
10-20cm	3.7	1.0	18.5	78.0	17.8	3.2	0.2	4.6	5.6	199.0



**Figure 3: Phosphorus (Colwell) (mg/kg) at different soil depths for selected soil sampling sites from 2015-2017. Note that 8S1:2 data is only based on 2015-2016 data. 8S2:3 data was not included as it was only sampled at all three depths in 2017.**



**Figure 4: Nitrate-Nitrogen (mg/kg) at different soil depths for selected soil sampling sites from 2015-2017. Note that 8S1:2 data is only based on 2015-2016 data. 8S2:3 data was not included as it was only sampled at all three depths in 2017.**

## 7. Risk assessment

### 7.1 Risk Assessment for proposed amendments

Table 13 below describes the Risk Events as associated with the amendment consistent with the *Guidance Statement: Risk Assessments*. The table identifies whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

**Table 13: Risk assessment for proposed amendments during operation**

Risk Event					(See sections 7.2 and 7.3)			Reasoning	
Source/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts	Consequence rating	Likelihood rating	Risk		
<b>Category 15</b> (Abattoir), <b>Category 16</b> (Rendering operation) and <b>Category 55</b> (Livestock saleyard or holding pen)	Onsite disposal of treated wastewater via irrigation to 144.05 hectare area (including proposed 21.85 hectare area)	Wastewater to land with excessive contaminants	Surface water: existing agricultural drainage network located immediately south of the majority of the existing and immediately north of the proposed irrigation areas.	Direct discharge to land.  Discharge to existing drainage network from overland flows.	Surface water contamination affecting ecosystem health	Moderate	Possible	Medium	See section 7.4 of this Decision Report for detailed risk assessment and section 8 for Regulatory Controls.
			Depth to groundwater is approximately 1 to 2 m below ground level.	Infiltration to groundwater					

		Wastewater to land with excessive hydraulic loading	Surface water: existing agricultural drainage network located immediately south of the majority of the existing and immediately north of the proposed irrigation areas.	Direct discharge to land. Discharge to existing drainage network from overland flows.	Surface water contamination affecting ecosystem health	Moderate	Possible	Medium	See section 7.5 of this Decision Report for detailed risk assessment and section 8 for Regulatory Controls.
			Depth to groundwater is approximately 1 to 2 m below ground level.	Infiltration to groundwater	Groundwater contamination affecting ecosystem health.				
		Odour	Several closest residential premises (rural) located approximately 50 m N, E and S of existing irrigation area and 200 m W and E of proposed irrigation area.	Air / wind dispersion	Potential amenity impacts	Slight	Unlikely	Low	The Delegated Officer considers that the separation distance between the source and potential receptors is sufficient noting that fugitive odour from irrigation of the treated wastewater on the existing 122.2 and additional 21.85 hectares is expected to be insignificant compared to abattoir and rendering operations onsite and the treatment of wastewater in the onsite wastewater treatment pond system.  There have been no complaints received by DWER in relation to odour in at least the last 3 years.  No further assessment required.

DWER administrative amendments	Relating to the AACR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<p>In May 2016 the Department revised and simplified the existing AACR form to enable more valuable reporting and to be consistent with reporting arrangements in other jurisdictions with the most up to date version of the form being available on DWER's website. Therefore, the following amendments were made to the Licence:</p> <ul style="list-style-type: none"> <li>• removal of the AACR form in Attachment 3 of the Existing Licence;</li> <li>• amended wording of condition 20 of the Existing Licence (new condition 18); and</li> <li>• definitions for annual period, approved form and condition were added.</li> </ul>
	Other Administrative Amendments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	<p>Administrative amendments include:</p> <ul style="list-style-type: none"> <li>• The Revised Licence has been issued in a new format with existing conditions being transferred, but not reassessed (unless detailed in this Decision Report), to the new format. Therefore, numbering, wording and formatting of existing conditions may have changed. A conditions map is provided in Section 9;</li> <li>• updated description of premises production or design capacity for each category;</li> <li>• definitions updated and</li> </ul>

									revised; and <ul style="list-style-type: none"> <li>maps have been updated.</li> </ul>
Consolidation of Amendment Notices	Relating to consolidation of Amendment Notice to extend expiry date and Amendment Notice 1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	See section 9 of this Decision Report.

## 7.2 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in Table 14 below.

**Table 14: Risk rating matrix**

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

DWER will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with Table 15 below.

**Table 15: Risk criteria table**

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		The following criteria has been used to determine the consequences of a Risk Event occurring:		
		Environment	Public health* and amenity (such as air and water quality, noise, and odour)	
Almost Certain	The risk event is expected to occur in most circumstances	Severe	<ul style="list-style-type: none"> <li>onsite impacts: catastrophic</li> <li>offsite impacts local scale: high level or above</li> <li>offsite impacts wider scale: mid-level or above</li> <li>Mid to long-term or permanent impact to an area of high conservation value or special significance<sup>^</sup></li> <li>Specific Consequence Criteria (for environment) are significantly exceeded</li> </ul>	<ul style="list-style-type: none"> <li>Loss of life</li> <li>Adverse health effects: high level or ongoing medical treatment</li> <li>Specific Consequence Criteria (for public health) are significantly exceeded</li> <li>Local scale impacts: permanent loss of amenity</li> </ul>
Likely	The risk event will probably occur in most circumstances	Major	<ul style="list-style-type: none"> <li>onsite impacts: high level</li> <li>offsite impacts local scale: mid-level</li> <li>offsite impacts wider scale: low level</li> <li>Short-term impact to an area of high conservation value or special significance<sup>^</sup></li> <li>Specific Consequence Criteria (for environment) are exceeded</li> </ul>	<ul style="list-style-type: none"> <li>Adverse health effects: mid-level or frequent medical treatment</li> <li>Specific Consequence Criteria (for public health) are exceeded</li> <li>Local scale impacts: high level impact to amenity</li> </ul>
Possible	The risk event could occur at some time	Moderate	<ul style="list-style-type: none"> <li>onsite impacts: mid-level</li> <li>offsite impacts local scale: low level</li> <li>offsite impacts wider scale: minimal</li> <li>Specific Consequence Criteria (for environment) are at risk of not being met</li> </ul>	<ul style="list-style-type: none"> <li>Adverse health effects: low level or occasional medical treatment</li> <li>Specific Consequence Criteria (for public health) are at risk of not being met</li> <li>Local scale impacts: mid-level impact to amenity</li> </ul>
Unlikely	The risk event will probably not occur in most circumstances	Minor	<ul style="list-style-type: none"> <li>onsite impacts: low level</li> <li>offsite impacts local scale: minimal</li> <li>offsite impacts wider scale: not detectable</li> <li>Specific Consequence Criteria (for environment) likely to be met</li> </ul>	<ul style="list-style-type: none"> <li>Specific Consequence Criteria (for public health) are likely to be met</li> <li>Local scale impacts: low level impact to amenity</li> </ul>
Rare	The risk event may only occur in exceptional circumstances	Slight	<ul style="list-style-type: none"> <li>onsite impact: minimal</li> <li>Specific Consequence Criteria (for environment) met</li> </ul>	<ul style="list-style-type: none"> <li>Local scale: minimal to amenity</li> <li>Specific Consequence Criteria (for public health) met</li> </ul>

<sup>^</sup> 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.

## 7.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment Table 16 below:

**Table 16: Risk treatment table**

Rating of Risk Event	Acceptability	Treatment
<b>Extreme</b>	Unacceptable.	Risk Event will not be tolerated. DWER may refuse application.
<b>High</b>	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.
<b>Medium</b>	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.
<b>Low</b>	Acceptable, generally not controlled.	Risk Event is acceptable and will generally not be subject to regulatory controls.

## 7.4 Risk Assessment – Discharge of treated wastewater to land (irrigation) – nutrient loading impact analysis

### 7.4.1 Description of risk event

Discharge of treated wastewater with high levels of nutrients to land causing soil degradation, surface water and groundwater contamination and affecting ecosystem health.

### 7.4.2 Identification and general characterisation of emission

Wastewater is generated from the slaughter floor, boning room and rendering plant with a small amount of wastewater from the cleaning of chilling and freezing areas within the abattoir.

Wastewaters from abattoir and rendering processing plants are characterised by high biochemical (or biological) oxygen demand (BOD), chemical oxygen demand, total suspended solids, oil and grease, nitrogen, phosphorus salt (typically NaCl), micro-organisms and chemicals (AMPC 2017).

Treated wastewater is currently irrigated from either Pond 6 or Pond 3. The Licence Holder currently monitors treated wastewater quality at locations P3B (Pond 3) and P6A (Pond 6) as per condition 13 of the Existing Licence. The Licence Holder has advised that wastewater will be irrigated to the proposed irrigation area- 'Phoenix', from pond 3.

Wastewater quality from monitoring site P3B (pond 3) and P6A (pond 6) is shown in Table 17.

**Table 17: Quality of treated wastewater discharged to irrigation area**

Parameter	Units	Pond 3 treated wastewater quality		Pond 6 treated wastewater quality		Average wastewater quality of Pond 3B and 6A combined (2012-2017)	Common levels of concern <sup>1</sup>
		Range of wastewater quality (2012 – 2017 data)	Average water quality (2012 – 2017 data)	Range of wastewater quality (2012-2017)	Average wastewater quality (2012-2017)		
Total Nitrogen	mg/L	15 – 340	85	13 – 310	77	81	125
Total Phosphorus	mg/L	14 – 75	26	13 – 37	25	25	12
pH	pH units	5 - 8	6.8	3.1 – 8	6.8	6.8	-
Total Dissolved Solids	mg/L	500 – 1,100	794	470 – 1100	783	789	-
BOD	mg/L	5 - 41	15	5 - 75	16	16	-

Note 1: Maximum short term trigger value guideline for irrigation water, taken from Table 4.2.11 from ANZECC & ARMCANZ

The Licence Holder has stated in the NIMP that there is currently approximately 3.45 kL of irrigated wastewater per head of livestock. At maximum capacity of 170,000 animals, approximately 587 ML of treated wastewater would be irrigated. A maximum of approximately 513 ML/year of treated wastewater has been irrigated, collectively from Pond 3 and Pond 6, to paddocks within the premises totalling 122.2 ha between 2014 and 2017.

Future irrigation is proposed to include an additional 21.85 ha paddock (Phoenix), located immediately south (across Uduc Rd) of the existing irrigation area.

Preliminary assessment of nutrient loading rates at the site can be determined as follows (NSW EPA, 1998):

$$A = \frac{C \times Q}{L_x}$$

Where

A	=	land area (m <sup>2</sup> )
C	=	concentration of nutrient or BOD (mg/L)
Q	=	treated wastewater flow rate (L/d)
L <sub>x</sub>	=	critical loading rate of nutrient or BOD (mg/m <sup>2</sup> /d)

Based on:

- 2012-2017 average treated wastewater quality (combined Pond 3 and Pond 6) (see Table 17);
- maximum irrigation rate of 587 ML/year and
- critical loading rates of 25 mg/m<sup>2</sup>/day for nitrogen and 3 mg/m<sup>2</sup>/day for phosphorus (NSW EPA, 1998);

the land area required to sustainably manage the nitrogen application rate would be 906 ha and 2,329 ha to manage the phosphorus application rate. It should be noted that while the above calculation shows that 144.05 ha is not a large enough area to manage the nutrient application



rates, it is only an estimate and does not accurately represent what may occur onsite; however, it can give an indication that there may be overloading of nutrients at the premises.

The Licence Holder has modelled nutrient uptake/removal capability for each cropping system used on the premises (section 6.3 of NIMP). The Licence Holder has advised that the model takes into account the establishment time for planted crops, which have the ability to uptake nutrients in their respective growing phases; however, the model does not take into account reintroduction of nutrients to soil from stock or feed which will graze over designated paddocks. Table 18 is taken from page 32 of the NIMP and is a summary of predicted nitrogen and phosphorus uptake rates by various crop systems according to crop productivity determined from plant biomass. The Licence Holder has measured annual leaf tissue analyses and crop yield measurements annually since 2015/16. The Licence Holder has advised that the data in Table 18 takes into account leaf tissue analyses and crop yield measurements from January 2018.

**Table 18: Modelled nutrient uptake by crop system<sup>1</sup>**

System	Period	Productivity (kg DM/ha)	Total Produced (kg DM/ha)	Nutrient Removal (%/kg/DM)		Nutrient Removal (kg/ha)		Total Uptake (kg/ha)	
				N	P	N	P	N	P
System 1 - Kikuyu	May-Oct	ND	8,011	0	0	0	0	328.45	22.43
	Nov-Apr	ND		4.1	0.28	328.45	22.43		
System 2 – Annual RG & Maize	May-Oct	3,960	13,061	1.08	0.46	123.16	18.02	268.76	62.61
	Nov-Apr	13,116		1.11	0.34	145.59	44.60		
System 3 – Annual RG & Millet	May-Oct	3,960	3,425	4.08	0.46	123.16	18.02	123.16	18.02
	Nov-Apr	0		2	0.25	0	0		
System 4 – Annual RG & Sudan Grass	May-Oct	3,960	13,425	4.08	0.46	123.16	18.02	273.16	43.02
	Nov-Apr	10,000		1.5	0.25	150	25		

Note 1: Taken from Table 6-2 on page 32 of NIMP.

The proposed cropping plan for the proposed irrigation area, Phoenix's is shown in Table 19. The cropping plan for the current irrigation area is shown in section 6.4 (Table 6-3) of the NIMP.

**Table 19: Predicted Crop Rotation<sup>1</sup> Plan for Phoenix's up to 2023<sup>2</sup>**

Paddock	Area (ha)	Season	Crop System <sup>3</sup>
Phoenix's	21.85	May-Oct	System 2 – 4
		Nov-Apr	System 2

Note 1: Licence Holder has advised that rotation may vary depending upon seasonal variations including cattle supply, weather and soil testing results.

Note 2: Table 19 is based on information found in Table 6-3 on page 34 of the NIMP.

Note 3: See Table 18 for description of crop system

The Licence Holder has predicted gross nutrient loading rates to the irrigation areas taking into account the predicted crop rotation plan and predicted nutrient uptake rates for each cropping system. This can be seen in Table 20.

**Table 20: Predicted gross and net nutrient loading rates to irrigation areas**

Production Scenario	2017 Base Case		DWER Existing Licensed Capacity		Existing Licensed capacity, with current and proposed irrigation areas <sup>1</sup>	
Head Killed	139,806 hd/yr		170,000 hd/yr		170,000 hd/yr	
Hectares Irrigated Summer	86.9		122.2		144.05	
Hectares irrigated Winter	115.1		122.2		144.05	
Nutrient	N	P	N	P	N	P
Summer Irrigation (kg)	19,320	6,495	23,492	7,897	24,492	7,897
Winter Irrigation (kg)	16,853	4,675	20,493	5,685	20,493	5,685
Annual loading rate (kg/yr)	36,173	11,170	43,985	13,582	43,985	13,582
Gross annual loading rate (kg/ha/yr)	368.7	115.4	359.9	111.1	305.3 <sup>2</sup>	94.29 <sup>2</sup>
Current DWER Licence Limits	400	120	400	120	400	120
Annual nutrient uptake rate (kg/ha/yr)	306	50	283	50	283 <sup>3</sup>	50 <sup>3</sup>
Net application to soil	62.83	65.24	76.54	61.32	22.3 <sup>4</sup>	44.29 <sup>4</sup>
WQPN 22 (kg/ha/yr)	300	50	300	50	300	50

Note 1: This has been calculated by DWER with the following assumptions: (a) nutrient loading to land remains unchanged from what the Licence Holder provided for 122.2 ha; and (b) annual nutrient uptake rate remains the same for what the Licence Holder provided for 122.2 ha (see Note 3).

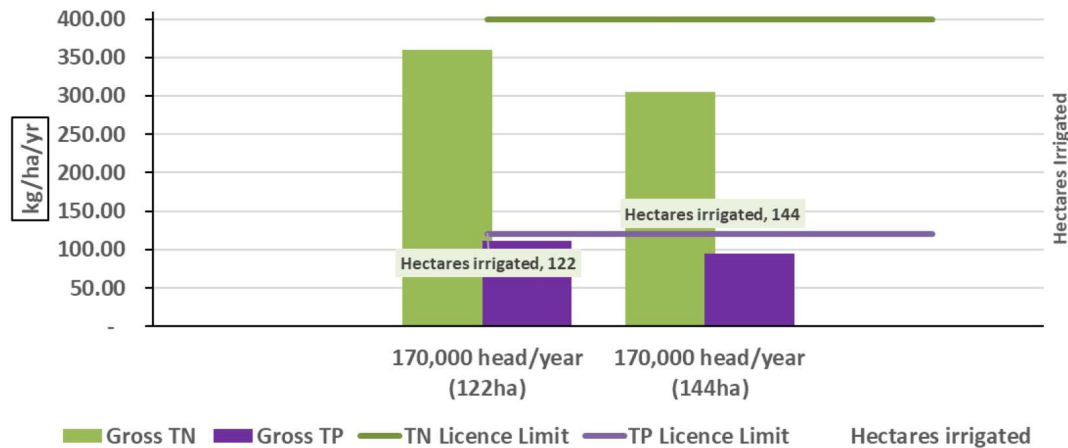
Note 2: DWER calculated: annual loading rate divided by hectares irrigated (144.05 ha).

Note 3: Annual nutrient uptake rate is taken from Licence Holder provided data for 122.2 ha. It is noted that with the additional 21.85 ha of crops, that the annual nutrient uptake is likely to be higher; however, this should provide a conservative estimate for net application to soil.

Note 4: DWER calculated: gross annual loading rate – annual nutrient uptake rate.

It is noted that net nutrient loading rates (which takes into account crop nutrient uptake) for both total nitrogen and total phosphorus, at the current maximum capacity of 170,000 hd/yr, with irrigation over 144.05 ha (which includes the existing and proposed irrigation area) are estimated to be 22.3 and 44.29 kg/ha/yr respectively; which are below the WQPN 22 guideline of 300 kg/ha/yr for TN and and 50 kg/ha/yr for TP.

The Licence Holder provided a graph (see Figure 5) that shows a comparison of the nutrient loading rates from 122.2 ha to 144.05 ha at maximum capacity, 170,000 head/yr.



**Figure 5: Net nutrient loading rates for total current and proposed irrigation at maximum capacity.**

The Licence Holder has exceeded the relevant annual gross nutrient loading rate limits in the licence 4 times for total nitrogen and 5 times for total phosphorus since 2011. It is noted that the annual gross nutrient loading rate limits, as described in the Existing Licence, for both total nitrogen and total phosphorus were complied with in 2016 and 2017.

Soil sampling at sites with similar soil type to the proposed irrigation area shows that the concentration of all parameters measured decreases with increasing depth except sulphur, pH and PBI that all increased, and conductivity that stayed the same (see Table 11, Figure 3 and Figure 4). However, comparing 2015 to 2017 soil sampling data, there has been a slight increase in phosphorus at 3 of the 5 sites for 0-10 cm and 4 of the 5 sites at 10-20 and 20-30 cm depths. Nitrate-nitrogen decreased from 2015 to 2017 at all 5 sites for the 0-10 cm sample depth, with no significant change for the 10-20 and 20-30 cm sampling depths.

### 7.4.3 Description of potential adverse impact from the emission

The discharge of wastewater (treated or untreated) to land through irrigation has the potential to contaminate surrounding land and adversely impact upon surface water, soil and groundwater.

Agricultural drainage networks are located within the Premises and immediately south of the existing and immediately north of the proposed irrigation area and drain into the Harvey River Diversion Drain which in turn discharges into the ocean (see Table 8). Depth to groundwater at the proposed irrigation area, Phoenix, is approximately 1 to 2 m (see Table 8).

### 7.4.4 Criteria for assessment

The nutrient application criteria to control eutrophication risk set out in WQPN 22 are considered appropriate assessment criteria, for this site to determine loading limits for nitrogen and phosphorus when irrigating wastewater to land (refer to Table 21).

**Table 21: Nutrient application criteria for treated wastewater**

Parameters	WQPN 22 Nutrient application loading rate
Biochemical oxygen demand	30 kg/ha/day
Total Nitrogen	300 kg/ha/year
Total Phosphorus	50 kg/ha/year

### 7.4.5 Licence Holder controls

The Licence Holder's controls to manage treated wastewater irrigation area set out in Table 22.

**Table 22: Licence Holder's controls for treated wastewater irrigation (from Application)**

Control	Description
Infrastructure	<p>Treated wastewater is pumped into head ditches of the paddocks to be irrigated, via the Licence Holder's piping system.</p> <p>Treated wastewater is irrigated in conventional flood irrigation style where the treated wastewater is allowed to flow onto the paddock through controlled outlets (side gates) in the head ditch. Generally there is one outlet per lot or border of the paddock. Individual lands spaced 33 m apart direct water by gravity feed from the head ditch into the paddock.</p> <p>Flow meters are maintained and calibrated on an annual basis.</p>
Procedures / Management	<p>Treated wastewater is irrigated as per <i>Harvey Beef Standard Operating Procedure, Irrigation of Treated Wastewater – SP E09.04</i>, that includes:</p> <ul style="list-style-type: none"> <li>• Volume of wastewater irrigated is determined by the Farm Manager taking into account the following: <ul style="list-style-type: none"> <li>○ Weather conditions (rainfall, temperature and humidity);</li> <li>○ Soil conditions at the time;</li> <li>○ Crop species present; and</li> <li>○ Stage of the crop development;</li> </ul> </li> <li>• Prior to irrigation the Farm Manager will: <ul style="list-style-type: none"> <li>○ Determine the short to medium term weather forecasts from the Bureau of Meteorology;</li> <li>○ Consider predicted rainfall (mm); and</li> <li>○ Undertake visual inspection of the paddocks to be irrigated;</li> </ul> </li> <li>• Onsite rain monitors/gauges will be inspected in accordance with the manufacturer's specifications;</li> <li>• Treated wastewater will not be applied to any paddocks during times of rainfall that may cause flooding or when (in the opinion of the Farm Manager) flooding is likely;</li> <li>• Treated wastewater will be applied in a manner that does not cause spillage into the stormwater drainage system;</li> <li>• Details of volumes of irrigation and paddocks irrigated are recorded and entered into the Licence Holder's Environmental Monitoring Database.</li> <li>• In the event that weather conditions cause or are likely to cause the loss of wastewater the following actions will be undertaken: <ul style="list-style-type: none"> <li>○ Immediate action is taken to prevent and or remove spillage into the stormwater drainage system. Actions will be determined on a case by case basis but may include sandbagging and or the pumping of waters into a contained area or tanker;</li> <li>○ The collected waters shall then be passed through the wastewater system or disposed of in a manner determined in consultation with DWER;</li> <li>○ Procedures are examined and where applicable, improvements made to both the methodology and corrective actions.</li> </ul> </li> </ul> <p>As Table 18 shows, there is variability in nutrient utilisation depending on the crop system and time of year; therefore, the Licence Holder has committed to alternating crop systems on a biannual basis to ensure an even distribution of crop species over the entire irrigation area and to ensure that nutrients are utilised in the most efficient manner.</p> <p>Crops in the irrigation areas are removed by one of the following methods:</p> <ul style="list-style-type: none"> <li>• Grazing by stock which in turn are sold or slaughtered, and where paunch</li> </ul>

	<p>material is rendered or removed from the premises;</p> <ul style="list-style-type: none"> <li>• Conversion of excess pasture into hay which in turn is used as feed for stock offsite; or</li> <li>• Harvesting and sale of maize offsite.</li> </ul>
Monitoring	<p>The Licence Holder has committed to monitoring the following:</p> <ul style="list-style-type: none"> <li>• Volume of water consumed on a weekly basis;</li> <li>• Volume of water irrigated from Pond 3 and Pond 6;</li> <li>• Water quality of wastewater for the following parameters: TN, TP, BOD, EC, TDS, oil and grease and pH on a monthly basis;</li> <li>• Daily visual inspection of internal drainage system;</li> <li>• Monthly visual inspection of health of vegetation in paddocks and presence of weeds;</li> <li>• Regular visual inspections of ponding and soil erosion in paddocks;</li> <li>• Annual soil sampling at 76 sites (including 4 new sites in the proposed irrigation area) for at least pH, salinity, TP, TN, potassium and PBI with selected sites sampled at 0-10 cm, 10-20 cm and 20-30 cm depths. All other sites to be sampled at 0-10 cm depth;</li> <li>• Annual (or as needed at the end of rotation/harvest) crop annual yield (dry biomass);</li> <li>• Annual (or as needed at the end of rotation/harvest) leaf tissue analysis.</li> </ul>

#### 7.4.6 Consequence

Based on the treated wastewater quality and volume irrigated, preliminary assessment of nutrient loading rates, cropping regime and predicted net application of nitrogen and phosphorus to the soil, applicant controls and groundwater and agricultural drain line use for cropping and stock watering, the Delegated Officer has determined that there will be low level impacts at a local scale. Therefore the Delegated Officer considers the consequence to be moderate.

#### 7.4.7 Likelihood of Risk Event

Based upon the irrigation area available, proximity to receptors, soil type, current treated water quality, volume irrigated, cropping regime and compliance history in regards to nutrient loading rate limits the Delegated Officer has determined that low level impacts at a local scale could occur at some time if the irrigation is not managed appropriately. Therefore, the Delegated Officer considers the likelihood to be possible.

#### 7.4.8 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 14) and determined that the overall rating of the risk of treated wastewater irrigated impacting on receptors is medium and subject to regulatory controls.

### 7.5 Risk Assessment – Discharge of treated wastewater to land (irrigation) – hydraulic loading impact analysis

#### 7.5.1 Description of risk event

Application of water in excess of the soil absorptive capacity, evaporation or plant transpiration capacity will result in infiltration of treated wastewater past the crop root zone into groundwater and/or waterlogging and overland flow of treated wastewater into adjacent agricultural drains causing surface water and groundwater contamination and affecting ecosystem health.

#### 7.5.2 Identification and general characterisation of emission

Common contaminants in wastewaters from abattoir and rendering facilities include high BOD, chemical oxygen demand, total suspended solids, oil and grease, nitrogen, phosphorus salt (typically NaCl), micro-organisms and chemicals (AMPC 2017).

Wastewater generated from the slaughterfloor, boning room and rendering plant with a small amount of wastewater from the cleaning of chilling and freezing areas within the abattoir is directed through solids removal followed by anaerobic and RENOIR ponds before being stored in evaporation ponds until it is used to irrigate pastures and crops on the premises as part of the Licence Holder's cropping program.

The wastewater treatment ponds (anaerobic, RENOIR and evaporation ponds) have a total volumetric holding capacity of approximately 60 ML. Irrigation is from Pond 3 or Pond 6 to paddocks that total 144.05 ha (including the proposed additional irrigation area, Phoenix).

The irrigation area is mostly flat, with a slope of approximately 0.24% across the premises, sloping east to west.

A preliminary assessment of the wastewater hydraulic loading at the site can be determined as follows (US EPA, 2006):

$$F = 3.65 \frac{Q}{LP} \text{ (metric)}$$

**Where:**

- F = field area, ha (acres)
- Q = average flow, m<sup>3</sup>/d (mgd)
- L = loading rate, cm/wk (in/wk)
- P = period of application, wk/yr
- 3.65 = metric conversion factor =

$$0.0001 \frac{\text{ha} \cdot \text{m}}{\text{m}^3 / \text{d}} \times \frac{100 \text{ cm} \times 365 \text{ days}}{\text{year}} \times 1/\text{m}$$

Based on a maximum irrigation rate of 587 ML, generic loading rate of 3.8 cm/week for pasture (US EPA, 2006) and the period each year (P) when irrigation can be carried out at the Premises is assumed to be 30 weeks<sup>1</sup>, the land area required for irrigation is calculated to be approximately 89.5 ha for pasture. As the current and proposed irrigation area total 144.05 ha, the hydraulic loading rate is not a limiting factor for irrigation at the Premises.

Note 1: The Licence Holder has not provided a water balance for the site; therefore, DWER has calculated a water balance based on the maximum irrigation volume of 587 ML, irrigation area of 144.05 ha, assumed design percolation rate of 5 mm/week to remove salt in the root zone, precipitation data (1951 to 2018) from the Bureau of Meteorology, evaporation data from the Department of Primary Industries and Regional Development, and a generic crop factor of 0.7. The water balance indicated that inputs (precipitation and irrigation) exceed outputs (evapotranspiration and percolation to remove salt) for 5 months of the year indicating that wastewater should be stored during this time and irrigation only occur during the remaining 7 months (30 weeks) of the year. Further information is in Section 8 of this Decision Report.

It should be noted that the Licence Holder currently irrigates 12 months of the year. Based on the above water balance, there is potential for treated wastewater to be infiltrating past the crop root zone into groundwater and/or waterlogging and overland flow of treated wastewater into adjacent agricultural drains causing surface water and groundwater contamination and affecting ecosystem health for 5 months of the year (May to September).

**7.5.3 Description of potential adverse impact from the emission**

The operation of irrigation schemes above the capability of a site (irrigation in excess of hydraulic loading rates and irrigating during periods where rainfall meets the needs of the vegetation) can cause hydraulic loading to the extent that local water tables rise. Waterlogging of soils can occur, along with the transfer of contaminants to groundwater through leaching and excess runoff flowing into surface water. Contaminated runoff into adjacent vegetated buffers could adversely affect plant health.

#### 7.5.4 Criteria for assessment

The Delegated Officer has had regard to NSW EPA, 1998 and US EPA, 2006 documents. These guidelines are considered appropriate and present a conservative approach to water balance calculations.

#### 7.5.5 Licence Holder controls

The Licence Holder's controls to manage irrigation, including hydraulic loading, are as set out previously in Table 22 above.

#### 7.5.6 Consequence

Given the shallow depth to groundwater (see Table 8) and the potential for treated wastewater to be discharged to groundwater and/or adjacent agricultural drains, the Delegated Officer has determined that excess runoff and potential pollution of groundwater and surface water could occur on a scale that includes on and off-site impacts at a mid and low level respectively. Therefore, the Delegated Officer considers the consequence to be Moderate.

#### 7.5.7 Likelihood of Risk Event

Based upon the irrigation area available, climate data, the amount and quality of wastewater for disposal, cropping regime and compliance history in regards to nutrient loading rate limits, the Delegated Officer has determined that the likelihood of on and off-site impacts at a mid and low level could be occur at some time. Therefore the Delegated Officer considers the consequence to be Possible.

#### 7.5.8 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 14) and determined that the overall rating for the risk of an excess hydraulic loading of treated wastewater on receptors during operation is Medium and subject to regulatory controls.

## 8. Regulatory controls – Revised Licence controls for management of discharge of treated wastewater to land (irrigation)

### 8.1 Existing Licence Conditions

#### 8.1.1 Treated wastewater discharge and Emissions to Land limits

The following Existing Licence conditions relate to the management of the irrigation of wastewater at the Premises:

Existing Licence Condition 8 (Revised Condition 8, Table 7) requires the Licence Holder to manage the discharge of treated wastewater within the Irrigation Area such that:

- (i) *wastewater is evenly distributed over the Irrigation Area;*
- (ii) *no soil erosion or ponding of wastewater occurs;*
- (iii) *there is no direct runoff, spray drift or discharge beyond the Irrigation Area;*
- (iv) *healthy vegetation cover is maintained over the Irrigation Area; and*
- (v) *discharge does not occur during periods of rainfall or onto flooded area(s).*

Existing Licence Condition 9 (Revised Condition 10, Table 9) requires the Licence Holder to ensure the following nutrient loading rates are not exceeded within the Irrigation Area:

- (i) *Total Nitrogen of 400 kilograms per hectare per year;*
- (ii) *Total Phosphorus of 120 kilograms per hectare per year; and*
- (iii) *Biochemical Oxygen Demand of 30 kilograms per hectare per day.*

The above nutrient loading rates were determined in Amendment Notice 1 and take into account the Licence Holder's cropping program. Therefore, the above loading limits should only apply to paddocks where the Licence Holder intends to remove nutrients via cropping.

Following consultation with the Licence Holder, see Appendix 2, the Irrigation Area has been divided into three areas, with the above nutrient loading rate limits and management of the treated wastewater irrigated, applicable to each area, Area A, Area B and Area C (see Irrigation Areas map in the Revised Licence). This is to enable DWER to monitor the spread of treated wastewater across the total Irrigation Area.

Additionally, the Licence Holder is required to monitor the volume and quality of treated wastewater irrigated as per Existing Licence conditions 11 to 16 (Revised Conditions 11 and 14 to 16). The Licence Holder is currently required to monitor treated wastewater for pH, TDS, TSS, BOD, TN, ammonium nitrogen, nitrate + nitrite nitrogen and total phosphorus on a monthly basis and aluminium, cadmium, chlorine residuals, boron, copper, lead, mercury and zinc on an annual basis.

### **8.1.2 Premises description**

This Decision Report has assessed the risk of discharge of treated wastewater to land (irrigation), which includes the proposed Phoenix irrigation area. The Delegated Officer determined that the overall rating of the risk of treated wastewater irrigated impacting on receptors, in terms of nutrient and hydraulic loading, is medium and subject to regulatory controls as outlined in this Decision Report.

The Licence Holder has provided certificates of title to show that they are the Registered Proprietor for the proposed irrigation area. The Premises description and Premises Plan have been updated to include the proposed irrigation area, Lot 105 and 106 on Plan 202106.

### **8.1.3 Discharge of treated wastewater from the RENOIR Pond**

Existing Licence condition 7 requires the Licence Holder to direct all treated wastewater from the RENOIR pond to the Irrigation Area or the wastewater storage ponds. The Licence Holder has provided information in the NIMP that shows that all wastewater from the RENOIR pond is directed to Pond 5 and that irrigation is only from Pond 3 and Pond 6.

Existing condition 7 will be amended to clarify that all treated wastewater from the RENOIR pond is directed to wastewater storage pond 5. This is included in Revised Condition 5, Table 4.

### **8.1.4 Treated wastewater sampling points**

Table 1 within Condition 11 of the Existing Licence requires the Licence Holder to maintain a sampling point and water flow meter at three locations, DP1, DP2 and DP3. The current description of the three sampling points is not clear as it describes all three points as being discharge points to the Irrigation Area. The Licence Holder provided information in the NIMP that shows that wastewater from the RENOIR pond is directed to Pond 5. Treated wastewater is irrigated from either Pond 3 (current DP1) or Pond 6 (current DP3).

Existing condition 11 has been amended to clarify that DP1 is sample point P3B (from Pond 3) and that DP3 is sample point P6A (from Pond 6). This also ensures the Licence conditions are more consistent as Existing Condition 13 refers to sample points P3B and P6A. This is included in Revised Conditions 5 and 11.

The Map of Monitoring Locations and Main Site Features has been amended to show the location of P3B and P6A.



## 8.2 Licence Holder Commitments

### 8.2.1 Soil quality monitoring

The Licence Holder currently conducts annual soil sampling at 72 sites across the irrigation area and has committed to an additional 4 soil sampling sites within the proposed irrigation area. Soil sampling is currently conducted at 0-10 cm at all sites and 0-10 cm, 10-20 cm and 20-30 cm at selected sites. Soil samples are currently tested for nitrate nitrogen, ammonium nitrogen, phosphorus, Phosphorus Buffering Index (PBI), potassium, sulfur, organic carbon, electrical conductivity (EC) and pH.

While sampling at the site has been conducted since 2007, soil samples have only been taken at a maximum depth of 30 cm at selected sites and it is unknown whether nutrients are leaching below 30 cm. Additionally, soil data from 2015 to 2017 shows a slight increase in soil Phosphorus at each soil sample depth over time.

A condition will be added to the Licence to require the Licence Holder to monitor soil quality at selected sites across the Premises for the following parameters: pH, Electrical conductivity, moisture content, total nitrogen, nitrate nitrogen, ammonium nitrogen, phosphorus (Colwell), Phosphorus Buffering Index and exchangeable sodium percentage. With the exception of moisture content, total nitrogen and exchangeable sodium percentage, the Licence Holder has committed to monitor soil samples for these parameters. Moisture content, total nitrogen and exchangeable sodium percentage have been added as soil monitoring parameters as per DWER internal advice regarding irrigation of treated wastewater and based on Table 2 from the Environmental Guidelines – *Use of Effluent by Irrigation* (NSW DEC, 2003).

The Licence Holder will be required to monitor these parameters at the following soil profile depths: 0-10 cm, 10-20 cm, 20-30 cm and 30-70 cm. The 30-70 cm soil profile has been added to determine whether nutrients may be leaching further into the soil profile.

Routine sampling and testing of the required sections of the soil profile will provide results that can be compared with standard reference tables for irrigated wastewater, to consider and assess the ongoing suitability or otherwise of the soils to receive the wastewater and determine any future potential limitations on quantity and quality of applied wastewater.

### 8.2.2 Crop yield, leaf tissue analysis and net nutrient loading rates

The Licence Holder has undertaken crop yield measurements and leaf tissue analysis on an annual basis since 2015/16. This is to measure plant growth response as a result of irrigation and actual plant nutrient uptake. The Licence Holder has used this data to model nutrient uptake by crop system and therefore, to predict net nutrient loading rates to the irrigation area.

The Licence Holder will be required to provide a summary of the crop yield measurements and leaf tissue analysis in the Annual Monitoring Report. Additionally the Licence Holder will be required to provide the estimated net nutrient loading rates for the irrigation area, taking into account crop rotation, crop yield measurements and leaf tissue analysis for the reporting period. Condition 19 of the Licence is amended accordingly.

## 8.3 Additional Regulatory Controls (Licence Conditions)

### 8.3.1 Discharge of treated wastewater to the Irrigation Area

The draft Amendment Notice included a condition that was added to the Licence to restrict the irrigation of treated wastewater to the months of November, December, January, February, and March.

**Grounds:** The Delegated Officer has considered the hydraulic loading of the irrigation scheme and the nutrient mass balance to assess the proposed wastewater application rate (at maximum capacity), areas available for irrigation (including the proposed Phoenix area) and considers there is a risk of nutrients being leached to surface and groundwater if irrigation occurs during

the winter months when soils are already saturated.

The site soils, the quality and beneficial uses of groundwater and surface water in the area, proximity of receptors (surface and groundwater) have been taken into account to determine the extent to which leachate from wastewater irrigation may affect the environment.

The Licence Holder did not provide a water balance with their application, therefore, DWER calculated a water balance of the irrigation scheme using the spreadsheet-based “Nominated Area” approach (refer to Appendix 6 of NSW EPA, 1998) which assesses precipitation, applied wastewater, evapotranspiration and percolation. The water balance was based on the maximum irrigation volume of 587 ML, irrigation area of 144.05 ha, assumed design percolation rate of 5 mm/week to remove salt in the root zone, median 50<sup>th</sup> percentile precipitation data (1951 to 2018) for Wokalup (site number 009642) from the Bureau of Meteorology, evaporation data from the Department of Primary Industries and Regional Development, and a generic crop factor of 0.7.

The water balance indicates that inputs (precipitation and irrigation) exceed outputs (evapotranspiration and percolation to remove salt) from May to September indicating that wastewater should be stored during this time and irrigation should only occur from October to April. The Licence Holder currently irrigates 12 months of the year and there is a risk that contaminants in the wastewater that is irrigated during May to September may infiltrate past the crop root zone into groundwater and/or cause waterlogging and overland flow into adjacent agricultural drains causing surface water and groundwater contamination affecting ecosystem health.

Groundwater quality at the premises is poor (based on information submitted by the Licence Holder); however, depth to groundwater is shallow and drains, used for agricultural purposes, are located within the Premises boundary and immediately south and west of the Premises boundary. The Harvey Diversion Drain is also located approximately 1.9 km south of the proposed irrigation area.

Condition 7A was added to the draft Amendment Notice to restrict the irrigation of treated wastewater to the Irrigation Area from October to April inclusive. The implication of the condition is such that wastewater generated between May and September would have to be stored in the wastewater storage ponds and/or removed from the Premises. The Application did not include any soil moisture management strategies.

The Delegated Officer has considered comments made by the Licence Holder during a meeting on 5 February 2019 and in response to the draft Amendment Notice (see Appendix 2), and has determined that condition 7A will be removed from this Licence Amendment. See reasoning in Appendix 2.

### 8.3.2 Installation of groundwater monitoring bores

The Licence Holder will be required to install at least three new groundwater monitoring bores, to be sited in accordance with WQPN 30 *Groundwater Monitoring Bores* (DoW, 2006). The new groundwater monitoring bores must be installed to meet the requirements of *Minimum Construction Requirements for Water Bores in Australia* (NUDLC, 2012) including the recording and submission of bore logs. The new groundwater bores must be sited with one up hydraulic gradient of the existing and proposed irrigation area and the others down hydraulic gradient of the existing and proposed irrigation areas. The bores are to have screened intervals that extend 3 to 6 metres below the water table and be surveyed to allow the ground level (to Australian Height Datum) to be accurately determined.

**Grounds:** The irrigation of nutrient rich treated wastewater has potential risk for contamination of groundwater if not managed appropriately. Even though the Licence Holder has estimated that their cropping regime will remove nutrients from the soil such that the net application to soil is estimated to be within WQPN 22 guidelines; the model does not take into account reintroduction of nutrients to soil from livestock that graze over part of the irrigation area and the

Licence Holder has previously exceeded annual gross nutrient loading rate limits as specified in Licence. The water balance calculated by DWER indicates that irrigation should only occur 7 months of the year; however, the Licence Holder irrigates all year round and the preliminary assessment of nutrient loading rates also indicates that there may be overloading of nutrients at the premises. Therefore, there is potential for nutrients to be infiltrating past the crop root zone.

The requirement to install new groundwater monitoring bores is necessary to establish and monitor the potential input of nutrients and contaminants from the current and proposed irrigation area to groundwater and to provide reliable information about groundwater depth and movement under the irrigation area. Conditions require that the bores are appropriately installed and sited.

### 8.3.3 Monitoring of groundwater

The Licence Holder will be required to carry out groundwater monitoring of the three new bores, commencing within 30 days of their installation, for the following parameters: standing water level, pH, total nitrogen, total phosphorus, reactive phosphorus, ammonium-nitrogen, nitrate-nitrogen, total dissolved solids, biochemical (or biological) oxygen demand, electrical conductivity; and major ions (sodium, potassium, magnesium, chloride, sulphate and bicarbonate).

**Grounds:** The Delegated Officer considers that irrigation of treated wastewater on the Premises may impact groundwater and surface water quality if discharge to land is not conducted in a controlled manner. Groundwater is shallow and agricultural drains are located immediately adjacent to the irrigation area. Monthly monitoring of standing water levels is required for the first two years, reducing to quarterly in the third year, to establish clear understanding of seasonal groundwater depth fluctuations from bores that have been installed and established to required construction and screening interval standards. Quarterly monitoring of key groundwater parameters will allow seasonal changes to groundwater quality to be identified and allow comparison against suitably sited up gradient bore (MB01) and the two down gradient bores (MB02 and MB03). Monitoring results will be used to assess the effects of wastewater irrigation on the groundwater and whether additional controls need to be implemented. DWER may review appropriateness and adequacy of the licence controls based on the review of the monitoring data, including requirements for monitoring frequency and parameters tested. 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 have been included.

### 8.3.4 Other additional Licence conditions

Other conditions have been added to the Revised Licence, such as: authorised emissions, additional infrastructure and equipment controls, waste and by-products acceptance monitoring and additional waste and by-products storage disposal and monitoring conditions.

**Grounds:** These conditions are valid and necessary to mitigate unreasonable emissions and to ensure compliance with the EP Act. The waste and by-products acceptance and waste and by-products removed monitoring conditions have been added to the Revised Licence to ensure compliance with other conditions in the Licence, the EP Act and subsidiary legislation.

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

## 9. Consolidation of Amendment Notices and Transfer to New Format Licence

For this Licence amendment, DWER has consolidated past Amendment Notices such that the amended Licence will include the changes that were authorised under the Notice of Amendment

to extend the expiry date of the Licence (April 2016) and Amendment Notice 1. The Revised Licence has been issued in a new format with existing conditions being transferred, but not reassessed, to the new format. Therefore, the numbering, wording and format of existing conditions may have changed, but the intent remains the same. Additional changes, as proposed by the Licence Holder for this licence amendment, are detailed within this Decision Report, but not included in Table 23 below.

**Table 23: Conditions map**

Existing Licence condition	Licence Amendment condition	Description
Expiry date: 14 September 2016	Expiry date: 14 September 2030	On 29 April 2016, a Notice of Amendment to extend the expiry date of Licences was issued. The Harvey Beef Abattoir licence, L6395/1993/16, was extended from 14 September 2016 to 14 September 2030.
1	6	Waste acceptance and monitoring: Limited to receiving up to 10,000 tonnes of renderable material, as per Executive summary of proposal and assessment in Decision Document of Existing Licence.  Existing Licence conditions 1 and 2 have been transferred to Table 5.
2	6	
3	5, Table 4	Rendering Plant operation
4	5, Table 4	Existing Licence conditions 3 and 4 have been transferred to Table 4.
5	8, Table 7	Discharge to Land  Existing Licence conditions 5 and 6 have been transferred to condition 8, Table 7.
6	8, Table 7	
7	5, Table 4	Existing Licence condition 7 has been transferred to condition 5, Table 4.
8	8, Table 7	Treated Wastewater Discharge  Existing Licence condition 8 has been transferred to condition 8, Table 7. Part (vi) was removed in Amendment Notice 1.
9	10, Table 9	Emission to land loading limits  Existing Licence condition 9 has been transferred to condition 9, Table 8. The emission loading limits for Total Nitrogen and Total Phosphorus were amended in Amendment Notice 1.
10	5, Table 4	Maintenance of wastewater storage ponds  Existing Licence condition 10 has been transferred to condition 5, Table 4. Part (iv) was amended in Amendment Notice 1.
11	11, Table 10 and 5, Table 4	Flow monitoring
12		Existing Licence conditions 11 and 12 have been incorporated into conditions 10 (Table 9) and condition 5 (Table 4).
13	11, Table 10 and 16	Emissions and discharge monitoring
14		Existing Licence conditions 13, 14 and 16 have been transferred to

Existing Licence condition	Licence Amendment condition	Description
16		condition 10 (Table 9) and 15.
15	-	This condition has been removed from the licence as it is not required. Treated wastewater samples must be taken, recorded and analysed in accordance with conditions 10, 13, 14 and 15.
17	-	This condition was removed in Amendment Notice 1.
18	8, Table 7	Sludge waste Existing Licence condition 18 has been transferred to condition 8 (Table 7). This condition was amended in Amendment Notice 1 due to condition 17 being removed and an administrative error.
19	20	Annual Environmental Report Existing Licence condition 19 has been transferred to condition 19.
20	19	Annual Audit Compliance Report Existing Licence condition 20 has been transferred to condition 18.
Plan of Premises	Premises map	The Plan of Premises map in the Existing Licence was replaced with the Plan of Premises map in Amendment Notice 1. Which has been replaced with the Premises map in this Amended Licence.

## 10. Licence Holder's comments

The Licence Holder was provided with a draft Amendment Notice on 24 January 2019. Comments received, on 18 February 2019, from the Licence Holder have been considered by the Delegated Officer as shown in Appendix 2.

Following a meeting with the Licence Holder on 5 February 2019, the Delegated Officer considers a Licence Amendment to consolidate past Amendment Notices to be appropriate. The Licence Holder was provided with a draft Amended Licence on 7 March 2019. Comments received, on 22 March 2019, from the Licence Holder have been considered by the Delegated Officer as shown in Appendix 2.

## 11. Conclusion

This assessment of the risks of the discharge of treated wastewater to the Irrigation Area, including the proposed Phoenix area, at the Premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this Decision Report (summarised in Appendix 1).

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

**Caron Goodbourn**  
**Manager, Process Industries**  
Delegated Officer  
under section 20 of the *Environmental Protection Act 1986*

## Appendix 1: Key documents

	Document title	In text ref	Availability
1	Licence – L6395/1993/16 – Harvey Beef Abattoir	Existing Licence	accessed at <a href="http://www.dwer.wa.gov.au">www.dwer.wa.gov.au</a>
2	Amendment Notice 1 – L6395/1993/16 – Harvey Beef Abattoir	Amendment Notice 1	accessed at <a href="http://www.dwer.wa.gov.au">www.dwer.wa.gov.au</a>
3	<i>Notice of Amendment of Licence expiry dates</i> , Section 59B(9) and Section 59(1)(k) <i>Environmental Protection Act</i> 1986, Licenced Prescribed Premises, 29 April 2016	April 2016	accessed at <a href="http://www.dwer.wa.gov.au">www.dwer.wa.gov.au</a>
4	Licence Amendment application and supporting documentation	Application	DWER records (A1738325)
5	Harvey Industries Group Pty Ltd, Harvey Beef Abattoir, <i>Nutrient and Irrigation Management Plan</i> , Version 4, November 2018	NIMP	DWER records (A1738325)
6	Response to draft Amendment Notice, received via email from Harvey Beef on 18 February 2019		DWER records (DWERDT135457)
7	Response to revised draft Decision Report and Amended Licence via email, including attachments, from Peter Jansen, Kasa Consulting, on behalf of Harvey Beef, 22 March 2019		DWER records (A1774838)
8	Response to further information request via email, <i>RE: L6395 Harvey Beef licence amendment</i> , from Peter Jansen, Kasa Consulting on behalf of Harvey Beef, dated 3 April 2019		DWER records (DWERDT149858)
9	Harvey Industries Group Pty Ltd, 2018 Annual Environmental Report, 1 January 2018 – 31 December 2018.		DWER records (DWERDT138797)
10	Depth to groundwater geographical information system layer as part of the Myalup Water for Food project, Department of Water, 2015	DoW 2015	Personnel communication – Robert Gibbs, Hydrogeologist, Department of Water and Environmental Regulation
11	Perth Groundwater Map		accessed at <a href="https://maps.water.wa.gov.au">https://maps.water.wa.gov.au</a>
12	Water Information Reporting		accessed at <a href="http://wir.water.wa.gov.au">http://wir.water.wa.gov.au</a>
13	<i>Wastewater Management in the Australian Red Meat Processing Industry</i> , Version 2, Australian Meat Processor Corporation, 2017.	AMPC 2017	accessed at <a href="http://www.ampc.com.au">http://www.ampc.com.au</a>
14	<i>Harvey Beef Standard Operating Procedure – Irrigation of Treated Wastewater SP E09.04</i> , revision 3, 2016. Appendix 6 of NIMP.		DWER records (A1738325)
15	Bureau of Meteorology – Climate data online		accessed at <a href="http://www.bom.gov.au">www.bom.gov.au</a>
16	Comments received by DWER via email from Water Corporation, <i>Re Harvey Beef L6395 – Request for Comment – Referral of a Licence Amendment under the Environmental Protection</i> , dated 20 December 2018		DWER records (DWERDT128054)
17	National Water Quality Management Strategy, Paper No. 4, <i>Australian and New Zealand Guidelines for Fresh</i>	ANZECC & ARMCANZ	accessed at <a href="http://www.waterquality.gov.au">www.waterquality.gov.au</a>

	<i>and Marine Water Quality</i> , Volume 1, The Guidelines (Chapters 1 – 7), Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, October 2000		
18	<i>Environment &amp; Health Protection Guidelines: On-site Sewage Management for Single Households</i> , NSW EPA Technical Guidelines, 1998.	NSW EPA, 1998	available at: <a href="https://www.olg.nsw.gov.au/sites/default/files/Onsite-sewage-management-guide.pdf">https://www.olg.nsw.gov.au/sites/default/files/Onsite-sewage-management-guide.pdf</a>
19	<i>Process Design Manual: Land Treatment of Municipal Wastewater Effluents</i> , US EPA technical guidance document, September 2006	US EPA 2006	accessed at <a href="http://www.epa.gov">www.epa.gov</a>
20	<i>Minimum Construction Requirements for Water Bores in Australia</i> , third edition, National Uniform Drillers Licensing Committee 2011, February 2012	NUDLC, 2012	accessed at <a href="http://www.water.wa.gov.au">www.water.wa.gov.au</a>
21	Water Quality Protection Note 30 – <i>Groundwater Monitoring Bores</i> , Department of Water, February 2006	WQPN 30	accessed at <a href="http://www.water.wa.gov.au">www.water.wa.gov.au</a>
22	Water Quality Protection Note 22 – <i>Irrigation with nutrient-rich wastewater</i> , Department of Water, July 2008	WQPN 22	accessed at <a href="http://www.water.wa.gov.au">www.water.wa.gov.au</a>
23	<i>Environmental Guidelines – Use of Effluent by Irrigation</i> , Department of Environment Conservation (NSW), 2003	NSW DEC, 2003	available at <a href="http://www.environment.nsw.gov.au/resources/water/effguide.pdf">http://www.environment.nsw.gov.au/resources/water/effguide.pdf</a>
24	Resource Management Technical Report No. 65 - <i>Evaporation Data for Western Australia</i> , G.J. Luke, K.L. Burke, T.M. O'Brien, Department of Agriculture Western Australia (now known as the Department of Primary Industries and Regional Development), 2003	evaporation data	accessed at <a href="https://researchlibrary.agric.wa.gov.au">https://researchlibrary.agric.wa.gov.au</a>
25	DWER, July 2015. <i>Guidance Statement: Regulatory Principles</i> . Department of Water and Environmental Regulation, Perth.		accessed at <a href="http://www.dwer.wa.gov.au">www.dwer.wa.gov.au</a>
26	DWER, October 2015. <i>Guidance Statement: Setting Conditions</i> . Department of Water and Environmental Regulation, Perth.		
27	DWER, February 2017. <i>Guidance Statement: Risk Assessments</i> . Department of Water and Environmental Regulation, Perth.	DWER RA 2017	
28	DWER, February 2017. <i>Guidance Statement: Decision Making</i> . Department of Water and Environmental Regulation, Perth.		
29	DWER, November 2016. <i>Guidance Statement: Environmental Siting</i> . Department of Water and Environmental Regulation, Perth.		

## Appendix 2: Summary of Licence Holder's comments

The Licence Holder was provided with a draft Amendment Notice on 24 January 2019 for review and comment. The Licence Holder responded on 18 February 2019. The following comments were received on the draft Amendment Notice.

Summary of Licence Holder comment	DWER response
<p>The Licence Holder confirms that approvals from the Shire of Harvey were received on 7 February 2019.</p>	<p>Information has been added to section 5.</p>
<p>The Licence Holder has provided soil sampling results for the proposed irrigation area.</p> <p>The Licence Holder has noted that the proposed irrigation area will be referred to as the Phoenix Paddocks rather than the Italiano Paddocks.</p>	<p>Soil sampling results have been included in this Decision Report in section 6.4.</p> <p>All references to Italiano have been changed to Phoenix throughout the document.</p>
<p>The Licence Holder has confirmed that sample points DP1 and DP3, referred to on the Existing Licence, are sample points P3B (from Pond 3) and P6A (from Pond 6) respectively.</p>	<p>No updates are required to this Decision Report or the Licence.</p>
<p>Discharge of treated wastewater to the Irrigation Area – Condition 7A:</p> <p>The Licence Holder has stated that the proposed limitation on (controlled and monitored) winter irrigation from May to September would prohibit operations during this time and most likely cease the viability of the business.</p> <p>The Licence Holder has commented that the assessment has not fully taken into account the following:</p> <ul style="list-style-type: none"> <li>(a) history of successfully managed irrigation during winter;</li> <li>(b) historical amendments to the licence that accepted historical drain monitoring as an indication of seepage and sheet-flow impacts;</li> <li>(c) nutrient uptake data in the NIMP was based on specialist agronomic advice taking into account actual crop yield and leaf tissue analyses to demonstrate that for certain crops, winter uptake does occur.</li> <li>(d) crops are selected at the Premises to ensure that controlled irrigation in winter will result in nutrient utilisation by these crops.</li> </ul>	<p>The Delegated Officer has considered the Licence Holder's comments in response to a condition to restrict the irrigation of treated wastewater to the months of November to March (see section 8.3.1) and has the following comments:</p> <ul style="list-style-type: none"> <li>(a) The Licence Holder does not currently sample groundwater or surface water to show whether nutrients from the irrigation of treated wastewater are being contained within the Premises, and soil sampling is only conducted to a depth of 30 cm. There is also currently no soil moisture monitoring at the Premises;</li> <li>(b) Soil sampling results that were provided for the proposed irrigation area show phosphorus and nitrate-nitrogen results approximately two to four times lower and approximately four to seven times lower than soil sampling results from currently irrigated paddocks with a similar soil type to the proposed irrigation area, at similar depths;</li> <li>(c) A risk assessment has been conducted on the discharge of treated wastewater to land (irrigation) in regards to nutrient and hydraulic</li> </ul>



Summary of Licence Holder comment	DWER response
<p>Proposed approach to winter irrigation</p> <p>The Licence Holder requests DWER to consider the approach such that the Licence Holder may further justify undertaking controlled irrigation over winter months in a considered and systematic manner. The Licence Holder considers that a minimum of 12 months of monitoring data will be required.</p> <p>Therefore, within 12 months of the date of the amended licence, the Licence Holder proposed to revise the NIMP to include the following:</p> <ul style="list-style-type: none"> <li>(a) feasibility assessment of opportunities to further reduce wastewater generation from the premises;</li> <li>(b) review potential improvement opportunities to further reduce nutrient loads in irrigated wastewater;</li> <li>(c) present a pond management strategy to maximise the holding capacity of Ponds 3, 4, 5 and 6 leading into winter months;</li> <li>(d) monitor soil moisture in accordance with the monitoring program proposed in the amended licence;</li> <li>(e) groundwater monitoring from new groundwater monitoring bores;</li> <li>(f) at the end of 12 months of data collation, conduct a qualitative risk assessment of the leaching sheet-flow impact taking into account: <ul style="list-style-type: none"> <li>(i) monitored groundwater results;</li> <li>(ii) visual inspections of sheet-flow during irrigation;</li> <li>(iii) review of the hydraulic loading impact analysis using site specific data;</li> <li>(iv) revision of management controls and contingency measures where necessary;</li> <li>(v) updated nutrient balance for the premises.</li> </ul> </li> </ul>	<p>loading impact analysis. This risk assessment was based on current irrigation quantity and quality. See sections 7.4 and 7.5 for further information; and</p> <p>(d) The Licence Holder has not provided a soil moisture monitoring and management plan to ensure that irrigation only occurs under non saturated conditions.</p> <p>Considering that:</p> <ul style="list-style-type: none"> <li>(a) DWER will receive the results of groundwater monitoring (from the newly constructed bores) and soil sampling results (including soil moisture content) in the Annual Report, next due by 28 February 2020; and</li> <li>(b) that the Licence Holder has expressed concern that limiting the irrigation of treated wastewater to summer months only would most likely cause business operations to cease;</li> </ul> <p>the Delegated Officer has removed the restriction on the irrigation of treated wastewater at this time.</p> <p>Following the information that the Licence Holder provides in the next Annual Report, DWER will determine if additional regulatory controls are required to manage the irrigation of treated wastewater at the Premises.</p>
<p>The Licence Holder notes the proposed additions of requirements to install groundwater monitoring bores and monitor groundwater and soil sampling and</p>	<p>No response required.</p>

Summary of Licence Holder comment	DWER response
monitoring requirements.	

The Licence Holder was provided with a draft revised Decision Report and Amended Licence on 7 March 2019. The Licence Holder responded on 22 March 2019 and these comments are outlined below including the Delegated Officers responses to these comments..

Licence Holder comments on revised draft Decision Report and Amended Licence received on 22 March 2019	
Summary of Licence Holder comments	Delegated Officer response
<p>Table 3 of Decision report:            Confirming approved premises production or designed capacity is 220,000 tonnes/yr. At 170,000 head this equates to approximately 50,000 tonnes/year as HSCW.            Confirming 170,000 animals/yr is acceptable for category 55.            Confirming approved premises production or design capacity is 120,000 tonnes/yr for rendering. Unless specified under Schedule 1, Part 1 of the EP Regulations, please remove 12 tph limit as rate can vary whilst staying below the annual limit.</p>	<p>Table 3 in section 3 has been updated.</p> <p>The limit of not more than 12 tonnes per hour for category 16 (rendering operations) was added to the licence as the Delegated Officer considered that a limit on the amount of renderable material that can be processed, per year and per hour, is appropriate to ensure the facility and wastewater treatment system is not overloaded. The 12 tonnes per hours was based on information from the Licence Holder in the 2018 Annual Environmental Report.</p> <p>Following comments from the Licence Holder, the limit of 12 tonnes of animal material rendered per hour has been removed. Further information was requested from the Licence Holder regarding the maximum design capacity of the rendering operations. The Licence Holder advised that the processing rate of renderable material is highly dependent on the drying rate of products introduced to the cooker with dry products being processed faster (15 t/hr) than wetter products (3 t/hr). This information has been added to the Decision Report in section 4.1. The Delegated Officer may consider imposing a limit (tonnes per hour) for rendering operations in the future if there is evidence of the rendering facility not being managed appropriately.</p>

Section 4.1 of Decision report – provided simplified process flow diagram of the rendering process.	Information on rendering process has been added to section 4.1.
Section 4.2 of Decision report – Infrastructure. Information was provided on a labelled site plan for location of abattoir and rendering facility infrastructure, biofilters, boiler and saveall. Further information provided on biofilters and boiler.	Information has been added to section 4.1 and 4.2. Site layout map has been added to the Revised Licence.
Table 3 of draft licence – Groundwater bores and Conditions 3 and 4. The Licence Holder notes the proposed conditions relating to groundwater bore installation, reporting and ongoing monitoring.	No response required.
Condition 5 of draft licence – Infrastructure and equipment: Provided further information infrastructure relating to abattoir and rendering facilities, biofilters, anaerobic, RENOIR and holding ponds and lairage/livestock holding yards.	Information has been added to Table 4, Condition 5 of the Licence.
Table 5 – Waste acceptance criteria The current condition appears to limit renderable material to blood only. Harvey Beef requests DWER to clarify in this condition that renderable material that has been processed at Harvey Beef under DWER licence includes blood, as well as other renderable by-products from Harvey Beef and its customers.	Wording has been changed to clarify that Table 5, Condition 6 is referring only to renderable material that is accepted on to the Premises. The specification that only blood is to be accepted has been removed with the Licence Holder able to accept no more than 10,000 tonnes of renderable material per annual period on to the Premises.  Condition 7 (Table 6) of the Revised Licence has been amended to additionally require the Licence Holder to record the type and source of each load of renderable material accepted at the premises.
Table 7 – Waste Management Specifications Please change heading to Waste and By-Products Specifications given the commercial nature of these materials i.e. they are not considered a waste in common industry terms.	Noted. The heading has been amended.
Table 7 - Further and clarification of information provided on the management of mortalities, manure, paunch, hides, renderable material and treated wastewater.	Information has been added to Table 7, Condition 8 of the Licence.

<p>Paddock layout plan showing location of treated effluent pipelines and irrigation channels was provided.</p>	
<p>Other wastes - Other than general rubbish which is collected via the contractor pick up, and incidental volumes of recyclable materials, no other process wastes are relevant.</p>	<p>No response required.</p>
<p>Emission Loads – The Licence Holder notes that DWER is considering that the Irrigation Area will be separated into smaller areas following further information on irrigation infrastructure. Prior to implementing these changes, the Licence Holder would like to understand the intent of and implications of this change on daily operations and would like to be consulted as part of the process.</p>	<p>Following correspondence with the Licence Holder, the Irrigation Area has been divided into three areas, Area A, Area B and Area C, with the irrigation emission limits applying to each individual irrigation area. This is to enable DWER to monitor the spread of treated wastewater across the total Irrigation Area.</p> <p>The Licence Holder has advised that Area A is irrigated from Pond 3 and Area B and Area C are irrigated from Pond 6.</p> <p>Condition 10 has been amended to clarify that the nutrient loading rates apply to each irrigation area; and a map, Irrigation Areas, has been added to the Revised Licence to show the boundary of each Irrigation Area.</p>
<p>Table 8 – Waste removed from the Premises</p> <p>Please change the heading to Waste and By-Products Specifications given the commercial nature of many of these materials i.e. they are not considered waste in common industry terms.</p>	<p>Noted. Table 8 heading has been changed to Waste and by-products removed from the premises.</p>
<p>Condition 20 – Annual Environmental Report</p> <p>Given the increase in reportable information and to align reporting timelines with other DWER licensed premises, the Licence Holder requests that the AER due date is changed to 3 months after the reporting period i.e. no later than 31 March after the end of each annual period.</p>	<p>The Delegated Officer acknowledges that there are additional reporting requirements in the Revised Licence compared to the Existing Licence. Licence Holders of other prescribed premises are required to submit annual reports generally within 30 to 90 calendar days after the end of the reporting period. The Licence Holder is currently required to submit the Annual Environmental Report within 59 days after the end of the reporting period. Considering the additional reporting requirements, the Delegated Officer has amended the submission date for the Annual Environmental Report within Condition 20 from 28 February to 31 March, which is approximately 90 calendar days after the end of the annual period.</p>