



Amendment Report

Licence Number	L4404/1991/15
Licence Holder	Harvey Fresh (1994) Ltd
ACN	065 591 219
File Number:	DWERVT2474
Premises	Harvey Fresh Dairy and Juice Factories Third Street HARVEY WA 6229 Legal description – Lot 1 on Diagram 4786, Lot 20 and Lot 22 on Plan 2344, Lot 187 and Lot 189 on Plan 202110, Lot 200 on Diagram 66494, Lot 190 on Plan 202110 and Lots 33, 34, 35 and 36 on Plan 205324, Lot 191 on Deposited Plan 2020109 with the northern boundary defined by the coordinates in Schedule 1 of the Amended Licence.
Date of Report	6 April 2020
Status of Report	Final

1. Definitions and interpretation

1.1. Definitions

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

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
AER	Annual Environment Report
Amended Licence	the amended Licence issued under Part V, Division 3 of the EP Act following the finalisation of this amendment.
Amendment Report	refers to this document
bgl	below ground level
BOD	biochemical oxygen demand
Category/ Categories/ Cat.	categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
DAF	dissolved air floatation
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
EP Act	Environmental Protection Act 1986 (WA)
EP Regulations	Environmental Protection Regulations 1987 (WA)
EPN	Environmental Protection Notice
EPP	Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of and during this Amendment
Licence Holder	Harvey Fresh (1994) Ltd
m ³	cubic metres
NIMP	Nutrient Irrigation Management Plan
Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Amendment Report applies, as specified at the front of this Amendment Report.
Risk Event	as described in Guidance Statement: Risk Assessment
SBR	sequence batch reactor

2. Amendment Description

This amendment is made pursuant to section 59 of the *Environmental Protection Act 1986* (EP Act) to amend Licence L4404/1991/15 granted to Harvey Fresh (1994) Ltd (the Licence Holder) for its Harvey Fresh Dairy and Juice Factories (the Premises).

3. Purpose and scope of assessment

An application was received from the Licence Holder on 30 August 2019 to amend Existing Licence L4404/1991/15 to increase the prescribed premises boundary to include an additional irrigation area, L7 (Lot 191 on Deposited Plan 202109 Warrawarrup Road, Harvey).

The addition of irrigation area L7 is considered by the Delegated Officer to present a potential change to the risk profile of emissions and discharges from the Premises and, as such, has been considered in a revised risk assessment (Table 14) in accordance with DWER's published Regulatory Framework.

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	DWER reference number
Application form: Licence amendment and supporting information	30 August 2019	DWERDT194586
Licence Holder response to DWER request for further information on irrigation infrastructure, revised Nutrient and Irrigation Management Plan (NIMP), soil testing, depth to groundwater and proposed monitoring.	15 October 2019	DWERDT211925

The Amended Licence has been issued in the existing format with the front cover updated to include the prescribed premises category descriptions and assessed production capacity. Changes regarding the addition of proposed irrigation area L7 have been made to the conditions of the Existing Licence as summarised in sections 12 and 13.1.

4. Premises information

4.1. Background

The Licence Holder holds Licence, L4404/1991/15 for milk processing (Category 17) and non-alcoholic beverage (juice) manufacturing (Category 24) at the Premises with processing facilities located approximately 1.5 km north of Harvey on the Swan Coastal Plain, approximately 120 km south of Perth.

The Premises covers a number of individual land titles which are physically separated by a gazetted road, but are linked via wastewater disposal infrastructure. The juice factory was established in 1986, followed by the dairy factory in 1989.

An amendment to Licence L4404/1991/15 was issued to the Licence Holder on 6 June 2019 authorising the irrigation of wastewater to additional irrigation areas L5 and L6 and to increase the approved premises production capacity for Category 17 (milk processing) from 165,000 to 180,000 tonnes per annual period.

Wastewater generated from the milk and juice processing facilities is combined and treated through a dissolved air floatation (DAF) clarification system and a dual sequence batch reactor (SBR) system prior to being discharged to storage ponds. The Existing Licence then authorises disposal via flood irrigation of up to 74.6 ha of pasture and 18.9 ha of orange orchard over four irrigation areas (L3, L4, L5 and L6).

The Licence Holder has applied to add an additional irrigation area totalling 16.02 ha (see Figure 1); L7 being Lot 191 on Deposited Plan 202109 Warrawarrup Road, Harvey.

The Licence Holder has submitted a revised NIMP to include the proposed irrigation area L7. The NIMP has been reviewed, along with the Application supporting information, as part of the risk assessment for this licence amendment.

Table 3 lists the relevant prescribed premises categories and applicable throughputs authorised under L4404/1991/15.

Table 3: Prescribed premises categories

Category	Description	Current authorised throughputs
17	Milk processing: premises on which – (a) milk is separated or evaporated (other than a farm); or (b) evaporated or condensed milk, butter, ice cream, cheese or any other dairy product is manufactured, and from which liquid waste is or is to be discharged onto land or into waters.	Not more than 180,000 tonnes of milk processed per annual period.
24	Non-alcoholic beverage manufacturing: premises on which a non-alcoholic beverage is manufactured and from which liquid waste is or is to be discharged onto land or into waters.	Not more than 13,000 kilolitres of fruit and vegetable juice and concentrate produced per annual period.

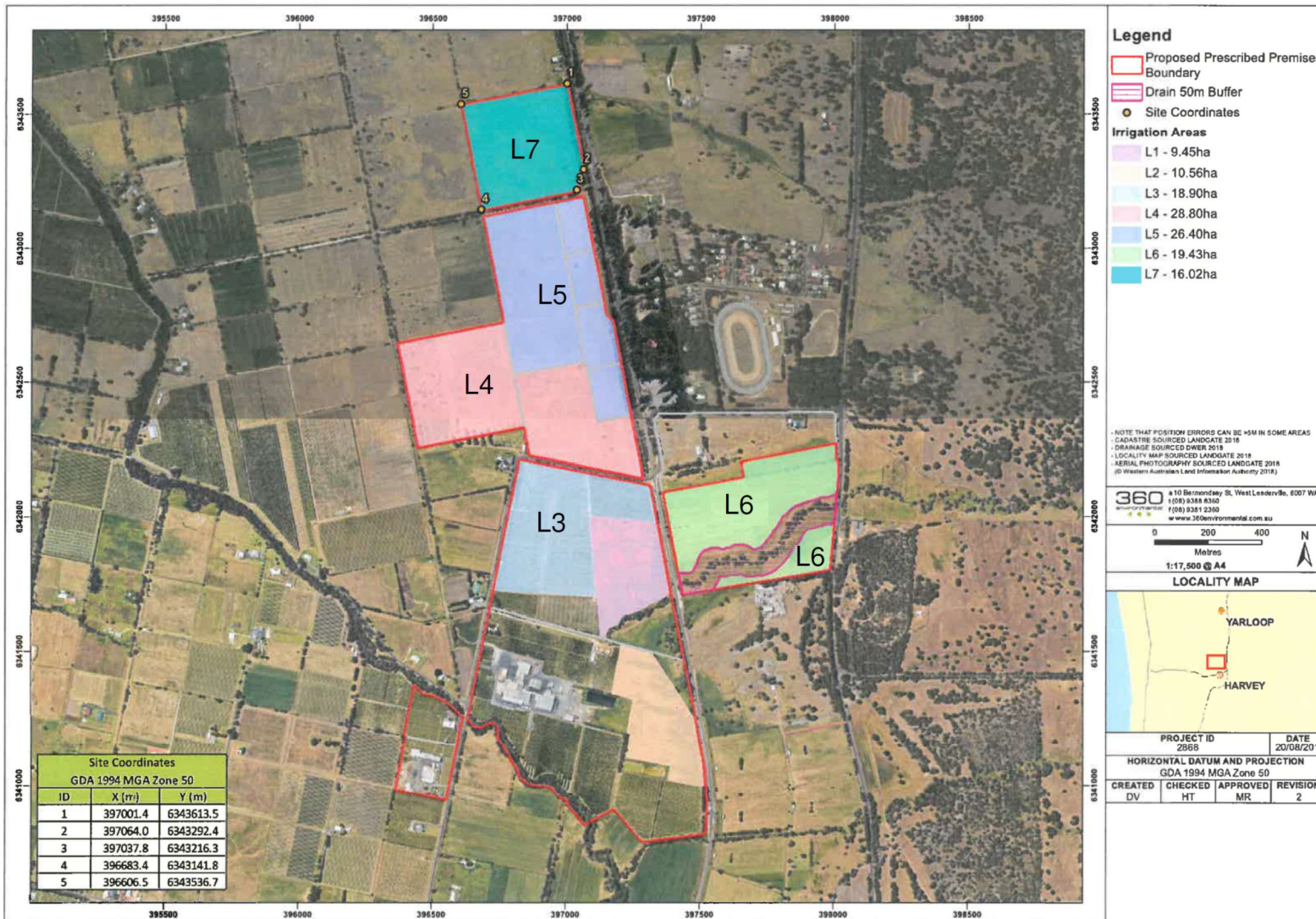


Figure 1: Current (L4 and L5), previous (L3 and L6) and proposed (L7) wastewater irrigation areas

4.2. Operational aspects

4.2.1. Dairy Factory

Approximately 70% of Harvey Fresh products are manufactured in the dairy factory, with up to 416 kL per day of milk processed during peak season.

Raw milk is transferred from milk tankers into large insulated vats on a continuous 24/7 basis. Wash down of trucks and tankers is collected in a series of drains and is combined with the dairy wastewater stream.

The raw milk is piped from the insulated vats to pasteurisers to kill any bacteria. For reduced fat milk and skim milk products, cold raw milk is firstly passed through a separator, which regulates the milk fat content, prior to being pasteurised. The excess milk fat is then stored in cream tanks and later packed into cream products.

Harvey Fresh utilise the 'high temperature-short time' pasteurisation process, in which the milk is heated as it flows through the pasteuriser continuously. Whole milk, skim milk and standardised milk are heated to approximately 75°C for 15 seconds, where other milk products (such as long life milk) have different time and temperature requirements. The hot milk passes through a long pipe whose length and diameter is sized so that it takes the liquid 15 seconds to pass from one end to the other. A temperature sensor at the end of the pipe diverts the milk back to the inlet for reprocessing if the temperature has fallen below the required standard.

For flavoured milk products, the ingredients are added into a holding/mixing tank from which it is then drawn on for pasteurisation.

The finalised milk product is then cooled and pumped from the pasteurisers to the bottling room, where it is filled into coated paper cartons or plastic bottles, labelled, sealed, packaged into cardboard boxes or milk crates and stored in large refrigerated rooms, pending shipment.

Long life products are stored at ambient temperature in the warehouse. A range of long-life reconstituted fruit juices are also manufactured in the dairy factory, where water is added to fruit concentrate, pasteurised at high temperatures, bottled, packaged and stored in the same manner as the long life milk products.

Approximately 500 kL/day of water is used in the dairy factory, predominantly through cleaning process equipment and work areas to maintain hygiene standards. The pasteurisers and other automated equipment contain "clean in place" technology, which allows self-cleaning of the interior surface of the machine without disassembly. The automated machines are sterilised at the start of the day using steam, and self-clean once the daily volume of milk has been reached (it takes approximately 7 hours to pasteurise 300 kL of milk). Each pasteuriser holds 0.3 – 0.4 kL of milk at any one time. Once the daily volume of milk has been reached, water is added to push the remaining milk through the system. To maintain product quality, the last 20 seconds of the process (equates to approximately 0.05 – 0.1 kL of milk per pasteuriser, up to 1kL/d in total), will be flushed out of the system. The self-clean system then activates, which involves flushing the system with hot water, followed by flushing with a hot water and caustic solution, and a final flush out with hot water. The floor of the pasteuriser room is also washed frequently. All wastewater is directed to a sump prior to being directed to the wastewater treatment system.

Wastewater is also generated in the bottling rooms, where bottles are washed to remove milk and juice residues after filling and prior to labelling and packaging. Up to 4 kL/hr is used for this activity. Water is also used to cool concentrated juice bottles after bottling, as the filling process is done at high temperature. Mechanical equipment in the bottling room and remaining parts of the dairy factory are also rinsed at the end of a day's production. A foam solution is used to coat the machines and conveyors and then rinsed off with hot water. All wastewater is directed to a sump prior to being directed to the wastewater treatment system.

4.2.2. Juice factory

The juice factory is located on the west side of Third Street, approximately 270 m SW of the milk processing facility. The juice factory manufactures freshly squeezed orange, apple, lemon and carrot juice and concentrate. Fruit is manually fed into hoppers and a conveyor system, where it is then washed, squeezed in a machine which separates the juice from the solids, and piped to large vats, prior to being bottled, sealed, packaged and stored in refrigerated rooms pending shipment. The solids are removed from the process via augers, which collect in skip bins on the outside of the factory and are sold to farmers to feed stock.

Wastewater generated from the wash down of machinery and the conveyor system is collected in a series of drains and transferred to a common sump on the outside of the factory. This wastewater typically contains residual solids which are screened out prior to the wastewater being pumped across to the dairy factory and into the wastewater treatment plant.

4.2.3. Wastewater treatment

The two primary wastewater streams (the juice factory and the dairy factory) generate a combined current amount of up to 1,000 kL/day of wastewater. The wastewater streams are combined and treated through a multistage treatment process (see Figure 2) comprising a DAF clarification system and a dual SBR system. Following treatment, wastewater is transferred to a storage pond prior to being disposed of via flood irrigation to approximately 74.6 ha of pasture (refer to section 4.2.4).

Raw wastewater, typically comprising of milk and juice products, fats, organic solids from juice production, detergents, sanitisers, acidic and caustic cleaning agents, nutrients, dissolved solids (including sodium chloride) and small amounts of lubricants, is collected in one of three, 3.5 kL sump pits located near the milk processing facility. Wastewater from the juice processing facility is also directed to these sumps. The wastewater is then pumped to a rotary drum screen (1.0 mm wedgewire) with solids collected in a bin, located on a hardstand, for disposal. The wastewater is then gravity fed to a 500 kL equalisation tank fitted with a submersible aerator and then sent to the DAF plant that has a capacity of 50 kL/hr. The wastewater is dosed with a coagulant to flocculate the suspended matter. A portion of the wastewater is pumped to a small pressure vessel when compressed air is introduced, with the water then recycled to the front of the process in the form of tiny bubbles which adhere to the suspended matter, causing it to float to the surface and form a froth layer, which is removed by a skimmer. The froth is collected to a corner baffle and moved to the wet sludge tank where it is processed again to make dry sludge.

The froth free wastewater is then adjusted to pH 7.0 and pumped to a dual SBR system with a treatment capacity of 1,200 kL per day. The treatment process includes:

- (a) fill – the inlet valve opens and the tank is filled, which takes approximately 30 mins. The initial fill is carried out with aeration.
- (b) aerate – oxygen is added to the liquor by transferring air into fine bubble diffusers fixed to the floor of the tanks. This encourages the multiplication of aerobic bacteria to break down the nutrients and the nitrification process. The cycle runs for approximately 3.5 hours. Where required, excess biomass (activated sludge) is wasted to control the mixed liquor suspended solids to within design loadings.
- (c) settle – the sludge formed by the aerobic bacteria is allowed to settle and separate from the water phase to form a sludge blanket towards the bottom of the tank. The aerobic bacteria continue to multiply until all the dissolved oxygen is used up, forming anoxic conditions which facilitate de-nitrification. This phase runs for approximately 1 hour, until clear water is on the top 20-30% of the tank contents.
- (d) decant – the clear water is then slowly decanted and transferred to the holding pond.

The excess waste activated sludge generated from the SBR system is automatically dosed with

a polymer and pumped to a disc thickener to thicken the sludge to 3 – 4% solids. It is then combined with sludge from the DAF and dewatered in an inclined screw press. The dewatered cake is then discharged to a skip bin and removed off-site.

4.2.4. Treated wastewater disposal

Decanted wastewater from the SBR system is diverted either to Pond 1 or to the Winter Dam, prior to disposal via irrigation to the following current irrigation areas:

- L3 – 18.9 ha orange orchard (*Harvey Fresh has confirmed that it does not irrigate to this area, nor does it propose to irrigate to it in the near future*);
- L4 – 28.79 ha of pasture;
- L5 – 26.40 ha of pasture; and
- L6 – 19.43 ha of pasture (September to April inclusive irrigation permitted only). *However Harvey Fresh has confirmed that this irrigation area has not been commissioned nor does it intend to commission it in the near future.*

The Licence Holder has applied to include the following additional irrigation area:

- L7 – 16.02 ha of pasture.

Irrigation is proposed to occur via flood irrigation with a pipeline system bordering the periphery of the irrigation area fitted with a series of valves. Selection of the cells and irrigation rate is to be undertaken manually by an operator, who also manually changes the 2-inch ball valves of the cells to be flooded. The Licence Holder advises that approximately 20 cattle are grazed within the irrigation areas (the paddock grasses are not harvested). During wet periods, irrigation will be deferred and effluent retained within either Pond 1 (capacity of 6,000 kL) or the winter dam (two compartments of 4,000 kL each).

This represents about 12 days of holding capacity at normal production rates, based on the ponds being empty. If the ponds are already full, there is no capacity to defer irrigation. Based on little to no winter holding capacity, the Licence Holder has previously committed to constructing additional storage (through a works approval application) in time for the 2020 winter season. However, DWER has not received an application for the construction of this additional storage pond.

The Licence Holder has also advised that there is currently no irrigation infrastructure in the orange orchard, L3, and therefore, only limited amounts of treated wastewater have been disposed of to L3 in the past. The Licence Holder also advised that there is no intent to irrigate to L3 in the near future due to unknown impacts to the orange orchard, nor is there any irrigation infrastructure in-situ to allow irrigation. For this reason DWER has removed approval to irrigate to L3. The Licence Holder may apply for a licence amendment to install irrigation infrastructure and re-instate irrigation to L3 at a later stage when and if they are ready to irrigate to L3.

Additionally, the Licence Holder has indicated that they do not intend to dispose of wastewater to irrigation area L6 due to the cost of installing infrastructure under an existing railway. For this reason L6 has also been removed from the licence through this amendment.

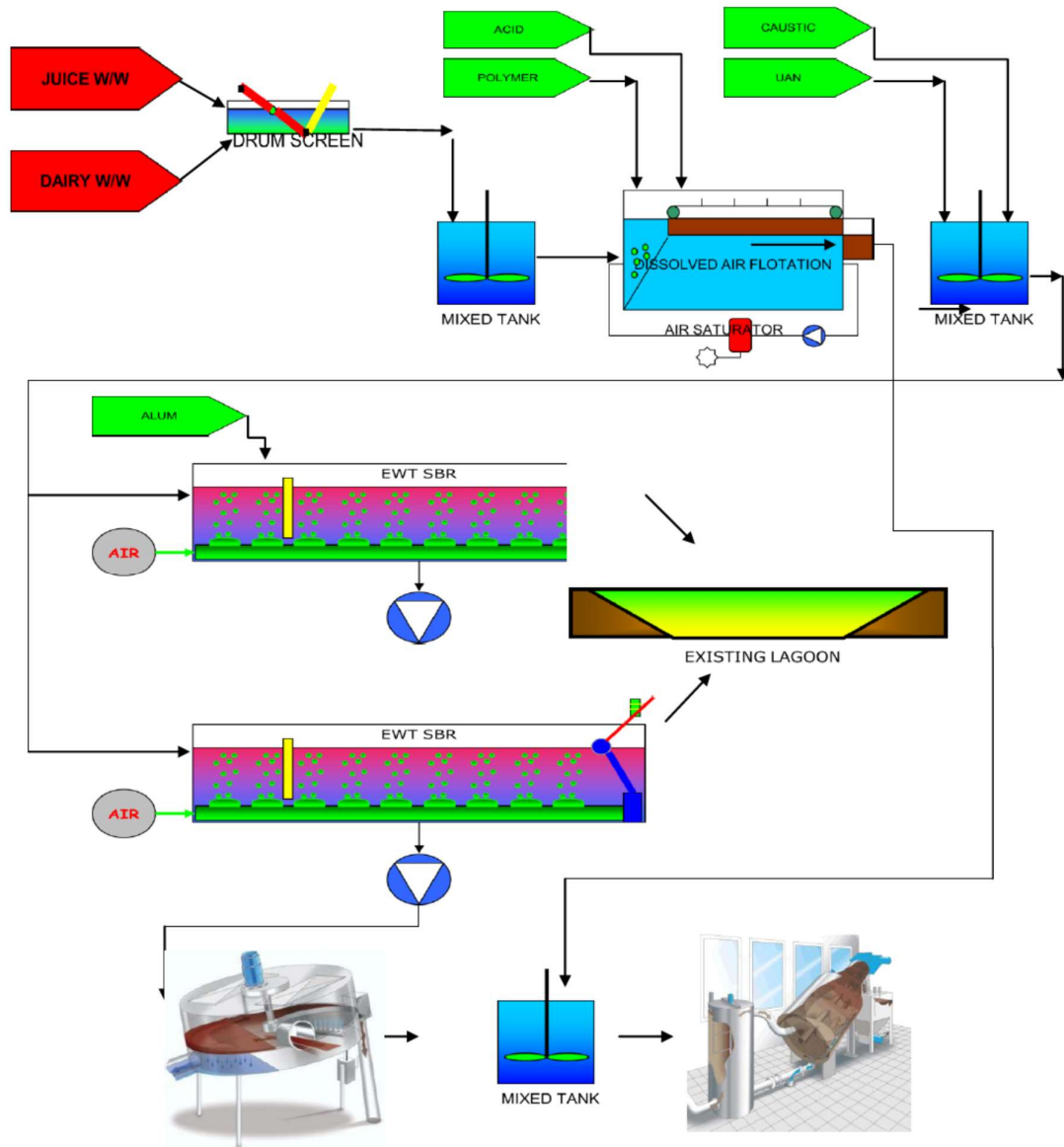


Figure 2: Wastewater treatment system process

5. Amendment Application

The Licence Holder has applied to add an additional irrigation area totalling 16.02 ha (see Figure 1); L7 being Lot 191 on Deposited Plan 202109 Warrawarrup Road, Harvey.

The Existing Licence authorises irrigation of treated wastewater to irrigation areas L3 to L6, with L6 only to be irrigated from September to April inclusive. However, as L3 and L6 do not have infrastructure installed and are not being utilised they will be removed from the licence and have not been included in this assessment. With the addition of L7, the irrigation area for the premises will total 71.21 ha (not including L3 and L6).

5.1. Treated wastewater quality

Wastewaters from milk and juice processing facilities are characterised by high concentrations

of organic matter (expressed as COD or BOD), nutrients (particularly nitrogen and phosphorus), fats, oils and grease, total dissolved solids (Dairy Australia, 2017), and cleaning agents (from Application).

Treated wastewater is currently irrigated from either Pond 1 or the Winter Dam to the irrigation areas. The Licence Holder currently monitors treated wastewater quality at one of three locations, depending if the treated wastewater is being sourced from the WWTP, Pond 1 or the Winter Dam for irrigation. However, treated wastewater is usually sourced from either Pond 1 or the Winter Dam rather than straight from the WWTP.

The Existing Licence requires the Licence Holder to monitor the quality of treated wastewater for volumetric flow rate, pH, TDS, TSS, BOD, TN, TP and EC on a monthly basis. Figure 3 and Figure 4 show the available results of treated wastewater quality monitoring from August 2014 to October 2019.

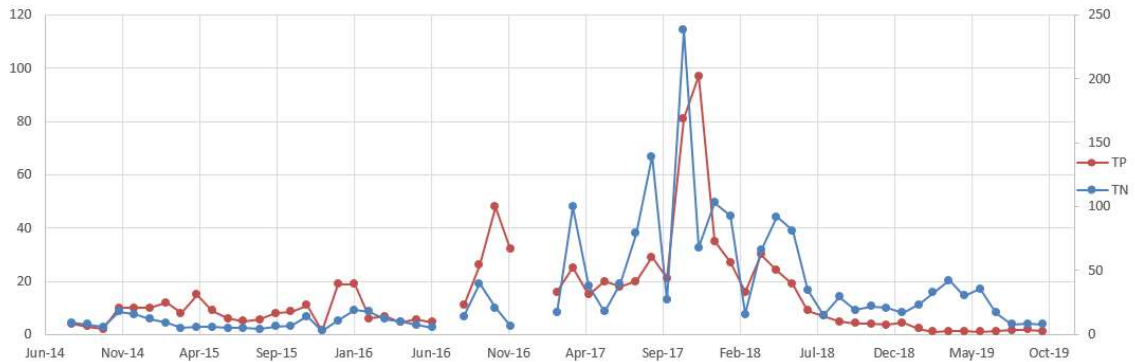


Figure 3: Treated wastewater quality from August 2014 to October 2019 for TP (primary axis) and TN (secondary axis)

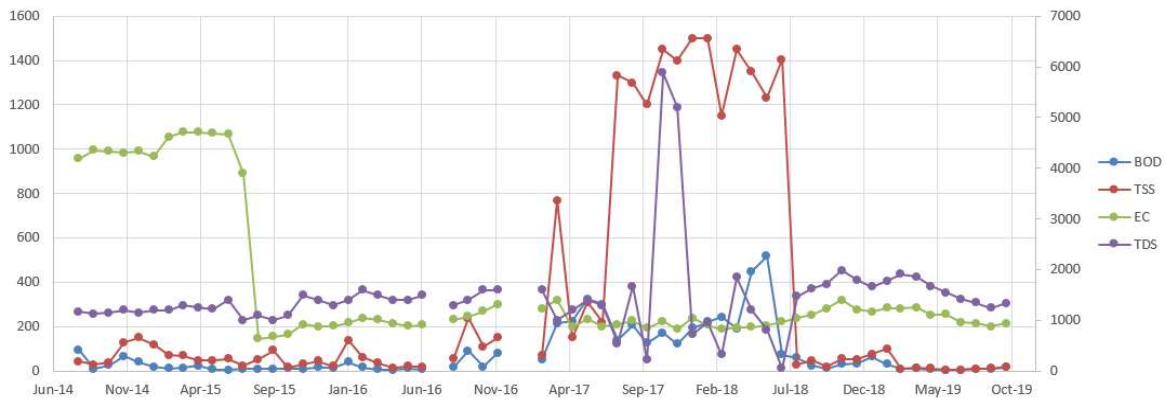


Figure 4: Treated wastewater quality from August 2014 to October 2019 for BOD, TSS, EC (primary axis) and TDS (secondary axis)

Figure 3 and Figure 4 show fairly consistent results for all parameters until October 2016 when all parameters, except EC, show varied results for the next 21 months. It is noted that from August 2018 to October 2019, all parameters appear to be fairly consistent again and lower (except for TDS and EC) than monitoring between December and July 2018. Table 4 show the range and average treated wastewater quality from August 2018 to October 2019.

Table 4: Quality of treated wastewater discharged to irrigation areas

Parameter	Units	August 2018 – October 2019		Common levels of concern ¹
		Range of treated wastewater quality	Average treated wastewater quality	
Total Nitrogen	mg/L	8 – 42.1	21.9	125
Total Phosphorus	mg/L	1.1 – 6.9	2.7	12
pH	pH units	5.2 – 8.5	7.9	-
Total Dissolved Solids	mg/L	1243 – 1985	1625	-
Total Suspended Solids	mg/L	5.3 - 101	31.6	-
BOD	mg/L	4.3 – 64.4	22.3	-

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

5.2. Nutrient loading impact analysis

The area of land required for vegetation to accommodate the applied nutrients without seepage to groundwater (assuming that irrigation is only taking place under conditions where there is no rainfall) can be determined by calculating nutrient loading rates for the premises. A preliminary assessment of nutrient loading rates at the premises can be determined as follows (NSW EPA, 1998):

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

Where	A	=	land area (m ²)
	C	=	concentration of nutrient or BOD (mg/L)
	Q	=	treated wastewater flow rate (L/d)
	L _x	=	critical loading rate of nutrient or BOD (mg/m ² /d)

The Licence Holder has not given an indication on the amount of wastewater that will be irrigated to proposed area L7, therefore, the assessment of nutrient loading rates at the premises has been based on the existing and proposed irrigation areas (L4, L5 and L7).

Based on:

- 2018-2019 average treated wastewater quality (see Table 4);
- maximum irrigation rate of 401.5 ML/year (based on an estimated 1,100 kL/day that was assessed for the licence amended on 6 June 2019); and
- critical loading rates of 36 mg/m²/day for nitrogen and 4 mg/m²/day for phosphorus (NSW EPA, 1998);

the land area required to sustainably manage the nitrogen and phosphorus application rate would be 66.9 ha and 74.25 ha respectively. L4, L5 and L7 is a land area of 71.21 ha (see section 4.2.4), therefore, there is not enough land available for irrigation of the wastewater and additional land suitable for irrigation or additional storage methods need to be found before the next winter season.

It should be noted that while the above calculations show that the current and proposed irrigation areas utilised on the premises (L4, L5 and L7) totalling 71.21 ha is not large enough to manage the nutrient application rates, it is only an estimate and does not accurately represent what may occur onsite; however, it does give an indication that there may be overloading of nutrients at

the premises.

It should be noted that the Licence Holder has stated in the Application that cattle are grazed within the paddocks of the irrigation area, potentially contributing to additional nutrients within the soil and from manure and that the pasture grasses are not harvested. The additional nutrients from stock grazing have not been factored into the NIMP and nutrient loadings; however, the Licence Holder should include these additional sources of nutrients.

The Licence Holder has provided information on a nitrogen and phosphorus balance as part of the NIMP that was submitted with the Application. The Licence Holder has made the following assumptions in their calculations:

- pasture paddocks contain a mixture of ryegrass and clover;
- that irrigation areas L3 – L7 are available for irrigation of treated wastewater. *DWER notes that L3 and L6 is not available for irrigation;*
- the volume of wastewater irrigated between August 2018 and July 2019 is 289,854 kL. *DWER notes that this is the amount of wastewater irrigated during the 2018-2019 reporting period; however, it does not appear to include the increase in production by 9% (estimated irrigation volume of 1,100 kL/day that was assessed for the licence that was amended on 6 June 2019);*
- the average concentration of total nitrogen is 24.53 mg/L and the average concentration of total phosphorus is 3.1 mg/L (based on August 2018 to July 2019);
- annual ryegrass can uptake 210 kg/ha of nitrogen and 9.3 kg/ha of phosphorus; and
- orange orchard can uptake 80 kg/ha of nitrogen and 9.2 kg/ha of phosphorus. *Noting that the orange orchard does not have wastewater irrigation infrastructure installed nor is it proposed to be used in the near future.*

Table 5 shows the Licence Holder's calculated predicted nutrient loading inputs and amount removed by pasture and orange orchard. The net nutrient loading has been calculated by DWER.

Table 5: Predicted Nutrient Loading

	Licence Holder calculated input ¹	Nutrient removal ² (kg/yr)	Net nutrient loading ³ (kg/ha/yr)
		L4, L5 and L7 ³	L4, L5 and L7
Total Nitrogen	7,125 kg/yr	14,954.1	-109.94
Total Phosphorus	809 kg/yr	662.2	2.06

¹The Licence Holder has not provided the formula used nor calculations to show how these numbers were obtained.

² Based on information provided by the Licence Holder in the NIMP.

³ Calculated by DWER. Note that this presumes that (a) the Licence Holder is able to continue to achieve ≤ 24.53 mg/L for TN and ≤ 3.1 mg/L for TP on a consistent basis; (b) no additional N or P have been added to the soil due to manure from grazing cattle; (c) that the cattle are grazed over the entire irrigation area and/or crops are harvested; (d) no additional fertilisers have been added to the irrigation areas; (e) the whole amounts of nitrogen and phosphorus in the soil are available to the plants (pasture); (f) the plants cover the entire irrigation area; and (g) that the whole 71.21 ha (L4, L5 and L7) are irrigated.

From the above calculations it appears that the existing nutrient loading rates in the Existing Licence will be complied with; however, as noted above there are a number of factors that have not been considered, such as:

- the Licence Holder has indicated that the pasture in the irrigation areas will be grazed but the Licence Holder has not taken into account additional nutrients due to manure from the grazing cattle;
- it is unknown whether the quality of wastewater used in the calculations is achievable in the long term (based on previous monitoring results, see Table 4, Figure 3 and Figure 4);
- cattle are grazed over the entire pasture areas; and
- the pasture cover the entire irrigation areas.

The Licence Holder has exceeded the relevant annual gross nutrient loading rate limits specified on the Existing Licence in 3 reporting periods for TN and 7 reporting periods for TP over the last 8 reporting periods. Nutrient loading rates for TP have been up to 88 times higher than the limits specified in the Existing Licence.

Soil investigations were conducted at the proposed irrigation area, L7 (see Table 12). While hydraulic conductivity (infiltration) and soil profile data has been provided, no soil samples were taken to determine existing TP and TN concentrations in the soil or phosphorus buffering index (PBI). A summary of soil sampling data of irrigation areas L1-L6 has been provided in the 2018-2019 AER with actual data provided in the Investigation Report and Remediation Plan, June 2019. The summary stated that both nitrogen and phosphorus are elevated in irrigation areas L3 – L6. It is noted that the data shows that, generally, nitrogen and phosphorus concentrations decrease with increasing depth.

Soil sampling has not been conducted in the same locations in previous years, therefore, it is unknown whether TP and TN have changed at each site over time.

Key Findings:

1. The Licence Holder has exceeded the relevant annual gross nutrient loading rate limits in the Existing Licence in 3 reporting periods for TN and 7 reporting periods for TP over the last 8 reporting periods. **Nutrient loading rates for TP have been up to 88 times higher than the limits specified in the Existing Licence.**
2. It is noted that treated wastewater quality has improved in the last 12 months compared to the previous 12 months.
3. The Licence Holder has advised that treated wastewater is not irrigated to L3 and L6.
4. Preliminary assessment of nutrient loading rates at the premises has been based on 1,100 kL/day that was estimated by the Licence Holder to be irrigated with the increase in throughput of category 17 that was approved in the licence amended on 6 June 2019. The preliminary assessment of the nutrient loading rates shows that **the irrigation area (L4, L5 and L7) is not a large enough area to manage the nutrient application rates for TN and TP.**
5. Screening criteria for an assessment of site suitability for wastewater irrigation (US Army Corp, 1982 and US EPA, 2006) indicates that as the premises is within the EPP, the irrigation of pasture, crops or tree plantations with wastewater may not be suitable. However, the depth to groundwater, minimal land slope and existing agricultural land use suggest that the premises may be suitable.
6. River health surveys carried out by DWER showed that the Harvey River downstream of the Premises has significantly degraded water quality and ecological condition compared to upstream of the Premises.
7. Flood irrigation is the least suited method for managing water and nutrient application rates.

5.3. Hydraulic loading impact analysis

Wastewater generated from the milk and juice processing facilities is combined and then directed through solids removal followed by a DAF plant and dual SBR system before being stored in either Pond 1 or the Winter Dam until it is used for irrigation on the premises.

Pond 1 has a total volumetric holding capacity of 6,000 kL. The Winter Dam has two compartments, with each having a capacity of 4,000 kL; therefore, the Winter Dam has a total

volumetric holding capacity of 8,000 kL. Irrigation is either from Pond 1 or the Winter Dam (with Harvey Fresh also having the ability to irrigate directly from the outlet of the WWTP) to irrigation areas that total 71.21 ha (including existing irrigation areas L4 and L5 and proposed irrigation area L7).

The proposed irrigation area (L7) is fairly flat, with a slope of approximately 0.69%, sloping SE to NW.

A significant physical constraint for siting a wastewater irrigation scheme is ensuring that the area of land selected is sufficiently large enough to enable the wastewater and its dissolved constituents to be taken up by vegetation or retained within the soil profile without excessive seepage into groundwater. A preliminary assessment of the wastewater hydraulic loading at the premises was calculated using the following formula (US EPA, 2006) when the licence was amended in June 2019.

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

Where:

- F = field area, ha (acres)
- Q = average flow, m³/d (mgd)
- L = loading rate, cm/wk (in/wk)
- P = period of application, wk/yr
- 3.65 = metric conversion factor =

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

It should be noted that although the Licence Holder provided a water balance for the premises in their NIMP dated October 2019, the Delegated Officer noted the following issues which suggest that it would not be suitable for determining hydraulic loading:

- the water balance was based on actual irrigation volumes from August 2018 to July 2019 and not previously estimated 1,100 kL/day (401.5 ML/year) that was predicted with the increase in throughput that was approved in the licence amendment on 6 June 2019;
- the water balance included irrigation areas L3 and L6; however, the Licence Holder has indicated that these irrigation areas are not currently being utilised with no intention to irrigation to these areas in the foreseeable future; and
- formulas / calculations were not included to show how the water balance was estimated.

It is noted, however, in section 3.2 of the NIMP provided by the Licence Holder it states that the water balance has shown that the irrigation paddocks are naturally prone to water logging during the wetter months, even without wastewater being applied to the paddocks, as monthly rainfall is significantly higher than the monthly evapotranspiration and infiltration during May to September. It also states that the water balance indicates that there is sufficient storage and no waterlogging between the months of October to March.

Therefore, DWER has calculated a water balance based on the maximum irrigation volume of 401.5 ML/year (1,100 kL/day), an irrigation area of 71.21 ha, an assumed design percolation rate of 5 mm/week to remove salt in the root zone, precipitation data (1951 to 2019) from the Bureau of Meteorology, evaporation data from the Department of Primary Industries and Regional Development, and a generic crop factor of 1.0 for pasture (this is the same crop factor that has been used by the Licence Holder). 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.

No increase in the amount of wastewater to be irrigated is proposed with this amendment. Based on the above assumptions, the land area required for irrigation is approximately 61.21 ha for pasture.

The current and proposed irrigation area (L4, L5 and L7) totals 71.21 ha, therefore, the hydraulic loading rate is not a limiting factor for irrigation at the Premises.

However, it is noted that the Licence Holder currently irrigate for 12 months of the year (rather than 30 weeks as was assumed for the calculation. Based on the DWER calculated water balance, which suggests that inputs (precipitation and irrigation) exceed outputs (evapotranspiration and percolation to remove salt) for 5 months of the year, 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). The River Health survey (see Table 11) suggests that this may be occurring.

Key Findings:

1. The combined rate of treated wastewater irrigation and rainfall to the irrigation areas L4, L5 and L7 exceeds the hydraulic outputs (evapotranspiration and percolation) from May to September. Treated wastewater applied during this time may infiltrate past the root zone into groundwater.

It is noted the Licence Holder submitted a NIMP (October 2019) that states that the irrigation paddocks are naturally prone to water logging during the wetter months, even without wastewater being applied to the paddocks, as monthly rainfall is significantly higher than the monthly evapotranspiration and infiltration during May to September.

2. The current storage ponds onsite (Pond 1 (6,000 kL) and the Winter Dam (8,000 kL)) only have the capacity for approximately 12 days storage (based on them being empty at the start and at a maximum input rate of 1,100 kL/day).
3. Groundwater beneath the Premises and surface water adjacent to the Premises may be contaminated by elevated concentrations of nitrogen and phosphorus which could be discharged as base flow and surface water flow into agricultural drains immediately adjacent to the Premises, including the Harvey River Main Drain which in turn discharges into the Harvey Estuary.
4. Screening criteria for an assessment of site suitability for wastewater irrigation (US Army Corp, 1982 and US EPA, 2006) indicates that as the proposed irrigation area is within the EPP, the irrigation of pasture, crops or tree plantations with wastewater may not be suitable.
5. River health surveys carried out by DWER showed that Harvey River downstream of the Premises has significantly degraded water quality and ecological condition compared to upstream.

6. Infrastructure

Infrastructure, as it relates to this amendment of additional irrigation area L7, is detailed in Table 6 and depicted on the map within Schedule 1 of the Amended Licence.

Table 6: Proposed infrastructure related to this amendment

Infrastructure	Site Plan Reference
Prescribed Activity Categories 17 and 24	
Treated wastewater from the Harvey Fresh Dairy and Juice Factories is proposed to be irrigated to additional	

	Infrastructure	Site Plan Reference
	irrigation area L7	
1.	Irrigation area L7 – 16.02 ha of pasture. Paddock has a 200 mm earthen bund on the north, south and western boundaries. L7 is also laser levelled.	Irrigation area L7 shown in Schedule 1 of the Amended Licence- Irrigation Areas – Map 2

7. Legislative context

The Licence Holder has provided the following information relating to other approvals relevant to this amendment as outlined in Table 7.

Table 7: Relevant approvals

Legislation	Number	Approval
Local Government Authority – Shire of Harvey – Development Approval	N/A	As development approval was granted on 8 February 2019 for the installation of irrigation infrastructure in irrigation areas L5 and L6; it is assumed that development approval may also be required for proposed irrigation area L7. The Licence Holder has confirmed, however, that the Shire of Harvey has advised that a development approval is not required for additional irrigation area L7.
Lease of proposed irrigation area L7	Water distribution agreement for Lot 191 on deposited plan 202109 being approximately 15.9 ha. Agreement valid for 12 months commencing on the date that irrigation to proposed L7 is approved by DWER. For the irrigation of treated liquid effluent from the juice and dairy factories.	

The Application was referred to the Shire of Harvey with no response received.

The Application was referred to Department of Primary Industries and Regional Development and the following response was received in respect to the wastewater irrigation proposal:

- Recommend using daily pan evaporation (Epan) or evapotranspiration (ET) from weather stations but only when water is the limiting factor (the limiting factor for most effluent irrigation is likely to be phosphorous, nitrogen, salt or water). They can be measured directly using an evaporation pan or calculated as evaporation (Epan) or evapotranspiration (ET) from weather stations. Epan and ET data can be sourced from DPIRD, the Bureau of Meteorology or SMS weather services such as the one run by Vegetables WA.
- The biggest single variable is the irrigation equipment. Even if the equipment is being used right there can be as much as a 5 fold variation in distribution. If the irrigation gear is not being properly used then this can infinitely vary further.
- The secondary variable is the management of the vegetation that the liquid waste is being applied to. All vegetation has different performance or growth curves meaning there is variation at different stages as to water usage. The worst scenario is unmanaged irrigated vegetation. Even mowing is a legitimate management practice.
- Recommendation:
 - This will only be valid when water is the limiting factor.
 - Use Epan or ET data from a reliable data supplier. This then needs to be considered with the area that the waste is being applied to on a daily basis.

- Evaporation ponds properly designed allow for much simpler waste management that doesn't require day to day monitoring and recording.
- Plant water use is determined by environmental and plant factors. Environmental factors are related to climate and weather while plant factors relate to the type of crop, its stage of growth and vigor. Crop irrigation requirement is also influenced by cultural and site factors, including the method of irrigation delivery, uniformity, scheduling, planting density, variety and soil type.
- Environmental factors include climate and weather. Temperature, wind speed, solar radiation and relative humidity determine the amount of water required for productive plant growth. They can be measured directly using an evaporation pan or calculated as evaporation (Epan) or evapotranspiration (ET) from weather stations. Epan and ET data can be sourced from DPIRD, the Bureau of Meteorology or SMS weather services such as the one run by Vegetables WA. Using long-term averages do not provide sufficient accuracy of daily measurements. They should only be used for crops that can tolerate some stress or are growing in soils with water storage capacity greater than the crop's demand over a day or two.
- Crop water requirements: As plants grow larger, produce more leaf area, start producing fruit or approach maturity, the proportion of Epan or ET that needs to be replaced by irrigation changes. Differences in water requirements and the proportion of Epan to be replaced are called crop factors (CF). When using ET, they are called crop coefficients (Kc). Crop factors and crop coefficients are split into periods of growth that relate to key stages in the plant's development. Descriptions may detail the development stage or may reference a generic stage or phase of growth when water requirements change. An example of crop factors for an annual crop is shown in Table 8.

Table 8: Example of a crop factor table

Crop stage	Crop factor	Root depth (mm)
Transplanting and establishment	0.7	75
Rapid growth	1.0	100
Mid to late growth	1.1	200
Late growth to harvest	1.3	250

- Daily water use is calculated from weather data and crop stage.
 Daily water use (mm) = Evaporation (mm) x crop factor; or
 Daily water use (mm) = Evapotranspiration (mm) x crop coefficient
- Crop factors and crop coefficients are only a guide to crop water demand and are not definitive. When not developed specifically for a farm's cultural and site factors, some form of crop or soil moisture monitoring is always recommended to ensure plant water demands are met for the specific situation to which they are applied. Most crop factors and coefficients are developed for maximum potential yield. Where a specific size or quality of product is required or an area is subject to high disease pressure, generic crop factors may over- or underestimate plant water requirements. Soil moisture monitoring can also assist in these situations.

8. Part V of the EP Act

8.1. 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.

8.2. Works approval and licence history

Table 9 summarises the works approval and licence history for the premises.

Table 9: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
W231	13/12/1988	Works Approval issued for construction of a wastewater system for the dairy factory. Issued to Harvey Fresh Dairies.
L1699	20/12/1989	Initial licence issued to authorise operation of the dairy factory. Two-part licence (EPA and WA conditions). Issued to Harvey Fresh Dairies. Irrigation discharge criteria set for Phosphorus.
W676	22/07/2019	Works approval issued by the EPA requiring modifications to the wastewater treatment system. First instrument issued to Liase Pty Ltd.
L3093	02/09/1991	Licence re-issue
L3093	04/12/1992	Licence amendment to restrict throughput to 20,000 L/day and demonstrate the efficiency of the fat separator unit.
L3093	10/03/1993	Licence amendment following Minister's appeal determination on previous amendment, allowing throughput of 100,000 L/day.
L4404	30/09/1993	Licence re-issue. Addition of category 24. First instrument issued to Harvey Fresh (1994) Ltd and first non-annual licence, issued for 3 years.
L4404/1991/01	12/06/1997	Licence re-issue. Requirement to install a metering device on wastewater outflow.
L4404/1991/02	09/01/1998	Licence re-issue. Issued for one year.
L4404/1991/03	24/11/1998	Licence re-issue.
L4404/1991/04	22/09/1999	Licence re-issue. Addition of category 25.
L4404/1991/05	20/09/2000	Licence re-issue.
L4404/1991/06	09/10/2002	Licence re-issue.
L4404/1991/07	30/09/2003	Licence re-issue. Addition of irrigation discharge criteria for nitrogen.
L4404/1991/08	24/09/2004	Licence re-issue. Requirement to submit a Nutrient Irrigation Management Plan. Issued for 2 years.
L4404/1991/09	21/09/2006	Licence re-issue. Extension for submission of NIMP.
L4404/1991/10	25/10/2007	Licence re-issue. Category 25 removed due to throughput below the required threshold. Further extension of NIMP submission. Requirement to install appropriate metering devices on wastewater outflow.
L4404/1991/11	25/09/2009	Licence re-issue. Addition of category 25 due to throughput above the required threshold. Addition of AACR. Further extension of NIMP submission.
L4404/1991/12	24/09/2009	Licence re-issue.
L4404/1991/13	24/09/2010	Licence re-issue.
L4404/1991/14	29/09/2011	Licence re-issue. Review undertaken of Premises and EAR prepared. Licence issued in Welker style format.
L4404/1991/15	27/09/2012	Licence re-issue. Includes operation of new wastewater system and conversion to new format.
L4404/1991/15	03/05/2013	Licence amendment to convert to REFIRE format.
L4404/1991/15	29/10/2015	Licence amendment to include Category 61, remove Category 25, amend phosphorus loading limit for orange orchard and remove annual wastewater monitoring requirements.

Instrument	Issued	Nature and extent of works approval, licence or amendment
L4404/1991/15	29/04/2016	Notice of Amendment to extend expiry date of licence. Expiry extended from 30/09/2017 to 30/09/2031.
L4404/1991/15	06/06/2019	Licence amendment to increase production throughput for Category 17, increase the irrigation area, remove category 61 from the licence, decrease total phosphorus loading limit for irrigation area L4
L4404/1991/15	06/04/2020	Licence holder initiated amendment to increase the irrigation area by adding new irrigation area L7 and removing irrigation area 6. Includes DWER changes restricting winter wastewater irrigation, removing irrigation area L3 (orange orchard).

8.3. Complaints and incidents history

No complaints or incidents have been reported to DWER regarding Harvey Fresh since the licence was last amended on 6 June 2019.

8.4. Environmental Protection Notice

An EPN was served on the Licence Holder in March 2009 that required the inadequacy of the wastewater treatment system to be addressed. The wastewater treatment system was upgraded and the EPN revoked in October 2013.

An environmental compliance inspection conducted on 21 September 2017 and subsequent compliance activities determined that the Licence Holder was non-compliant with a number of licence conditions relating to the discharge of nutrient rich wastewater (ICMS 49673). The discharges were determined to exceed authorised discharge limits for an extended period of time. It is understood that the emission areas receiving effluent have become nutrient saturated and the exporting of nutrients from the emission areas to the environment and the associated area of the *Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992* is taking place. The export of nutrients was believed to be impacting the Peel Harvey system causing pollution.

An EPN, reference number DWERDG672/18, was served on the Licence Holder and owners of the Premises on 5 December 2018. The purpose of the EPN is to prevent further use of nutrient saturated emission areas (irrigation areas L1 and L2), determine the impact of nutrient rich discharges on the Harvey River system, determine the capability of emission areas to retain discharged nutrients and minimise further export of nutrients from the wastewater storage pond to the Harvey River system.

This EPN was amended on 2 July 2019 to allow for irrigation to areas other than L3 and L4.

Conditions of the EPN include, but are not limited to:

- (a) cease all discharge of wastewater to irrigation areas L1 and L2;
- (b) ensure discharge of wastewater only takes place to emission area L3 and L4 unless additional discharge areas are approved under Part V Division 3 of the EP Act;
- (c) monitoring of ambient surface water quality on a monthly basis; and
- (d) take and analyse soil samples in irrigation areas L1 and L2, and L3 and L4.

8.5. Annual Environmental Reports and Annual Audit Compliance Reports

DWER reviewed the 2018-2019 Annual Environmental Report (AER) received on 29 August 2019, and notes the following:

- (a) information provided in Table B of the AER shows that 144,068 tonnes of milk was processed and 8,299 kL of fruit and vegetable juice and concentrate was processed

- during the reporting period (1 August 2018 – 31 July 2019);
- (b) information provided in section 2.3.2 and 2.3.3 indicates that 289,854 kL of treated wastewater was irrigated to irrigation areas L4 and L5 during the reporting period. This is an average of 794 kL/day.
DWER notes that flow meter information provided to DWER in September 2019 for annual licence fee purposes, showed that 293,628 kL (average of 804 kL/day) of wastewater was irrigated during the August 2018 to July 2019 period.
 - (c) Table C and D in section 3 appear to show no exceedance of nutrient loading rate limits for each individual irrigation area during the reporting period;
 - (d) the Existing Licence (amended 6 June 2019) included additional ambient surface water quality monitoring locations that appear to have not been sampled during the reporting period. Data should have been provided for June and July 2019 for all 6 ambient surface water monitoring locations; and
 - (e) information provided in section 4.3 states that soil monitoring was not done in accordance with the Licence (prior to being amended on 6 June 2019) but rather with the EPN as soil sampling requirements were more extensive and detailed. However, as the Licence was amended on 6 June 2019, soil sampling results for the 22 sites across the premises for June and July 2019 should have been provided in the AER;

9. Location and receptors

The proposed irrigation area L7 is located on the Swan Coastal Plain approximately 3 km from the Harvey townsite and 125 km south of Perth. The land is zoned as intensive farming under the Shire of Harvey's Town Planning Scheme No. 1. The surrounding land is zoned intensive farming with a public utilities and special residential area located 140 m SE of the proposed irrigation area.

Table 10 lists the distances to residential and sensitive receptors that may be relevant to the proposed amendment.

Table 10: Receptors and distance from proposed irrigation area

Residential and sensitive receptors	Distance from proposed irrigation area
Residential premises	Four residential premises (zoned special residential) located within 460 m SE of the proposed irrigation area (the closest being 240 m). Residential premises (rural) located 450 m E and 500 m N of the proposed irrigation area.
Residential premises (zoned as special residential)	Approximately 23 residential premises located between 500 m and 750 m SE of the proposed irrigation area.

Table 11 lists the relevant environmental receptors in the vicinity of the proposed irrigation area which may be receptors relevant to the proposed amendment.

Table 11: Environmental receptors and distance from proposed irrigation area

Environmental receptors	Distance from proposed irrigation area
Geomorphic Wetlands – Swan Coastal Plain (management)	Proposed irrigation area located within: Swan Coastal Plain – Semeniuk, Palusplain (seasonally waterlogged) multiple use wetland

Environmental receptors	Distance from proposed irrigation area
<i>Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992 (EPP)</i>	<p>Proposed irrigation area (and premises) are entirely within the EPP with the Premises being identified in the <i>Hydrological and Nutrient Modelling of the Peel Harvey Catchment – Water Science Technical Series Report</i> and the <i>Agriculture Futures: Potential rural land uses on the Palusplain</i> as being in a high risk nutrient export area requiring a significant phosphorus load reduction. (DWER, 2019).</p> <p>River health surveys carried out by Aquatic Science Branch of DWER showed that the Harvey River downstream of the Premises has significantly degraded water quality and ecological condition compared to upstream.</p>
Threatened Ecological Communities and Priority Ecological Communities	<p>Proposed irrigation area is located 350 m NW of buffer area of the Federal Government Threatened Ecological Community <i>Banksia Woodlands of the Swan Coastal Plain</i> (BanksiaWld09227), and 520 m NW of <i>Banksia attenuata</i> and/or <i>Eucalyptus marginata</i> woodlands of the eastern side of the Swan Coastal Plain (Peterson01). Numerous other Banksia Woodland areas area located 1 km E and SE of the proposed irrigation area.</p>
Surface water	<p>The proposed irrigation area is located within the Harvey Irrigation District proclaimed under the <i>Rights in Water and Irrigation Act 1914 (RIWI Act)</i>.</p> <p>The Harvey Dam is located 4 km SE of the proposed irrigation area.</p> <p>The Harvey Main Drain, a modified section of the Harvey River, is located 1.2 km W of the proposed irrigation area.</p> <p>A minor, non-perennial river is located 70 m E of the proposed irrigation area which flows into the existing agricultural drainage network.</p> <p>Existing agricultural drainage networks are located adjacent (north) and further west and south of the proposed irrigation area. These drainage networks flow to the Harvey River Main drain discharging into the Harvey Estuary approximately 40 km downstream.</p> <p>DWER Water Services advice states that there is connectivity between the perched and seasonal groundwater and the Harvey River drainage network, and as such, any nutrient leaching from groundwater or surface flows can directly impact on the quality of the Harvey River (Harvey Estuary).</p>
Groundwater	<p>The South West Coastal Groundwater Area, proclaimed under the RIWI Act, is located 5.3 km NW of the proposed irrigation area.</p> <p>There are approximately 50 groundwater bores within a 3 km radius of the Premises, most of which are for production purposes associated with livestock and domestic requirements.</p> <p>The nearest licence to take groundwater is located approximately 4 km N of the proposed irrigation area.</p> <p>There is a groundwater bore located within the proposed irrigation area; however, it is not currently used due to no livestock being located within the paddock.</p> <p>The Perth Groundwater Map shows that the groundwater salinity at the proposed irrigation area ranges from 1,000 – 1,500 mg/L which is considered brackish.</p> <p>The depth to groundwater at the proposed irrigation area has not been determined by the Licence Holder; however, four 1 m test pits that were dug on 1 August 2019 at the proposed irrigation area did not encounter any groundwater (see Table 12).</p> <p>Groundwater monitoring bores, owned by DWER and located 150 m west and 400 m north and west of existing irrigation areas (within 450 m of proposed irrigation area L7) shows the maximum groundwater table to be approximately 2 to 3 m below ground level.</p> <p>The Licence Holder has installed 4 shallow groundwater bores on the Premises (approximately 1.95 km S of the proposed irrigation area) in March 2019. When they were installed they showed static water levels at 1.7 – 2.9 m, 4.5 m, 3.28 m and 0 m below ground level.</p>

Table 12 details soil types and characteristics relevant to this assessment.

Table 12: Soil and sub-soil characteristics

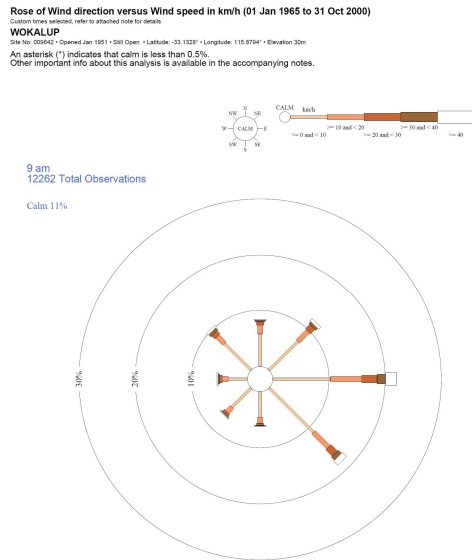
Soil and sub-soil characteristics	Description
Soil type classification	<p>The Licence Holder has provided, with their application, a NIMP that includes information on soil type of the Premises. The site is located on the Pinjarra Plain landform which is described as “flat and generally poorly drained alluvial plain”. The site is overlain by loamy sands of the Bassendean Sands complex followed by heavy clay of brown/grey colour at a depth of approximately 2 m.</p> <p>The soils statewide map show that the soils at the proposed irrigation area are flat to 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.</p> <p>Soil investigations at the proposed irrigation area, L7, was conducted by 360 Environmental Pty Ltd on 1 August 2019. The report for this soil investigations provided by the Licence Holder shows that:</p> <ul style="list-style-type: none"> - the soil profile at the four test pits sampled within the proposed irrigation area can be summarised as: loamy clay from the surface to approximately 0.1 to 0.2 m below ground level overlying clay. The test pits were dug to a depth of 1 m; - groundwater was not encountered in any of the 1 m test pits; - hydraulic conductivity (infiltration) testing was completed at four test sites along the eastern side of the proposed irrigation area. The results ranged from 0.88 mm/hr (0.021 mm/day) to 3.66 mm/hr (0.086 mm/day). The average being 2.3 mm/hr (0.055 mm/day); - a site walk over identified that the proposed irrigation area slopes from east to west and with the northern and southern boundaries having a low bund; - of the seven shallow pits that were dug across the proposed irrigation area, four of them (located in the NE, centre, SW and NW of the area) were found to have water (infiltrated through the soil from rainfall at the time of sampling) at approximately 0.3 to 0.4 m below the surface. No infiltrated water was found at the other three shallow pits (located SE, S and the very N of the area) that were dug to a depth of 0.4 m. - the south eastern corner of the proposed irrigation area appears to be more free draining than the remainder of L7; - the report concludes that the irrigation of wastewater to L7 will require appropriate management and irrigation during dry weather conditions is possible.
Acid sulfate soil risk	Moderate to low acid sulfate soil disturbance risk (<3 m from surface)

10. Meteorology

The region experiences cool, wet winters and warm to hot, dry summers. The nearest Bureau of Meteorology site is Wokalup (site number 009642), located approximately 8 km south of the Premises.

10.1. Wind direction and strength

Figure 5 shows the wind direction and strength for 9am at Wokalup.



Copyright © Commonwealth of Australia 2018. Prepared on 10 Aug 2018.
Provided by the Bureau of Meteorology.
Contact us by phone on (02) 9569 4000, by fax on (02) 9569 4010, or by email on climatedata@bom.gov.au
We have taken all due care but cannot provide any warranty nor accept any liability for this information.

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Figure 5: Wind direction and strength for 9am at Wokalup (site no. 009642).

It is important to note that the wind rose (shown in Figure 5) show historical wind speed and wind direction data (1 January 1965 to 31 October 2000) for Wokalup weather station and should not be used to predict future data.

10.2. Rainfall and temperature

Figure 6 shows the average monthly maximum temperature and the average monthly rainfall for Wokalup and is based on data from 1951 to 2019.

Average minimum temperatures range between 7.9°C and 16.1°C while the average maximum temperatures range between 16.7°C and 31°C. The total annual average rainfall is 966 mm.

From Table 13 you can see that rainfall exceeds pan evaporation for at least 4 months of the year (May to August).



Figure 6: Average monthly maximum temperature and average monthly rainfall

Table 13: Mean rainfall and mean evapotranspiration

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm) ¹	14.5	15.3	20.5	51	132.8	180.4	181.6	133.7	95.1	57.3	35.7	15.3
Mean monthly evapotranspiration (mm) ²	233	211	163	87	70	57	56	69	80	114	460	220
Mean monthly evapotranspiration (mm) ³	279	240.8	210.8	132	83.7	63	71.3	77.5	96	136.4	177	244.9

¹ sourced from Bureau of Meteorology (www.bom.gov.au), Wokalup (site number 009642)

² sourced from Department of Primary Industries and Regional Development Resource Management Technical Report No. 65, 2003

³ sourced from Bureau of Meteorology (given as daily evapotranspiration), calculated from number of days in each month by the mean daily evapotranspiration

11. Risk assessment

Table 14 below describe the Risk Events associated with the amendment consistent with the Guidance Statement: Risk Assessments. Table 14 identifies whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

Table 14: Risk assessment for proposed amendments during operation

Risk Event				Consequence rating ¹	Likelihood rating ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source / Activities	Potential emissions	Potential receptors, pathway and impact	Applicant controls					
Onsite disposal of treated wastewater via irrigation to proposed area L7 (16.02 ha)	Wastewater to land with excessive contaminants	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 immediately north and further west and south of the proposed irrigation area.	Irrigation occurs via flood irrigation with a pipeline system along the eastern side of L7. All boundaries of L7 are bunded. Selection of the cells within the irrigation areas and irrigation rate is undertaken manually by an operator who also manually changes the two inch ball valves of the cell(s) to be flooded. Cattle are grazed within the paddocks of the irrigation areas containing pasture; however, the pasture grasses are not manually harvested.	Major: mid-level off-site impacts at a local scale	Possible: the risk event could occur at some time	High	See section 5.2 for key findings. The Delegated Officer has considered the treated wastewater quality and volume estimated to be irrigated, irrigation area, applicant controls and distance to environmental receptors. The Delegated Officer considers the risk event to be tolerable and is subject to regulatory controls.	See section 12
	Wastewater to land with excessive hydraulic loading	Additionally the proposed irrigation area (and premises) is located entirely within the EPP (see Table 11). Depth to groundwater is approximately 2 – 3 m bgl.	During wet periods, irrigation is deferred and treated wastewater retained within either Pond 1 (capacity of 6,000 kL) or the Winter Dam (capacity of 8,000 kL). Wastewater is distributed evenly over the irrigated areas with irrigation bays used on a schedule across the field with the same amount of irrigation time on each bay. Irrigation occurs only within the designated irrigation areas. A 30 m buffer zone is maintained between watercourses and irrigation areas. Irrigation on visibly waterlogged land will be avoided. Vegetation cover is maintained over the irrigation area. Irrigation is managed to prevent the occurrence of soil erosion. Implement a water reduction program to reduce water use by 25% by the end of 2021: <ul style="list-style-type: none"> Water reduction measures include: guns and hoses, stormwater to DAF reduction, turning off package washing showers solenoid installation, homogeniser seal lubrication, condensate recovery program and environmental training on water usage. Water reduction measures will not result in an overall decrease in wastewater to be irrigated. 	Major: mid and low level off-site impacts at a local and wider scale respectively	Possible: the risk event could occur at some time	High	See section 5.3 for key findings. The Delegated Officer has considered the depth to groundwater, potential for treated wastewater to be discharged to groundwater and/or adjacent agricultural drains, distance to environmental receptors (including the EPP), compliance history and irrigation area available. The Delegated Officer considers the risk to be tolerable and subject to regulatory controls.	

Risk Event				Consequence rating ¹	Likelihood rating ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source / Activities	Potential emissions	Potential receptors, pathway and impact	Applicant controls					
	<p>Odour from the irrigation of treated wastewater to proposed irrigation area L7</p>	<p>Six residential premises (zoned special residential or intensive farming) located 240 m to 500 m of the proposed irrigation area.</p> <p>An additional 23 residential premises (zoned special residential) located between 500 m to 750 m SE of the proposed irrigation area.</p> <p>Winds tend from the east and south east in the mornings, which would direct any potential odour away from these premises. The direction of the afternoon winds are unknown.</p> <p>Exposure to repeated odour events can create a nuisance effect, impacting the amenity of the area.</p>	<p>The Licence Holder has not proposed any controls in addition to Existing Licence conditions.</p>	<p>Minor: odour impact to amenity at a local scale may be experienced for short periods by a small number of receptors.</p>	<p>Unlikely: the risk event will probably not occur in most circumstances. Prevailing winds in the morning are likely to direct any odour away from the receptors; however, afternoon prevailing winds are unknown.</p>	<p>Medium</p>	<p>The Delegated Officer has determined that the proposed amendment will result in a medium risk of odour impacting sensitive receptors.</p> <p>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 proposed 16.02 ha is expected to be insignificant compared to the treatment of wastewater in the onsite wastewater treatment system.</p> <p>There have been no complaints received by DWER in relation to odour from the irrigation of treated wastewater in at least the last 3 years.</p>	<p>Existing conditions require the Licence Holder to ensure that no irrigation generated runoff, spray drift or discharge occurs beyond the boundary of the Premises.</p> <p>No additional conditions have been added to the Licence.</p>

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the Department's Guidance Statement: Risk Assessments (February 2017)

12. Decision

1. The Delegated Officer has determined that proposed irrigation area L7 will be added to the Licence. As L7 includes pasture, the same as L4 and L5, the loading limits will be the same as for these irrigation areas.
2. The Delegated Officer has determined that soil sampling will be required across irrigation area L7, as is required for existing irrigation areas. 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 of the soils to receive the wastewater and determine any future potential limitations on quantity and quality of applied wastewater.
3. The Delegated Officer has determined that two new surface water sampling sites will be added to the licence, one up-gradient (SWQ-7) and one down gradient (SWQ-8) of L7. Routine sampling and testing of the required surface water locations will provide results that can be compared with standards to consider and assess whether the irrigation of treated wastewater at the Premises may be impacting on nearby surface water quality, and therefore, whether there may be any additional downstream impacts.
4. Based on the above risk assessment¹, the Delegated Officer determined that the overall rating of the risk of treated wastewater irrigated to the irrigation area, including proposed area L7, impacting on environmental receptors, in terms of nutrient and hydraulic loading, is high and subject to regulatory controls as outlined in this Amendment Report.
Note 1: As the Licence Holder has not given an indication on the amount of wastewater that will be irrigated to proposed area L7, the assessment of nutrient and hydraulic loading at the premises was based on the existing and proposed irrigation area, L4, L5 and L7 (see sections 5.2 and 5.3).

Table 13 shows that rainfall exceeds evapotranspiration for May, June, July and August and the DWER calculated water balance suggests that inputs (precipitation and irrigation) exceed outputs (evapotranspiration and percolation to remove salt) for 5 months of the year (May to September). Additionally, the Licence Holder submitted a NIMP (October 2019) that states that the irrigation paddocks are naturally prone to water logging during the wetter months, even without wastewater being applied to the paddocks, as monthly rainfall is significantly higher than the monthly evapotranspiration and infiltration during May to September. Therefore 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 at least 4 months of the year (May to August). The River Health survey (see Table 11) suggests that the Premises may already be impacting the Harvey River.

Groundwater quality at the premises is fresh to brackish with depth to groundwater at the Premises being approximately 2 to 3 m. A drain, used for agricultural purposes, is located immediately north of L7 and further west and south. A minor, non-perennial watercourse is located 70 m E of the proposed irrigation area and flows into the existing agricultural drain N of L7. The premises, including proposed L7, is located entirely within the EPP with the premises being identified as being a high risk nutrient export area requiring significant phosphorus load reduction (see Table 12).

Therefore, the Delegated Officer has restricted the application of treated wastewater to summer months only, September to April inclusive.

The Licence Holder expressed concerns regarding the restriction of wastewater at a meeting on 15 January 2020 and has requested, in information submitted on 17 January and 14 February, to irrigate for 12 months of the year (see Appendix 2). The Delegated Officer considered these comments (see Appendix 2 for details) and has determined that the Licence Holder has not provided sufficient information on the management of

irrigation of wastewater during the winter months.

However, the Delegated Officer understands that the Licence Holder may be required to cease business operations if irrigation is restricted to summer months only; therefore, the Delegated Officer will allow the irrigation of treated wastewater over the winter months (May to August) until 30 April 2021. If the Licence Holder would like to irrigate during May to August after this time, they can submit an application for a licence amendment.

Additionally, the Licence Holder will be required to submit a winter irrigation management plan. The Licence Holder will be required to demonstrate that the amount and quality of treated wastewater being applied to the irrigation areas over the winter months does not exceed the crop / vegetation nutrient, salt or water requirements. The plan should demonstrate that the winter irrigation will not cause wastewater containing nutrients and salt to leach to groundwater or cause waterlogging or overland flow into adjacent drains causing surface water and groundwater contamination potentially affecting ecosystem health. This may include the construction of additional storage dam(s), determining crop nutrient and water requirements using crop factors or crop coefficients for different crop stages and determining climate data specific to the premises.

The Licence Holder has committed to disposing of wastewater off-site if required. Therefore, a condition has been added to the licence to require the Licence Holder to record and report the volumes of wastewater taken off-site for disposal.

5. Irrigation area L6 and L3 have been removed from the Licence.

The Licence Holder has requested that irrigation area L6 is removed from the licence as they do not intend to irrigate to this land as the cost to install infrastructure is high. Lot 401 on Deposited Plan 52503 has been removed from the front of the licence and references to L6 in the conditions and maps of the licence have been removed.

Irrigation area L3, orange orchard, is currently not irrigated as there is no irrigation infrastructure for the discharge of wastewater to this area and the Licence Holder has previously indicated that the quality of wastewater is not suitable for the orange trees. Additionally, this area is not fully bunded. Considering this, the Delegated Officer has determined that irrigation area L3 will be removed from the licence. If the Licence Holder would like to irrigate to this area in the future, they can apply, through a subsequent licence amendment, to include this area back on the licence.

As L6 and L3 have been removed as irrigation areas on the licence, soil monitoring within these areas has also been removed.

References to L3 in the conditions and maps of the licence have been removed.

6. Conditions relating to the construction of groundwater monitoring bores have been removed from the Licence.

The Delegated Officer understands that the groundwater monitoring bores for monitoring of irrigation areas L4 and L5 have been installed.

Following DWER correspondence regarding MB01 – MB04, dated 5 December 2019, DWER received the groundwater monitoring bore installation report for MB05 – MB07 on 17 January 2020. The Delegated Officer understands that MB05 and MB07 were installed; however, MB06 was not installed due to hard clay being encountered.

As a result of MB06 not being installed, DWER understands that only MB07 and MB04 are located downgradient of the irrigation areas; however, as both are screened across the clay layer, neither are likely to be useful for monitoring any leaching of nutrients from the irrigation of wastewater. This was outlined in our letter, dated 4 November 2019, regarding MB04 (MB07 was not yet installed). DWER requested that you consider

drilling an additional hole alongside MB04 to at least 15 m. If the Yoganup sand lithology is not found, then no bore is required to be installed; however, if the Yoganup sand lithology is found, a bore should be installed and screened in the Yoganup sand interval.

DWER recommended, in our letter dated 5 December 2019, that MB05 – MB07 should be installed with a screened interval of approximately 1 to 4 m below the water table due to the likelihood of shallow clay layers and a shallow depth to groundwater across the premises. The Delegated Officer understands that for MB05 moist clayey sand was encountered at 1 mbgl and the slotted screen was installed 6 – 10 mbgl. DWER also understands that for MB07 moist clay was encountered at 1 mbgl and the slotted screen was installed 4 – 8.5 mbgl. The Delegated Officer understands that standing water levels were measured in the bores on 7 January 2020 (19 days after installation) to be 4.7 mbgl and 4.4 mbgl for MB05 and MB07 respectively.

As the monitoring bores have been installed, conditions 2 (including Table 3), 3, 4 and 5 requiring the Licence Holder to install groundwater monitoring bores have been removed from the licence. MB06 has been removed from condition 7 of the licence as it was not installed. The Groundwater monitoring bores general locations map has been removed from Schedule 1: Maps of the licence. It has been replaced by Groundwater monitoring bore locations map.

7. Surface water monitoring references updated.

The Licence Holder has requested (see Appendix 2) that the surface water monitoring locations map in the licence is updated to match the locations and references in the Environmental Protection Notice (EPN) (Amendment 1, dated 2 July 2019). Table 15 shows the changes that have been made.

Table 15: Surface water monitoring locations

Existing Licence	Amended Licence	Changes to the Existing Licence
WQ1	SWQ-2	Location has not changed from the Existing Licence, only the reference.
WQ2	SWQ-4	Location has not changed from the Existing Licence, only the reference.
WQ3	SWQ-6	This is an existing surface water monitoring location on the licence; however, it is not on the EPN. The location has not changed from the Existing Licence, only the reference.
WQ4	SWQ-3	Location has not changed from the Existing Licence, only the reference.
WQ5	SWQ-1	This monitoring location has been amended in the licence to align with the EPN. The location of WQ5 was upstream of irrigation area L6; however, as the irrigation area has been removed from the licence, the Delegated Officer considers that SWQ-1 is now an appropriate upstream monitoring location and correlates with the location of the monitoring required by the EPN.
WQ6	SWQ-5	Location has not changed from the Existing Licence, only the reference.

8. Addition of oil and grease to wastewater monitoring. The Delegated Officer has included oil and grease in the treated wastewater sampling parameters as it is possible it is present in the wastewater and is required to be included in annual licence fee applications as per the *Environmental Protection Regulations 1987*.

9. The Licence Holder has previously not factored into the NIMP, and calculated nutrient

loadings, additional nutrients from stock grazing. A condition has been added to the licence to require the Licence Holder to report the number and duration of stock held or grazed in each irrigation area. This should be used to then determine nutrient loading rates from manure to each irrigation area.

13. Conclusion

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

13.1. Summary of amendments

Table 16 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Amended Licence as part of the amendment process. The numbering of other conditions (not amended) may have changed but are not detailed below.

Table 16: Licence amendments

Condition No.		Proposed amendments
Existing Licence	Amended Licence	
Front page	Front page	Amended to include L7 (Lot 191 on Deposited Plan 202109) and the prescribed premises category descriptions and assessed production capacities. Amended to remove L6 (part of Lot 401 on Deposited Plan 52503)
Definitions	Definitions	Removal of definition for AHD. m(AHD) is still defined. Removal of definition for <i>Minimum construction requirements for water bores in Australia</i> and <i>WQPN 30</i> as groundwater bore construction conditions have been removed. Updated definition for Irrigation Area to include L7 and remove L3 and L6. Added definitions for Epan and ET.
Condition 2, including Table 3	-	Removal of these conditions
Condition 3	-	
Condition 4	-	
Condition 5	-	
Condition 7, Table 5	Condition 3, Table 4	Amended to include L7 and remove L3 and L6. Amended to include a condition to restrict winter irrigation after 30 April 2021. Amended section (c), previously section (b), to specify 'surface' runoff. Removed the word 'treated' from section (e), previously section (d).
Condition 8, Table 6	Condition 4, Table 5	Amended to remove nutrient loading rates for L3 and L6. Amended to include nutrient loading rates for L7: 250 kg/ha/yr for TN, 9 kg/ha/yr for TP and 30 kg/ha/day for BOD
-	Conditions 5 and 6	Addition of these conditions to require the submission of a winter irrigation management plan.
Condition 9, Table 7	Condition 7, Table 6	Addition of oil and grease to discharge monitoring.

Condition 10, Table 8	Condition 8, Table 7	Amended to remove soil monitoring locations S3, S7, S8, S9, S10, S11, S12, S13 and S14 as irrigation areas L3 and L6 have been removed from the licence. Amended to include 3 additional soil monitoring locations (S23, S24 and S25) for irrigation area L7.
Condition 11, Table 9	Condition 9, Table 8	Amended to remove MB06 as it was not installed. Amended to remove “commencing within 30 days of bore installation”.
Condition 12, Table 10	Condition 10, Table 9	Amended to update surface water quality sampling references (locations have remained the same except for SWQ-1) and the addition of two additional surface water monitoring locations (SWQ-7 and SWQ-8).
Condition 15(b)	-	Removal of this condition as works have been completed.
Condition 18, Table 11	Condition 16, Table 10	Amended sections (a) and (d) to remove references to specific irrigation areas as “irrigation area” is defined in the definitions. Amended to include new condition to require the Licence Holder to record the volumes of wastewater taken off-site for disposal. Amended to include number and duration of stock held or grazed in each irrigation area.
Premises map	Premises map	Updated to remove L6 from the premises boundary and include L7.
Groundwater monitoring bores general locations map	-	Removal of this map
Irrigation Areas	Irrigation Areas	Amended this map to remove reference to L6 and L3, and only reference L4, L5 and L7.
-	Groundwater monitoring bore locations map	Addition of this map to show the location of the groundwater monitoring bores.
Soil monitoring locations	Soil monitoring locations	Amended this map to remove S3, S7- S14 and include S23 – S25.
Surface water monitoring locations	Surface water monitoring locations	Removal of the existing map and replaced with a new map with updated references (see section 12, number 7) and two additional surface water monitoring locations (SWQ-7 and SWQ-8).
Schedule 2	Schedule 2	Included L7 within the irrigations area

Caron Goodbourn

Manager, Process Industries

An officer delegated by the CEO under section 20 of the EP Act

Appendix 1: Key documents

	Document title	In text ref	Availability
1.	Licence L4404/1991/15 – Harvey Fresh Juice and Dairy Factories	Existing Licence	accessed at www.dwer.wa.gov.au
2.	<i>Notice of Amendment of Licence expiry dates</i> , Section 59B(9) and Section 59(1)(k) <i>Environmental Protection Act 1986</i> , Licensed Prescribed Premises, 29 April 2016		accessed at www.dwer.wa.gov.au
3.	Harvey Fresh (1994) Ltd, 1 August 2018 to 31 July 2019 Annual Environmental Report and Annual Audit Compliance Report, received 29 August 2019		DWER records (DWERDT194006)
4.	Investigation Report and Remediation Plan, 360 Environmental, prepared for Lactalis Australia, June 2019		DWER records (A1836440)
5.	Supporting information submitted for annual licence fee payment, including <i>Harvey Fresh 2018-19 Irrigation Loads</i> spreadsheet, 25 September 2019		DWER records (DWERDT205083)
6.	Internal comments on from Department of Water and Environmental Regulation, Water Services, received 11 March 2019	DWER, 2019	DWER records (DWERDT141887)
7.	Environmental Protection Notice 2009 and October 2013 revoke		DWER records (A1686676 and A690079)
8.	Environmental Protection Notice, Reference No. DWERDG672/18, 5 December 2018, amended 2 July 2019		DWER records (A1802074)
9.	Perth Groundwater Map		accessed at https://maps.water.wa.gov.au
10.	Water Information Reporting		accessed at http://wir.water.wa.gov.au
11.	Bureau of Meteorology – Climate data online		accessed at www.bom.gov.au
12.	<i>Environment and Health Protection Guidelines: On-site sewage management for single households</i> , NSW EPA Technical Guidelines, 1998	NSW EPA, 1998	available at https://www.olg.nsw.gov.au/sites/default/files/Onsite-sewage-management-guide.pdf
13.	<i>Process Design Manual: Land Treatment of Municipal Wastewater Effluents</i> , US EPA technical guidance document, September 2006	US EPA 2006	accessed at www.epa.gov
14.	Environmental Guidelines – Use of Effluent by Irrigation, Department of Environment Conservation (NSW), 2003	NSW DEC, 2003	available at http://www.environment.nsw.gov.au/resources/water/effguide.pdf
15.	Resource Management Technical Report No. 65 - Evaporation Data for Western Australia, G.J. Luke, K.L. Burke, T.M. O'Brien, Department of Agriculture Western Australia (now known as the Department of	evaporation data	accessed at https://researchlibrary.agric.wa.gov.au

	Primary Industries and Regional Development), 2003		
16.	DWER, July 2015. <i>Guidance Statement: Regulatory principles</i> . Department of Water and Environmental Regulation, Perth.		available at: www.dwer.wa.gov.au
17.	DWER, June 2019. <i>Guideline: Industry Regulation Guide to Licensing</i> . Department of Water and Environmental Regulation, Perth.		
18.	DWER, October 2015. <i>Guidance Statement: Setting conditions</i> . Department of Water and Environmental Regulation, Perth.		
19.	DWER, November 2016. <i>Guidance Statement: Environmental Siting</i> . Department of Water and Environmental Regulation, Perth.		
20.	DWER, February 2017. <i>Guidance Statement: Risk Assessments</i> . Department of Water and Environmental Regulation, Perth.		
21.	DWER, June 2019. <i>Guideline: Decision Making</i> . Department of Water and Environmental Regulation, Perth.		

Appendix 2: Summary of Licence Holder comments

The Licence Holder was provided with the draft Amendment Report and draft Amended Licence on 7 January 2020 for review and comment. The Licence Holder responded on 17 January 2020 and 14 February 2020. The Licence holder was provided with a revised draft Amendment Report and revised draft Amended Licence on 20 March 2020. The Licence Holder responded on 2 April 2020.

Licence Holder comments received on 17 January and 14 February 2020	
Summary of Licence Holder comment	DWER response
<p>The Licence Holder is seeking approval to irrigate L7 during winter. They have stated this will be managed through:</p> <ul style="list-style-type: none"> - achieving similar treated wastewater quality results as the previous 12 months, which are significantly reduced compared to previous years; - seeking approval to irrigate additional land areas L8, L9 and L10 (and remove L6). The Licence Holder has indicated that a licence amendment application for these additional areas will be submitted in the coming weeks. The Licence Holder has also indicated that the application will include an updated Nutrient Irrigation Management Plan; - reduction of water use by 25% by the end of 2021. The reduction in water use will be achieved by an upgrade to their Cleaning in Place (CIP) system which is scheduled for October 2020. The Licence Holder indicated that the water reduction program was recently impacted by customer product quality requirements; however, the impacts are being managed and they believe they will return to pre-change levels later in 2020. The Licence Holder stated that production has returned to 4 days a week (from 5 days a week) with a further decrease planned in the future; and - developing a wastewater irrigation management plan which will include: <ul style="list-style-type: none"> o daily monitoring of the irrigation areas for water pooling and runoff. Where water pooling / runoff is observed, irrigation will cease to that area; o rotation of irrigation areas; o all irrigation areas are bunded with daily monitoring to monitor effectiveness of bunding; o prior to winter, dam 1 will remain empty and dam 2 (the irrigation dam) will be at 25% capacity or 300 mm from the base; and 	<p>The assessment of this proposal has determined an unacceptable risk of nutrient and hydraulic loading impacts on nearby highly sensitive receptors if irrigation is to occur during the months of May to August.</p> <p>At the meeting on 15 January 2020 it was discussed that DWER requires sufficient evidence to show that winter irrigation would be managed in such a way that impacts to the environment would be acceptable.</p> <p>The Delegated Officer has considered the Licence Holder's comments (received on 17 January and 14 February 2020) in response to a condition proposed to restrict the irrigation of treated wastewater to the lower rainfall months of September to April (see section 12, number 4) and provides the following response:</p> <ul style="list-style-type: none"> (a) the Delegated Officer reiterates the expectation in June 2019 that the Licence Holder will not find itself in a similar situation for winter 2020 and that it will have installed additional storage, irrigation areas and other waste efficiencies and improvements; (b) the Delegated Officer notes that no works approval application has been submitted for additional storage. It is noted that the Licence Holder currently has capacity for approximately 12 days of wastewater storage, based on normal production rates and the ponds being empty; (c) a licence amendment for an additional irrigation area (L7 – 16.02 ha) was received by DWER; however, the Licence Holder has asked for irrigation area L6 (19.43 ha) to be removed from the licence and the Delegated Officer has removed area L3 as it is not being utilised. Therefore, the total irrigation area has decreased by 22.3 ha; (d) the Delegated Officer acknowledges that treated wastewater quality has improved between August 2018 and October 2019 compared to the previous 21 months (see section 5.1);

Licence Holder comments received on 17 January and 14 February 2020	
Summary of Licence Holder comment	DWER response
<ul style="list-style-type: none"> ○ if no land is available for irrigation the Licence Holder will fill the dams to capacity (with required freeboard) or, if more storage is required, truck any excess water off site until irrigation can recommence. The Licence Holder has indicated that tentative arrangements are in place to ensure that trucks will be available and the destination of the waste water is to a facility that is licensed to receive it. 	<ul style="list-style-type: none"> (e) DWER has not received a licence amendment application for additional land areas L8, L9 and L10; (f) the Delegated Officer notes that a 25% reduction in water use has not yet occurred and understands that water use recently increased; (g) visual monitoring of irrigation areas for pooling and runoff is not sufficient for determining whether the soil is saturated and that irrigation will only occur under non saturated conditions; (h) the Licence Holder has not given any indication on how irrigation will be managed during summer months to ensure storage dams are empty prior to winter months; and (i) the Licence Holder has not given any indication on where waste water would be disposed of offsite or whether this is a practical option for the premises.
<p>Licence Holder included the following in response to clarification / further information by DWER within the 21 day draft documents:</p> <p>Section 6 Infrastructure Table 6:</p> <ul style="list-style-type: none"> - L7 has bunding in situ; and - L7 has been laser levelled. <p>Section 7 Legislative context:</p> <ul style="list-style-type: none"> - Shire of Harvey has confirmed that a development application is not required for the additional irrigation land. <p>Section 9 Location and Receptors:</p> <ul style="list-style-type: none"> - Table 10 – an old groundwater bore within L7 has not been used as there have been no livestock on this land; - Table 11 – water found in the shallow pits was rainwater; and - Licence Holder have asked DWER to clarify the statement “the report concludes that irrigation of wastewater to L7 will require appropriate management and irrigation during dry weather conditions is possible”. <p>Section 11 Risk Assessment:</p> <ul style="list-style-type: none"> - As discussed at the meeting on 15 January 2020, Licence Holder’s water reduction program was severely impacted by companywide changes in business/customer product quality requirements. The 	<p>DWER has updated the relevant sections of the Amendment Report.</p> <p>The statement (Section 9, Table 12) “the report concludes that the irrigation of wastewater to L7 will require appropriate management and irrigation during dry weather conditions is possible” is a direct quote from section 4 of the 360 Environmental, Harvey Fresh – Soil Sampling at Lot 191 (L7) report dated 10 October 2019 provided by the Licence Holder as part of a request for further information for the licence amendment application.</p>

Licence Holder comments received on 17 January and 14 February 2020	
Summary of Licence Holder comment	DWER response
impact of these changes are being managed and we believe will return our water consumption to pre-change levels later this year. Additionally, planned 2020 projects will deliver additional water use reduction.	
The Licence Holder has requested that the surface water monitoring points in the licence reflect the location and referencing within the EPN.	See section 12, number 7.

Licence Holder comments received on 2 April 2020	
Summary of Licence Holder comment	DWER response
The Licence Holder made the following comments:	
(a) we require that the irrigation area L3 is to remain on the licence as we are planning projects in the next 12 months to enable irrigation of this area;	Irrigation area L3 is currently not irrigated and there is no irrigation infrastructure for the discharge of wastewater to this area. Additionally, the Licence Holder has previously indicated that the current quality of treated wastewater is not suitable for the orange trees and the area is not fully bunded. Therefore, irrigation area L3 will be removed from the licence. However, the Delegated Officer agrees that as the L3 area will not be utilised for irrigation purposes soil sampling will be removed from this area.
(b) if L3 is to remain on the licence, we will continue to sample the soil in this area; however, if L3 is removed, we request the removal of soil testing which increases operational costs with no ongoing value;	If the Licence Holder would like to irrigate to area L3 in the future, they can apply, through a subsequent licence amendment, to include the area back on the licence.
(c) we request a review of the hydraulic conductivity requirement at all ground levels on all irrigation areas. We have been advised that this is unnecessary and has financial burdens. We would accept a change to test 0-10 cm levels only; and	The Delegated Officer has considered the Licence Holder's request and has determined that saturated hydraulic conductivity will remain on the licence for all soil depths. No justifiable reason for the removal of the monitoring of saturated hydraulic conductivity has been provided by the Licence Holder. Saturated hydraulic conductivity, along with other parameters, was added to the licence in June 2019 using guidance provided in the Environmental Guidelines – <i>Use of Effluent by Irrigation</i> (NSW DEC, 2003). The saturated hydraulic conductivity of the soil is an important soil property for determining the suitability of a soil for irrigation. Soils with high saturated hydraulic conductivity may allow nutrients and salt from irrigated wastewater to leach to the groundwater. Soils with low saturated hydraulic conductivity are prone to waterlogging (NSW DEC, 2003). The Licence Holder did not conduct soil monitoring in accordance with the amended licence for June and July 2019 as these results were not provided in the AER submitted in August 2019 (see section 8.5(e)). The Delegated Officer understands that the Annual Environmental Report for the 1 August 2019 to 31 July 2020 reporting period is not required to be submitted

Licence Holder comments received on 2 April 2020	
Summary of Licence Holder comment	DWER response
	until 28 August 2020; however, the Licence Holder has not provided the most recent results for saturated hydraulic conductivity to support their request to remove the monitoring.
(d) We object to any total restriction on winter irrigation however acknowledge that we will submit a winter watering plan as required;	Noted.
The Licence Holder clarified the following: (a) no alum dosing is used; (b) minimal stock grazing has taken place on an ad hoc basis and this will be included in the updated NIMP; and (c) bore locations have been confirmed.	The relevant sections of the amendment report and amended licence have been updated.