



Application for works approval

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

Works approval number	W6343/2020/1
Works approval holder	Brogate Pty Ltd
ACN	009360605
DWER file number	DER2019/000466
Premises	<p>Parron Place Cadda Road, Badgingarra WA 6521</p> <p>Legal description - Lot 3739 on Deposited Plan 207069 Certificate of Title Volume 2125 Folio 562 As defined by the coordinates in Schedule 1 of the Works Approval As defined by the Premises maps attached to the issued Works Approval</p>
Date of report	04 December 2020
Decision	Final

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1. Definitions

Key terms relevant to this decision report and their associated definitions are listed in Table 1.

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
bgl	Below Ground Level
Category / categories	Categories of prescribed premises as set out in Schedule 1 of the EP Regulations.
Composting	means the process whereby organic materials are microbiologically transformed under controlled aerobic conditions to achieve pasteurization and a specified level of maturity.
Decision Report	refers to this document.
Delegated Officer	An officer delegated under section 20 of the EP Act.
Department	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 As of 1 July 2017, the Department of Environment Regulation (DER), the Office of the Environmental Protection Authority (OEPA) and the Department of Water (DoW) amalgamated to form the Department of Water and Environmental Regulation (DWER). DWER was established under section 35 of the <i>Public Sector Management Act 1994</i> and is responsible for the administration of the <i>Environmental Protection Act 1986</i> along with other legislation.
Emission	has the same meaning given to that term under the EP Act.
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EP Regulations	<i>Environmental Protection Regulations 1987 (WA)</i>
Noise Regulations	<i>Environmental Protection (Noise) Regulations 1997 (WA)</i>
Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	This has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Risk Event	As described in <i>Guidance Statement: Risk Assessment</i>
Works Approval Holder	Brogate Pty Ltd

2. Works Approval and amendment history

Table 2 provides the amendment history for W6343/2020/1.

Table 2: Works approval amendments

Instrument	Issued	Nature and extent of works approval, licence or amendment
W6343/2020/1	04/12/2020	Works Approval issued for construction of composting facility

3. Purpose and scope of assessment

A new application for a Works Approval was received from Brogate Pty Ltd (Applicant) to construct and operate a new composting facility at Parron Place Lot 3739 on Deposited Plan 207069, Badgingarra, in the Shire of Dandaragan. The Applicant has occupational control of the Premises through Certificate of Title Volume 2125 Folio 562.

4. Application details

Table 3 lists the documents submitted during the assessment process.

Table 3: Documents and information submitted during the assessment process

Document/information description	Date received
Application submitted with supporting documents to DWER (DWERDT194411)	30/08/2019
Applicant response to DWER request for further information (A1850222)	10/12/2019

5. Overview of existing Premises

Parron Place is an 8,400-hectare property that is located 7.4 km west of the Badgingarra town site in the Shire of Dandaragan. The premises is zoned 'Rural' under the Shire of Dandaragan Local Planning Scheme No. 7. The Applicant have been receiving and spreading poultry manure on the property for almost twenty years, as an alternative to chemical fertilisers. Prior to the last 18 months, there have been no odour complaints made against Parron Place. This works approval application will convert an existing gravel pit located on the premises into a composting facility.

The Applicant has advised that the compost facility will receive two feedstocks for composting, spent hens and poultry manure. Both spent hens and poultry manure feedstocks require processing by composting to produce a fit-for-purpose waste derived product before being applied to land. Development approval for the construction of the compost facility has been granted by the Shire of Dandaragan. The Department of Primary Industries and Regional Development (DPIRD) have been consulted by the Applicant for advice on the design elements of this project.

Table 4 provides classification of premises and assessed design capacity.

Table 4: Classification of premises and assessed design capacity

Category	Description	Assessed production or design capacity or throughput
Category 67A	Compost manufacturing and soil blending: premises on which organic material (excluding silage) or waste is stored pending processing, missing, drying or composting to produce commercial quantities of compost or blended soils.	2,080 tonnes per annum

6. Description of proposed activities

6.1 Premises operations

6.1.1 Waste acceptance and throughputs

The Applicant proposes the receipt of three raw feedstocks (spent hens, poultry manure and straw) for the production of up to 2080 tonnes of compost product per year at Parron Place, Badgingarra.

The composting facility will receive 50 tonnes of spent hens, 20 tonnes of poultry manure and 10 tonnes of straw per fortnight. It is estimated that 3 - 4 loads per fortnight will be required. Both spent hens and manure feedstocks are to be sourced primarily from the AAA Egg Farm at Jurien Bay. Spent hens are proposed to be incorporated into the composting process upon the point of receipt. Poultry manure and straw are proposed to be stored on the hardstand within the controlled drainage area until incorporated into the composting process.

Table 5 provides annual waste and input quantity accepted for compost manufacturing.

Table 5: Annual waste and input quantity accepted for compost manufacturing

Waste/ feedstock accepted	Application design capacity (maximum)
Spent hens	1,300 tonnes
Animal manure	520 tonnes
Vegetative waste, straw and/or hay	260 tonnes
Total	2,080 tonnes

6.1.2 Proposed composting process

The Applicant has proposed the construction of a compacted hardstand, evaporation pond and stormwater diversion drain as infrastructure for the composting facility and will be discussed further in section 6.2.

The applicant has proposed to use windrows and follow the composting process described in the Composting by-products on Egg Farms Environment Factsheet (Australian Eggs, 2018). The following steps have been proposed by the applicant:

- spent hens, poultry manure and straw received to site will be formed into windrows with a layer of at least 300 mm of straw placed at the bottom;
- inert material, most likely the finished compost product, will be used to cover the windrows to a depth of at least 300 mm initially when formed and after each turn;

- windrows are to be turned a minimum of three times, using a front-end loader. If the composting process is not complete after around 12 weeks, then additional turning may be added to the process;
- temperatures of >55°C will be monitored and recorded for three consecutive days after each turning;
- moisture content for compost mix will be maintained at 30 to 40% through visual checks by the applicant;
- carbon to nitrogen (C:N) ratio of between 15:1 and 40:1 will be maintained through the addition of straw and/or sawdust; and
- oxygen levels will be maintained by the action of turning the windrows.

The design of the hardstand is such that there will be four windrows, each 39 m long. The windrows will be 2 metres high and four metres wide at the base. Spent hens are proposed to be included in the compost process upon the point of receipt, with no spent hens stored on the property. Excess poultry manure and straw are proposed to be stored on the hardstand within the controlled drainage area until incorporated into the composting process. The final compost product is to be stored on the composting hardstand until applied to land.

The amount and location of finished compost product that is applied to paddocks is to be recorded by the on-site manager, with the entirety of the product to be applied at the adjacent property also occupied by Brogate Pty Ltd (2446 Yerramullah Road, Hill River).

The Applicant proposes that moisture level and C:N ratio of the feedstocks will be measured upon commencement of operations and those results will be used as a representative and indicative sample. It is proposed that the testing of the moisture level and C:N ratio of windrows will only be revisited should the type of feedstock change.

The Applicant has not proposed the monitoring of the evaporation pond for BOD, temperature and pH, and windrow stacks for odour emissions during the composting process. The volume of sludge in the evaporation pond will be monitored at the end of summer, with the pond to be de-sludged as required.

6.2 Compost facility construction

The applicant has proposed the following infrastructure and design elements, as detailed in Table 6, for the composting facility:

Table 6: Proposed infrastructure and equipment

Ref	Infrastructure or Equipment	Site Layout Plan reference
1	Composting hardstand: a) 1,326 m ² in area (39m x 34m); b) Minimum 300 mm compacted in-situ material with a permeability of 1 x 10 ⁻⁹ m/s; c) Graded with a fall that prevents pooling of liquid; and d) Directs all leachate and run off into the evaporation pond.	Referred to as 'Hardstand' in Figure 1 Site Layout Plan
2	Evaporation pond: a) Lined by compacted in-situ material with a permeability of 1 x 10 ⁻⁹ m/s; b) Constructed to hold 1-in-20-year winter rainfall with an estimated maximum capacity of ~151	Referred to as 'Evaporation Pond' in Figure 1 Site Layout Plan

Ref	Infrastructure or Equipment	Site Layout Plan reference
	m ³ ; and c) Operated with a minimum 500 mm freeboard.	
3	Diversion drain: a) Compacted in-situ material with a permeability of 1 x 10 ⁻⁹ m/s; and b) Designed to prevent the run-on of surface water onto the hardstand area.	Located upslope of hardstand area
5	Front-end loader (100hp) used as compost turner	N/A – mobile equipment
6	Water cart/ fire unit retained on property for controlling dust emissions, windrow moisture content and in the case of a fire at the compost facility.	N/A – mobile equipment
	Other activities	
7	Tractor and muck spreader (compost spreader)	N/A – mobile equipment
8	Medium rigid (MR Class) heavy vehicle (Raw feedstock delivery)	N/A – mobile equipment

6.2.1 Hardstand

The hardstand has been designed to store a maximum capacity of 500 tonnes of feedstock (spent hens, poultry manure and straw) at any time. The design of the hardstand is proposed to be 39 m long and 39 m wide, and therefore the hardstand area will be approximately 1,326 m² in area. This hardstand area will store all incoming feedstock and the finished compost product.

The hardstand is designed as a hard-compacted base to contain contaminants from the composting process from infiltrating into the surrounding environment. The proposed hardstand area was previously operated by the Shire of Dandaragan as a gravel quarry. The Applicant will undertake additional earthworks in the construction of the hardstand and will be completed to form a minimum 300 mm layer from the in-situ shallow gravel and duricrust soils located at the site. The hardstand will be a compacted surface that is expected to have a permeability of less than 1x10⁻⁹ m/s. The permeability of the hardstand will be verified by a Suitably Qualified Person with testing completed in line with Water Quality Protection Note 27 (DoW, 2013a). The applicant hasn't proposed the use of bunding to contain leachate runoff from the hardstand or as a prevention for stormwater entering the hardstand area.

6.2.2 Evaporation pond

In determining the required pond volume, it is assumed that all liquids in the feedstock are absorbed during the composting process. The volume of water that needs to be captured is that which falls upon the hardstand area. The applicant has proposed the pond to be designed for a 1-in-20-year winter rainfall and estimated maximum capacity of ~151 m³, with the primary means of removal from the pond being evaporation.

The evaporation pond is designed for the ability to contain and capture any effluent that may runoff in the event of high rainfall. The pond will be lined with compacted in-situ soils (shallow gravel over duricrust) to achieve a permeability of 1x10⁻⁹ m/s. The proposed pond has been

designed to hold a 1-in-20-year accumulated winter rainfall with maintaining a minimum freeboard of 0.5m on the evaporation pond. In the event that the freeboard is breached, any excess or overflowing liquid waste will be pumped from the pond and removed offsite by a licensed operator.

6.2.3 Diversion drains

Diversion drains will be constructed upslope of the hardstand, to prevent the run-on of surface water onto the hardstand area. Diversion drains will be constructed of compacted in-situ soils. to achieve a permeability of 1×10^{-9} m/s.

Figure 1 below shows the compost facility site layout.

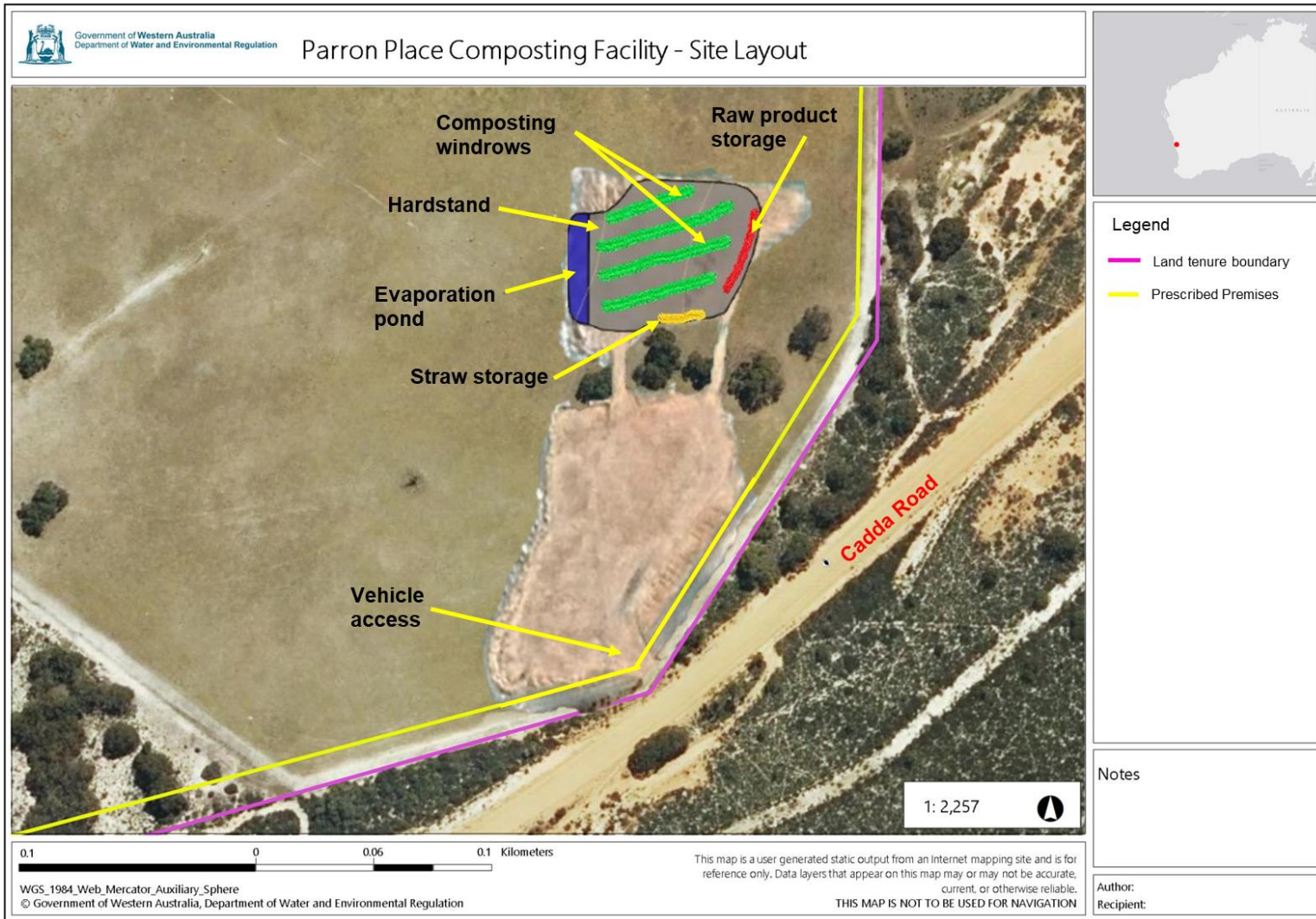


Figure 1: Site Layout Plan

6.3 Legislative context and other approvals

The Applicant lodged an application for development approval with the Shire of Dandaragan on 6 December 2019 for the development of a composting facility. The Shire of Dandaragan provided to DWER on 5 March 2020 the minutes extract from the Dandaragan Shire Council's 27 February 2020 Ordinary Meeting where development approval was granted for the compost facility, subject to the approval of the works approval application.

Table 7 details approvals relevant to the premises below.

Table 7: Summary of emissions and applicant controls

Legislation	Number	Approval
Planning and Development Act 2005	Approval ID: 150814	Local government planning approval – Shire of Dandaragan (27 February 2020)

7. Emission sources, receptors and pathways

7.1 Emissions

The potential for emissions to impact on sensitive receptors has been assessed in accordance with the Department's Risk Framework. The key emissions during premises construction which have been considered in this report are **noise** and **dust** from construction of hardstand and evaporation pond activities, which include earthworks, vehicle movements and placement of equipment and infrastructure.

The key emissions considered during time limited and full premises operation are dust, noise, leachate, stormwater contamination, odour, fire smoke risk, fire wash-water and from vehicle movements, waste acceptance/storage, windrow turning by machinery and the open windrow composting process.

The Applicant has proposed measures to assist in controlling these emissions, where necessary. The control measures are outlined in Section 7.4 below and have been considered when undertaking the risk assessment detailed in Section 8.

Following completion of works and time limited operations, a prescribed premises category 67A licence under Part V of the EP Act will be required to authorise emissions associated with ongoing operations of the premises. A risk assessment for the operational phase has been included in this Decision Report, however licence conditions will not be finalised until DWER assesses the associated licence application.

7.2 Environmental Siting

Parron Place is an 8,400-hectare property that is located 7.4 km west of the Badgingarra town site in the Shire of Dandaragan (Figure 2). The Premises is situated in an area zoned as 'Rural' as defined by the Shire of Dandaragan's Local Planning Scheme No.7 (District Scheme). Approximately 190 people reside in the town of Badgingarra. Properties situated to the north, east, south and west of the Premises are also zoned 'Rural'. The land situated immediately to the south of the Premises is zoned as 'National Park' and is known as the 'Badgingarra National Park'.

7.2.1 Potential receptors and environmental aspects

Risk is assessed as a combination of emission sources, the proximity and sensitivity of receptors to those emission sources and any pathways that can allow the emission to reach and potentially harm the receptor. Figure 3 and 4 and Table 8 below provides a summary of human and

environmental receptors in proximity to the premises which have a potential to be impacted from site activities, and the risk assessment in Section 8 considers these receptors in the context of emissions and potential pathways.

Table 8: Distance to receptors

Human receptors	Distance from activity or prescribed premises
Residential premises Zoned – Rural (refer to Figure 3)	Approximately 6.1 km to the north-east
	Approximately 7.0 km to the north-east
	Approximately 7.0 km to the north-north-east
	Approximately 7.9 km to the west
	Approximately 8.7 km to the south-west
	Approximately 11.9 km to the north-west
	Approximately 13.5 km to the north-north-west
Town site (Badgingarra)	Approximately 7.7 km to the east from premises boundary
Environmental receptors	Distance from activity / prescribed premises
Wetlands: – Geomorphic wetlands, Hydrography WA 250K Surface Waterbodies (refer to Figure 4)	Approximately 5 km downslope north-east from the proposed hardstand location, classified as Paluslope. It is situated approximately 1.6 south from Hill River.
	Approximately 5.6 km downslope north-east from the proposed hardstand location, classified as Playa. It is situated approximately 800 m south from Hill River.
	Approximately 6.6 km downslope north-east from the proposed hardstand location, classified as Barlkarra. Wetlands surrounds either side of Hill River.
Groundwater: Northern Perth Basin – Jurien Groundwater Area Badgingarra groundwater subarea	<ul style="list-style-type: none"> • Possibility of shallow/localised Surficial aquifers (unconfined) present in Jurien groundwater area; and • Yarragadee (north) aquifer (semi-confined) depth to groundwater is approximately 50mBGL and at a local regional level the Yarragadee is discharging north into the Hill River. At a deeper regional aquifer level, it discharges to south west. <ul style="list-style-type: none"> ○ GWL7428 (ceased) bore log for the property licensed under 26D and 5C in 1985 records water bearing beds cut at 54mBGL, the bore is screened in the deeper Yarragadee aquifer at 126-124mBGL. Closest bore is approximately 2.1 km west of proposed hardstand area (<i>Site ref: 61711228, 61711229, 61711166, and 61711167</i>).

<p>Beneficial users of groundwater</p>	<ul style="list-style-type: none"> • Groundwater licence (GWL161996) approximately 7 km north-east of proposed hardstand location utilised for domestic, commercial, and stock watering purposes <ul style="list-style-type: none"> ○ Static water level recorded at 75 mBGL • Private bore sites located approximately 6.5 km, 7 km and 10 km west from proposed hardstand location (<i>Site ref: 61711176, 61711183, 61711240</i>) <ul style="list-style-type: none"> ○ Static water level recorded at 59 mBGL • Private bore site located approximately 6.6 km east of proposed hardstand location (<i>Site ref: 61711156</i>) <ul style="list-style-type: none"> ○ Groundwater first recorded at 59 mBGL ○ Aquifer recorded at 63 mBGL • Private bore site located approximately 8.5 km south-west of proposed hardstand location (<i>Site ref: 61714936</i>) <ul style="list-style-type: none"> ○ Aquifer recorded at 22 mBGL • Beneficial user of private bore, approximately 11 km north-west of proposed hardstand location (<i>Site ref: 61711175</i>) <ul style="list-style-type: none"> ○ Groundwater first recorded at 32 mBGL; and ○ Static water level recorded at 60 mBGL
<p>Physical component: Surface waterbodies (ref Hydrography WA 250K) (refer to Figure 4)</p>	<p>An unnamed, non-perennial lake located approximately 6.3 km downslope from the proposed hardstand location. It is situated approximately 800 m south from Hill River.</p>
<p>Physical component: Surface streamlines (ref Hydrography WA 250K) (refer to Figure 4)</p>	<ul style="list-style-type: none"> • An unnamed minor non-perennial water course, originating within the occupied land tenure boundary, is located approximately 3.6 km northwest downslope from the proposed hardstand location travelling to the north-east. The watercourse drops approximately 25 m over 3.5 km in length and discharges into a geomorphic wetland. • An unnamed minor non-perennial water course, originating within Badgingarra National Park, is located approximately 4.2 km east downslope from the proposed hardstand location travelling to the north-east. The watercourse drops approximately 50 m over 5.2 km in length and discharges into Hill River. • Hill River, major non-perennial water course, is located approximately 7 km north-northeast downslope from the proposed hardstand location. The Hill River receives discharge from the Yarragadee aquifer as baseflow and supports GDE's in the southern Arrowsmith region, the river discharges into the Indian Ocean and recharges aquifers in the Jurien groundwater area. • Bibby Creek, minor perennial water course, is located approximately 8 km southwest downslope from the proposed hardstand location. Bibby Creek receives discharge from the Yarragadee aquifer as baseflow and supports GDE's in the southern Arrowsmith region.

<p>Physical component: Parks and Wildlife Managed Lands and Waters, Badgingarra National Park (Department of Biodiversity, Conservation and Attractions) (refer to Figure 4)</p>	<p>Badgingarra National Park (R 31809) gazetted under CALM Act 1984, is approximately 20 m south-south-east of premises boundary and is classified as 'remnant vegetation' by DBCA, various Threatened and Priority Flora and Fauna have been surveyed and within 10 kms of proposed Premises</p> <p>Threatened species identified: <i>Banksia serratuloides subsp. Perissa</i>, <i>Eucalyptus x balanites</i>, <i>Patersonia spirifolia</i>, <i>Ptychosema pusillum</i> <i>Spirogardnera rubescens</i>, <i>Eucalyptus absita</i> which is an endemic species to the region and <i>Calyptorhynchus latirostris</i> identified in the area.</p>
<p>Environmental aspects</p>	<p>Distance from activity / prescribed premises</p>
<p>Public Drinking Water Source Areas (PDWSA): Priority 1 and 3 known as the 'Badgingarra Water Reserve' (refer to Figure 4)</p>	<p>Approximately 7.8 km to the east of premises boundary</p>
<p>Rights in Water and Irrigation Act 1914 (RIWI Act): Proclaimed Surface Water Area – Hill River and Tributaries Catchment</p>	<p>Premises is situated within a Proclaimed Surface Water Area.</p>
<p>RIWI Act: Proclaimed Groundwater Area – Jurien Groundwater Area</p>	<p>Premises is situated within a Proclaimed Groundwater Area.</p>

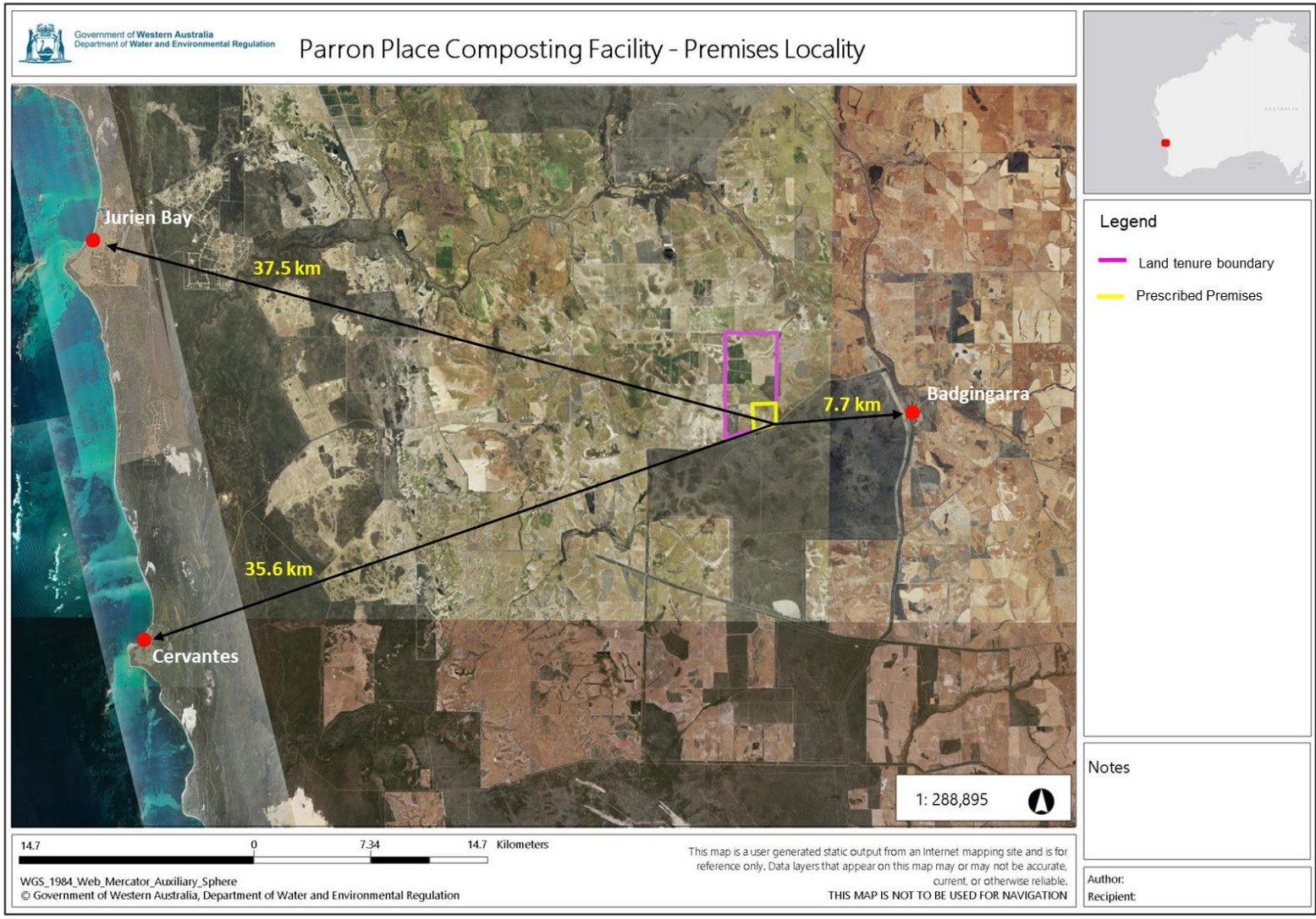


Figure 2: Premises locality

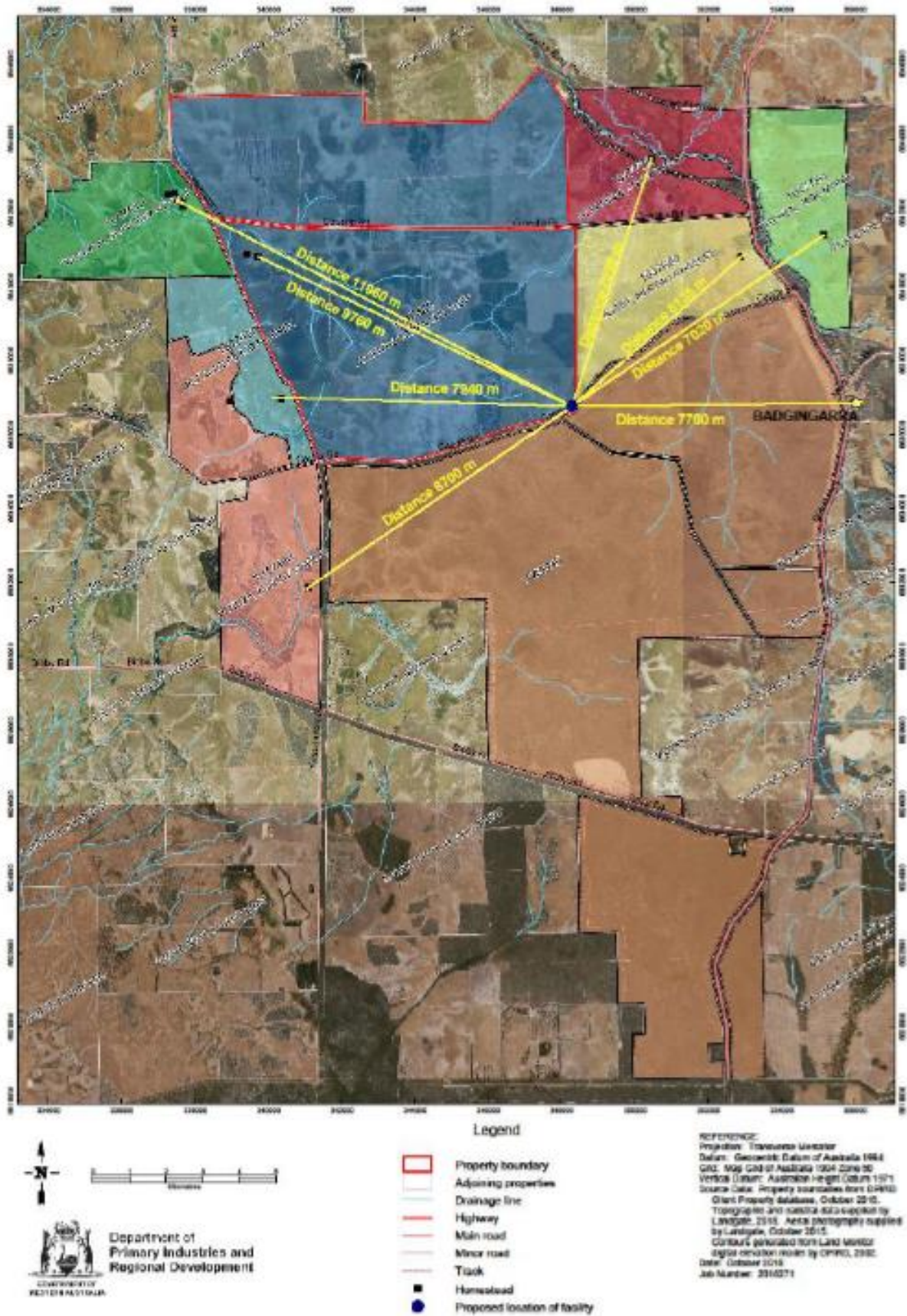


Figure 3: Distance to residential receptors

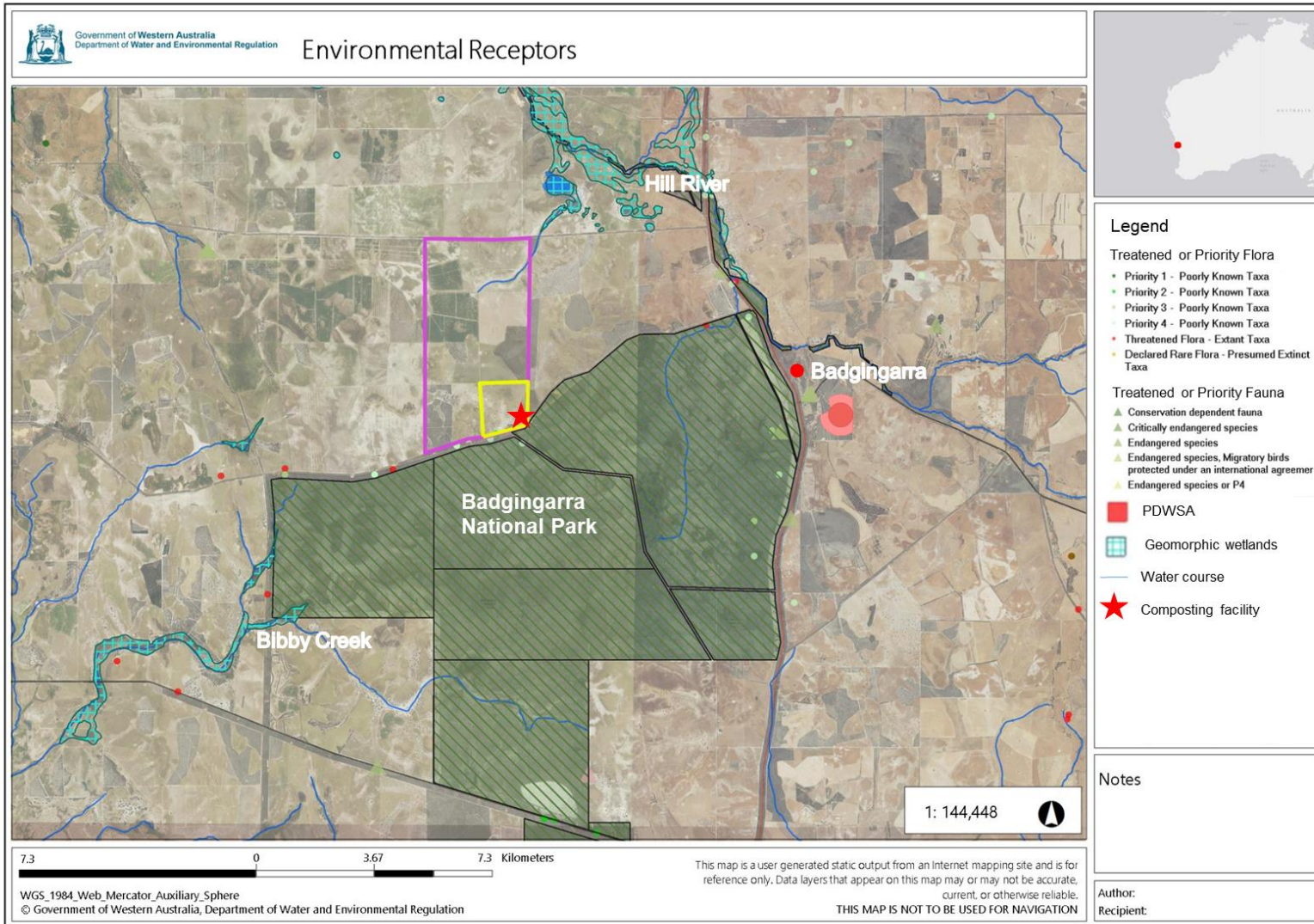


Figure 4: Environmental receptors

7.2.2 Climate and meteorology

The nearest Bureau of Meteorology (BoM) station with rainfall and temperature data is Badgingarra Research Station (station number 009037) located approximately 12.5 km north-east from the premises. As shown in Table 9, the BoM data for the Badgingarra Research Station shows that the area in the vicinity of the premises has an annual average rainfall of 542 mm (based on data between 1965 and 2018), and for the Wongan Hills Research Station (station number 008138) annual average evaporation is 2.3 m. Majority of rainfall is received during the winter months between May to September are shown in Figure 5.

Table 9 below details rainfall and evaporation data relevant to the premises.

Table 9: Climate data for Badgingarra

Climate descriptor	Value	Source
Average annual rainfall	542 mm	Bureau of Meteorology
Annual rainfall 1-in-10 wet year (90 th percentile)	949 mm	Bureau of Meteorology
Average annual evaporation ¹	2.3 m/year	Bureau of Meteorology

Note 1: Evaporation data is supplied for Wongan Hills Research Station.

Temperatures average around 17 - 22 degrees Celsius in winter months, and up to 34.6 degrees Celsius in summer months, for an average annual temperature of 25.9 degrees (BoM). Based on the climate data for the Badgingarra Research Station the prevailing wind direction is east in the morning and south west in the afternoon. This is depicted in the wind roses shown in Figure 6.

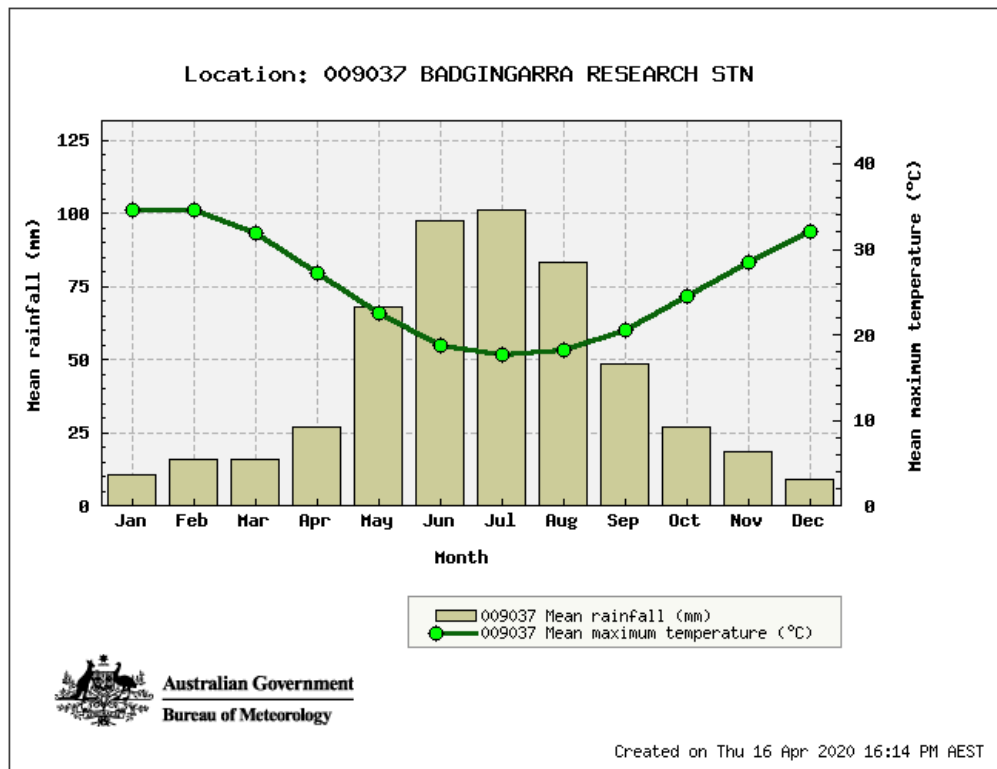
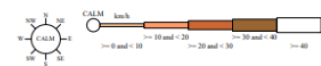


Figure 5: Mean rainfall and maximum temperature for Badgingarra Research Station (ID 009037)

Rose of Wind direction versus Wind speed in km/h (01 Jan 1965 to 10 Aug 2018)
 Custom times selected, refer to attached note for details
BADGINGARRA RESEARCH STN
 Site No: 009037 - Observed Jan 1962 - 08h Open - Latitude: -30.3381° - Longitude: 115.5394° - Elevation 275m
 An asterisk (*) indicates that calm is less than 0.5%.
 Other important info about this analysis is available in the accompanying notes.

Rose of Wind direction versus Wind speed in km/h (01 Jan 1965 to 10 Aug 2018)
 Custom times selected, refer to attached note for details
BADGINGARRA RESEARCH STN
 Site No: 009037 - Observed Jan 1962 - 08h Open - Latitude: -30.3381° - Longitude: 115.5394° - Elevation 275m
 An asterisk (*) indicates that calm is less than 0.5%.
 Other important info about this analysis is available in the accompanying notes.



9 am
15739 Total Observations

3 pm
7437 Total Observations

Calm 3%

Calm *

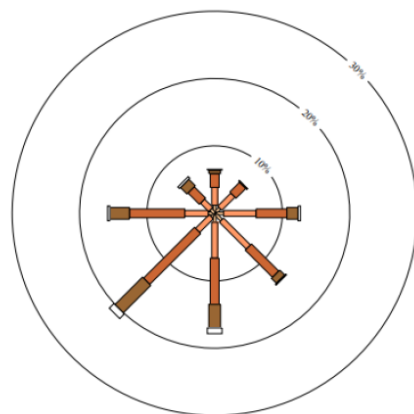
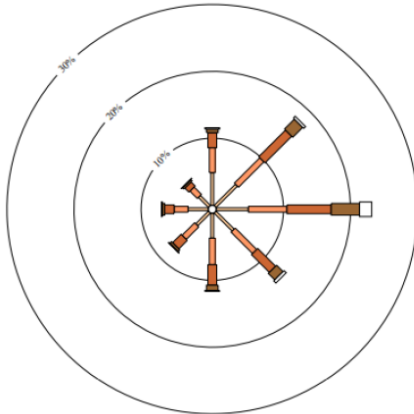


Figure 6: 9 am and 3 pm wind roses for Badgingarra Research Station (ID 009037)

7.2.3 Geology, hydrogeology and hydrology

Geology and topography

The geology of the area of the proposed composting site is known as the Yarragadee Formation (Watheroo Line). The Yarragadee Formation is a Middle to Late Jurassic, predominantly sand unit, which consists of interbedded sandstone, siltstone, shale and claystone beds with minor conglomerate. Sediments were deposited in a non-marine fluvial environment, with shale sections possibly representing a lacustrine or overbank setting. Yarragadee Formation Unit D is the uppermost section that has a basement at approximately 400 mBGL and is a sequence of interbedded sandstone, claystone and siltstone. Unit D is comprised of up to 80 per cent of fine-grained sediment deposits. The landform and soil type at the proposed Premises are known as the Yerramullah 2 Subsystem within the Arrowsmith region and is described as undulating and sandy with hills of Triassic and Jurassic sediments commonly capped by laterite. The dominant soil type at the proposed site is pale sandy gravels, shallow gravel over duricrust, gravelly pale deep sand and pale and yellow deep sands. These soils are highly permeable and likely to allow leachate to move through the soil profile (WRC, 1999a).

The Shire of Dandaragan recently extracted gravel from the proposed site and the existing gravel pit has a compacted surface from in-situ material.

Surface water

The proposed composting site is located approximately 3.6 km southeast and upslope from an unnamed minor non-perennial water course that originates within the occupied land tenure boundary. Additionally, the site is located approximately 5 km southwest and upslope from seasonal/intermittent geomorphic wetlands, and an unnamed non-perennial lake. The site exists within the Hill River surface water catchment, which is characterised by an average stream quality of 1000-3000 mg/L TDS and is classed as brackish (DoW, 2017a). Average annual streamflow is 5 GL per annum and streamflow is highly seasonal, with over 95 per cent of flow occurring over winter from June to October. The closest point of the Hill River is approximately 7 km east-northeast from the proposed site. The Hill River discharges into the Indian Ocean about 9 km south of Jurien Bay (DoW, 2017a).

The Hill River has significant ecological values. It has a relatively intact riparian zone, some of which runs through nature reserves, and it provides habitat for many species of macroinvertebrates, frog species of conservation significance, native freshwater fish, freshwater crayfish and the Long-necked Tortoise (*Chelodina oblonga*). It is the northernmost extent of the known range of the Nightfish, (*Bostockia porosa*). There is no flow in the Hill River for nearly two-thirds of the year, but these periods of no flow are gradually reducing. Extensive land clearing in the Hill River catchment has led to altered hydrology, notably large increases in flows in the river. In particular, September to November flows are becoming more permanent (DoW, 2009a).

Groundwater

The Badgingarra sub-area is located in the Jurien groundwater area of the northern Perth Basin. The Water Corporation supplies the town of Badgingarra with drinking water via two production bores which draw from a deep, semi-confined aquifer known as the Yarragadee aquifer (DoW, 2017b). DWER Midwest Gascoyne Region provided information from a general groundwater consideration, where depth to groundwater is approximately 50 m below ground level (mBGL) and at a local regional level the Yarragadee is discharging north into the Hill River. At a deeper regional aquifer level the flow is to the south west. Groundwater licence (GWL161996) located approximately 7 km north-east of proposed hardstand has recorded a static water level of 75mGBL compost facility and is utilised for domestic, commercial, and stock watering purposes. A bore log for a ceased ground water license (GWL7428) within the property boundary had recorded in 1985 water bearing beds that cut in at 54mBGL, and with the bore screened in the deeper Yarragadee aquifer at 126-124mBGL. Current groundwater use of the Yarragadee aquifer, outside of town water supply, is mineral sands mining, pasture operations and, olive and almond tree plantations near Badgingarra. This deep, semi-confined aquifer is not considered highly vulnerable to contamination from land uses in the broader recharge area. It is largely protected from surface contamination by the considerable depth to the aquifer and the presence of multiple layers of rock that sit above the groundwater. The main risks to Badgingarra's water quality would arise from inappropriate land uses or activities in the immediate vicinity of the bore field (DoW, 2017b).

The Jurien Groundwater Allocation Plan for the Jurien groundwater area (and Badgingarra Subarea) allocation plan states that the Surficial Aquifer has generally small supply (100 kL/day of marginal to brackish quality) and is limited to thin sediments and localised areas of saturation, no allocation limit has been applied (not a viable aquifer). Yarragadee outcrops generally supplies > 1,000 kL/day. DWER Midwest Gascoyne Region provided information that direction of water flow is typically south west. However, the Hill River is 6 km to the north and the property is fault bounded to the west by possibly the Coomallu fault, so discharge (at a local scale) could be north towards to the Hill River where water levels are mapped shallower at 20-30 m. Groundwater that discharges to the western section of Hill River maintains vegetation and is considered a Groundwater Dependent Ecosystem (GDE). Streamflow is not perennial but numerous pools and springs are present where the Hill River valley is incised below the hydraulic head in the Yarragadee aquifer (downstream of Watheroo Line WL8).

The aquifer is compartmentalised by faulting and by stratigraphy in the Yarragadee Formation as units A, B, C and D. Argillaceous beds (up to 120 m thick) within Unit B hydraulically separate Unit A from the overlying units C and D within the aquifer. Recharge of the aquifer generally occurs via direct rainfall infiltration over outcrop areas as well as downward leakage from overlying aquifers. Close to the land surface localised surficial aquifers are present within sand deposits in shallow watertable areas within the Jurien groundwater area. Recharge of unconfined aquifers are directly from rainwater infiltrating into the water table. In the region, low groundwater salinity and groundwater mounding west of Badgingarra suggests substantial groundwater recharge. Significant recharge is also likely where sand beds of the Yarragadee Formation are exposed at the surface in the valleys surrounds of the Hill River. However,

elsewhere the hydraulic connection between aquifers is often impeded across faults and low permeability clay/shale beds within the aquifer units. Both aquifers sustain GDE's directly across the northern Perth Basin and the Jurien groundwater area. The Northern Perth Basin Bulletin states The Yarragadee aquifer is recharged by leakage from the Hill River east of Watheroo Line bore WL8 which is directly north of the property. DWER's GIS mapping system indicates that groundwater in the area is likely to have a TDS concentration of 0 to 500 mg/L, and is fresh to marginal, locally brackish. The hydraulic conductivity of the Yarragadee aquifer is highly variable and difficult to assess. Hydraulic conductivity in the aquifer averages about 12 m/day with a median of 5.6 m/day, while the vertical hydraulic conductivity across the whole aquifer is likely to range between 1×10^{-2} and 1×10^{-4} m²/day (DoW, 2017a).

The proposed compost site is 7.9 km west of the boundary of the protection zone for the Badgingarra town production bore. The protection zone exists on the eastern edge of the town boundary.

7.3 Pathways

7.3.1 Groundwater, site topography and soil type

Leachate is considered a potential emission due to the moisture content of the composting process, and the ability for stormwater to interact with the open windrows resulting in seepage to unsealed ground. Wastewater from fire-fighting washwater (in the event of a fire) may become contaminated and has the capacity to infiltrate groundwater. Discharges of leachate and potentially contaminated wastewater/stormwater directly to soils onsite may result in seepage to groundwater or surface-run off to adjoining land. As a result, the soil type, topography and depth to groundwater have been considered.

A review of the published hydrogeological reports for the northern Perth Basin in the local area indicates the direction of groundwater flow within the Yarragadee Aquifer for the Jurien groundwater area is generally towards the Hill River. The closest point of the Hill River exists approximately 7 km east-north-east from the proposed location of the composting facility. Groundwater is currently being extracted from the Yarragadee aquifer by nearby users approximately 7 km downgradient (east-north-east) of the property. Although the depth to groundwater at the proposed site is approximately 50 m for the Yarragadee aquifer, it is considered as a potential pathway via downward infiltration (DoW, 2010a). Based on the current understanding of the hydrogeology of the region, the GDE's most at risk from the proposed composting facility are river baseflow systems (such as the Hill River) and some geomorphic wetlands situated north-northeast of the proposed site. The depth to water table of the Yarragadee aquifer, where unconfined, is generally greater than 20 m except in discharge areas along the Hill River. This depth-to-groundwater information helps to define areas of potential groundwater dependence in the vicinity of the Hill River as GDE's reliance on groundwater is greater in areas where the depth to groundwater is less than 10 m (DoW, 2017a).

Groundwater in the unconfined surficial aquifer system occurs only locally, where depth to groundwater is generally found in shallow alluvial and colluvial deposits, sand associated with laterite, and paleochannel sediments (DoW, 2017a). There are no active groundwater bores within the premises, so the presence of a surficial aquifer has not been determined.

The closest environmental receptor as identified in Table 8 that may potentially be impacted by groundwater discharge immediately south of the proposed location (over Cadda Road) is the Badgingarra National Park. The vegetation in Badgingarra National Park has been identified as having a moderate potential GDE. The area also has several threatened and priority flora and threatened fauna which may be reliant on these GDE's. (DoW, 2017a).

The Applicant has not proposed the installation of groundwater monitoring wells to monitor potential impacts to groundwater from the premise's activities.

Key Findings:

1. The predominant aquifer in the region is inferred to be greater than 20 m below ground surface in the vicinity of the premises. Based on the inferred hydrogeological properties of the soils, infiltration to the aquifer is considered to be a potential pathway.
2. The presence of a surficial ephemeral aquifer has not been established for the premises. Based on the regional soil profile, it is inferred that a surficial aquifer may provide a pathway for infiltrated leachate to move toward receptors via semi-permanent or transient groundwater flow.
3. The applicant has not proposed groundwater monitoring locations based on the separation distance between the land surface and the inferred permanent groundwater table.

7.3.2 Surface water runoff

Surface water runoff and contamination of surrounding surface water bodies from the proposed site is considered as potential emissions. The closest surface waterbody is a minor non-perennial water course that originates within the occupied land tenure boundary located approximately 3.6 km, which is a considerable distance from the proposed site. Also, the proposed site is approximately 7 km from the closest point of the Hill River that both receives discharge from and recharges the Yarragadee aquifer. The Hill River and Bibby Creek both support GDE's in the southern Arrowsmith region. It is acknowledged, that the distance to surface water bodies is quite considerable and the applicant has proposed controls to mitigate surface water discharges.

The water balance model provided by the applicant estimates volume of stormwater and leachate received on the drainage area during 1-in-20-winter ARI accumulated rainfall (May to October) and have been considered further in the risk assessment table in Section 8.

7.3.3 Air

As dust, noise and odour are considered potential emissions, the prevailing wind direction has been considered. Using information available on the Bureau of Meteorology's website, the closest available weather station for climate data is Badgingarra Research Station (station number 009037) located approximately 12.5 km north-east from the premises. Based on the climate data for Badgingarra station (between 1965 and 2018), the prevailing annual average wind direction is east in the morning and south west in the afternoon.

The above pathways have been considered in the risk assessment table in Section 8.

7.4 Applicant controls

Table 10 details the management controls that the Applicant has proposed as part of the application:

Table 10: Summary of emissions and applicant controls

Source	Emission (as identified above)	Proposed controls
Excavation works; Construction and placement of new infrastructure/equipment; and Vehicle movements on unsealed access roads	Dust	Water cart retained on site to apply fresh water to unsealed access roads if dust becomes visible.
Acceptance of feedstock, handling and storage; Compost manufacturing process; and Storage of final compost prior to spreading		Water cart retained on site for the wetting down of composting windrows to prevent dust emissions during operation. Moisture content levels of composting windrows to reduce dust generation will be maintained by staff undertaking visual inspections and water applied as required.
Excavation works; and Construction and placement of new infrastructure/equipment	Noise	The siting of the facility and distance to sensitive human receptors is considerable to create minimal noise impacts. Machinery used during the hours of 6 am-6 pm.
Acceptance of feedstock, handling and storage; Compost manufacturing process; and Storage of final compost prior to spreading		
Acceptance of feedstock, handling and storage; Compost manufacturing process; and Storage of final compost prior to spreading	Odour	The siting of the facility and distance to sensitive human receptors is considerable to create minimal odour impacts. The moisture content of composting windrows will be visibly maintained (30-40%) by staff and water applied in later stages if deemed necessary. All trucks carrying feedstock to the property and all trucks that may use public roads when transporting the finished compost product will be covered
Acceptance of feedstock, handling and storage; Compost manufacturing process; Storage of final compost prior to	Leachate/ Contaminated stormwater	Hardstand, evaporation pond and diversion drains constructed with compacted in-situ material to achieve a coefficient of permeability $<1 \times 10^{-9}$ metres per second or equivalent.

Source	Emission (as identified above)	Proposed controls
spreading; and Storage of leachate in evaporation pond and Potentially contaminated stormwater		The hardstand will include 2-3% slope to prevent pooling on hardstand and allow for leachate overflow from composting activities and stormwater runoff to be directed towards the evaporation pond. Diversion drains constructed upslope of hardstand to prevent the run-on of surface water onto the hardstand area.
Spontaneous combustion of windrows and stockpiles due to elevated internal temperatures	Particulates, noxious gases and smoke from upset conditions (compost fire)	Fire units retained on site that will be used in the case of a fire at the compost facility. The significant distance to the nearest sensitive receptors should help to disperse air emissions from a fire. Moisture content of the composting windrows will be maintained between 30-40% as part of the composting process, and by virtue will reduce the risk of spontaneous combustion.
	Fire wash-water generated from extinguishing a fire	Composting area graded towards a stormwater/leachate evaporation pond. Composting windrows are situated on a low permeability compacted hardstand. Fire waste waters are not intended to be reused in the composting process.

8. Risk assessment

The identification of the sources, pathways and receptors to determine Risk Events are set out in Tables 11 and 12 below, consistent with the *Guidance Statement: Risk Assessments*. Risk ratings have been assessed for each key emission source and take into account potential source-pathway-receptor linkages. The mitigation measures / controls proposed by the Applicant have been considered in determining the risk rating. Emissions during construction and operation have been assessed separately to allow clear delineation of activity phases.

The works approval that accompanies this report authorises construction and time-limited operations. A licence is required to operate the premises following the time-limited operational phase authorised under the works approval.

The conditions in the issued Works Approval, as outlined in Table 11 and 12, have been determined in accordance with the *Guidance Statement: Setting Conditions*.

8.1 Risk assessment – construction

Table 11: Identification of emissions, pathway and receptors during construction

Risk Event					Consequence ¹	Likelihood ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities	Potential emissions	Potential receptors	Potential pathway & receptor (impact)	Applicant controls					
Excavation works; Construction and placement of new infrastructure/ equipment; and Vehicle movements on unsealed access roads	Dust	Residences and users of adjacent roads and agricultural lands	Air/wind pathway causing impacts to health and amenity of closest human receptors.	Ongoing visual inspection for dust emissions. Unsealed roads and stockpiles to be wet down with water cart, as required.	Slight	Unlikely	Low	<p>The minor construction works (equipment placement) and short duration (1 week) of construction are not expected to generate significant dust emissions.</p> <p>The Delegated Officer considers that fugitive dust emissions may arise from construction activities and vehicle movements during the construction of the proposed facility, and these emissions may cause minimal off-site impacts.</p> <p>The Delegated Officer also considers that these impacts will probably not occur in most circumstances, resulting in a Low risk associated with construction dust emissions.</p>	Dust control Condition 10

Risk Event					Consequence ¹	Likelihood ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities	Potential emissions	Potential receptors	Potential pathway & receptor (impact)	Applicant controls					
Excavation works; Construction and placement of new infrastructure/ equipment; and Vehicle movements on unsealed access roads	Noise	Residences and users of adjacent roads and agricultural lands	Air/wind pathway causing impacts to health and amenity of closest human receptors.	Machinery used during the hours of 6am-6pm	Slight	Unlikely	Low	<p>The Delegated Officer considers that noise emissions may arise from construction activities and vehicle movements during the construction of the proposed facility, and these emissions may cause minimal off-site impacts.</p> <p>The proposed operational time of 6am is considered as 'night-time' hours in the <i>Environmental Protection (Noise) Regulations 1997</i> (EP Noise Regulations) and is afforded a lower assigned decibel level.</p> <p>The Delegated Officer considers that these impacts will probably not occur in most circumstances, resulting in a Low risk associated with construction dust emissions.</p>	The Delegated Officer considers that this risk can be regulated under the <i>Environmental Protection (Noise) Regulations 1997</i> and general provisions of the EP Act

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

8.2 Risk assessment – operation

Table 12: Identification of emissions, pathway and receptors

Risk Event					Consequence ¹	Likelihood ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors	Potential pathway & receptor (impact)	Applicant controls					
Acceptance of feedstock, handling and storage; Compost manufacturing process; and Storage of final compost prior to spreading	Dust	Residences and users of adjacent roads and agricultural lands	Air/windborne pathway causing impacts to health and amenity of closest human receptors	Maintenance of moisture levels of compost during production (visual inspection) Unsealed roads and stockpiles to be wet down with water cart, as required.	Slight	Rare	Low	The Delegated Officer considers that fugitive dust emissions may arise from operation activities - composting windrows, compost storage and vehicle movements during operation the proposed facility, and these emissions may cause minimal off-site impacts. The Delegated Officer also considers that these impacts will probably not occur in most circumstances, resulting in a Low risk associated with operations dust emissions. The Applicant's proposed dust mitigation controls are likely to be sufficient at mitigating dust emissions.	The Delegated Officer considers that this risk can be regulated under the general provisions of the EP Act; and dust control Condition 10.
		Surface water tributaries	Air/windborne pathway causing impacts to health and amenity of closest surface water receptors		Slight	Unlikely	Low	The Delegated Officer considers that fugitive dust emissions may arise from operation activities - composting windrows, compost storage and vehicle movements during operation the proposed facility, and these emissions may cause minimal off-site impacts. The Delegated Officer also considers that these impacts will probably not occur in most circumstances, resulting in a Low risk associated with operations dust emissions. The Applicant's proposed dust mitigation controls are likely to be sufficient at mitigating dust emissions.	

Risk Event					Consequence ¹	Likelihood ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors	Potential pathway & receptor (impact)	Applicant controls					
Acceptance of feedstock, handling and storage; Compost manufacturing process; and Storage of final compost prior to spreading	Noise	Residences and users of adjacent roads and agricultural lands	Air/wind pathway causing impacts to health and amenity of closest human receptors.	Machinery used during the hours of 6am-6pm Regular machinery servicing.	Slight	Rare	Low	<p>The proposed operational time of 6am is considered as 'night-time' hours in the <i>Environmental Protection (Noise) Regulations 1997</i> (EP Noise Regulations) and is afforded a lower assigned decibel level.</p> <p>The Delegated Officer considers that the siting of the Premises is likely to be sufficient at mitigating noise emissions associated with the composting activities. However, it is noted that compliance with Noise regulations is required for early operations.</p>	The Delegated Officer considers that this risk can be regulated by the <i>Environmental Protection (Noise) Regulations 1997</i> and general provisions of the EP Act

Risk Event					Consequence ¹	Likelihood ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors	Potential pathway & receptor (impact)	Applicant controls					
Acceptance of feedstock, handling and storage; Compost manufacturing process; and Storage of final compost prior to spreading	Odour	Residences and users of adjacent roads and agricultural lands	Air/wind pathway causing impacts to health and amenity of closest human receptors	Composting process and management of feedstock ratios De-sludging of evaporation pond as required.	Minor	Almost certain	High	<p>Feedstock accepted and processed at the Premises has the potential to generate odour emissions through the decomposition of odorous feedstocks and inadequate composting processes causing potential impact outside the Premises. The proposed feedstocks are considered high risk odour sources.</p> <p>Noting the closest sensitive residential receptor is located within the afternoon prevailing wind direction, the 6.1 kilometre separation distance, and in consideration of the Applicant's proposed controls which only include visual checks for the maintenance of composting windrows to be within specific ranges of moisture, the Delegated Officer considers that these measures alone are insufficient for mitigating odour emissions, where transient receptors may be present (workers or road users).</p> <p>Specified controls will be included in the Works approval as regulatory controls.</p>	Infrastructure and equipment Condition 1 and 2; and time limited operation control conditions 11, 12, 13, 14, 18, 19, 20 and 21

Risk Event					Consequence ¹	Likelihood ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors	Potential pathway & receptor (impact)	Applicant controls					
<p>Acceptance of feedstock, handling and storage;</p> <p>Compost manufacturing process;</p> <p>Storage of final compost prior to spreading;</p> <p>and</p> <p>Storage of leachate in evaporation pond</p>	<p>Leachate (from composting hardstand and evaporation pond)</p>	<p>Groundwater users/ dependent ecosystems</p>	<p>Overtopping of evaporation pond/ seepage through soil resulting in elevated levels of nutrients and/ or contaminants within groundwater and impact on beneficial users of groundwater.</p>	<p>Hardstand to meet specified permeability rates.</p> <p>Composting on the composting hardstand.</p> <p>Leachate and runoff directed to the diversion drains and evaporation pond</p> <p>In the event that the freeboard is breached, any excess or overflowing liquid waste will be pumped from the pond and removed offsite by a licensed operator</p>	Moderate	Possible	Medium	<p>There are sensitive receptors located in close proximity to the Premises that may be impacted by leachate runoff generation from the acceptance and composting pad and from the overflow/ seepage of the leachate evaporation pond.</p> <p>The compacted hardstand is considered to be a primary control measure for preventing direct discharges of leachate from the composting area to the immediate environment. The gradient of the composting facility is considered to be sufficient in directing and containing leachate and potentially contaminated stormwater to the evaporation pond.</p> <p>The Delegated Officer has reviewed the water balance model submitted as part of the Application and determined that the evaporation pond has insufficient capacity to contain leachate generated from the proposed composting and during a 1-in-20 AEP winter rain event) while maintaining freeboard of 0.5m.</p> <p>The Delegated Officer has also reviewed the additional information provided in the applicant's responses to the draft decision and determined</p>	<p>Infrastructure and equipment Condition 1, 2 and 4; time limited operation control conditions 11, 12, 13, 14, 18, 19, 20, 21, 23, 24, 25, and 26</p>

		Surface water tributaries	Overtopping of evaporation pond/ over land flow to surface water tributaries and elevated levels of nutrients and/ or contaminants within surface water		Moderate	Possible	Medium	<p>the alternate evaporation pond has sufficient capacity to contain leachate generated from the proposed composting activities.</p> <p>Overtopping of the pond is possible during the above mentioned AEP accumulated rain event or year, however it does not increase the risk profile. The Applicant has proposed the controls that in the event that the freeboard is breached, any excess or overflowing liquid waste will be pumped from the pond and removed offsite by a licensed operator.</p> <p>Consideration was also given to all composting activities with possible leachate generation occurring on low permeable hardstands, preventing the leachate from seeping through the soil profile and reaching groundwater. The applicant has not proposed the construction of groundwater wells in the application, and while it is noted that groundwater depth in the region is >50m, the depth to groundwater has not been confirmed for the proposed site.</p> <p>Due to the nature of the proposed activities, the Delegated Officer considers that additional controls are necessary to monitor for leachate emissions, as well as ensuring the infrastructure controls proposed to be constructed are sufficient and effective for preventing infiltration of leachate.</p> <p>Groundwater monitoring conditions have been placed on the Works Approval requiring the Applicant to install groundwater wells within a time period to monitor groundwater to detect any potential impacts to groundwater as a result of the operations.</p>	
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Risk Event					Consequence ¹	Likelihood ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors	Potential pathway & receptor (impact)	Applicant controls					
Management of storm water	Potentially contaminated stormwater	Surface water tributaries and erosion of adjacent lands	Over land flow to surface water tributaries and erosion impacts to adjacent lands (local offsite impacts)	Siting, composting hardstand, diversion drain, evaporation pond	Moderate	Unlikely	Medium	<p>The risk of impacts from potentially contaminated stormwater is considered to be Medium, noting the proximity of the composting facility to the closest surface water body, and the topography of the site (sloping north-north-east). The Delegated Officer considers this risk has been addressed to some extent by the Applicant's proposed controls which include that all composting activities will occur on a hardstand that is sloped towards a containment pond situated in the centre of the composting facility.</p> <p>Notwithstanding these controls, the Delegated Officer considers the design of the infrastructure and the diversion drains proposed are insufficient for the prevention of contaminated surface water runoff.</p> <p>The Works Approval will include additional conditions regarding the construction of bunding around the hardstand area to provide further measures for the prevention of contaminated surface water runoff outside of the operational area.</p>	Infrastructure and equipment Condition 1 and 2; and time limited operation control conditions 11, 12, 13, 14, 18, 19, 20, 21, 23, 24, 25, and 26
Spontaneous combustion of windrows and stockpiles due to elevated internal temperatures	Particulates, noxious gases and smoke from upset conditions (compost fire)	Residences and users of adjacent roads and agricultural lands	Air/wind pathway causing impacts to health and amenity of closest human receptors	<p>Fire units retained on site that will be used in the case of a fire at the compost facility.</p> <p>Maintenance of moisture levels of compost during production (visual</p>	Minor	Unlikely	Medium	<p>The Delegated Officer has taken into consideration the distance of the Prescribed Premises to these receptors and the Applicant's proposed controls and determined that these measures are likely to be sufficient for managing the risk of fire emissions to human receptors.</p>	Infrastructure and equipment Condition 1 and 2; and time limited operation control conditions 11, 12, 13, 14, 18, 19, 20 and 21

Risk Event					Consequence ¹	Likelihood ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors	Potential pathway & receptor (impact)	Applicant controls					
		Badgingarra National Park reserve area managed by DBCA	Air/wind pathway causing impacts to adjacent vegetation and its users	inspection)	Moderate	Possible	Medium	The Delegated Officer has taken into consideration the distance of the Prescribed Premises to these receptors, as well as the Applicant's proposed controls and determined that these measures are likely to be sufficient for managing the risk of fire emissions to adjacent vegetation and its users.	Infrastructure and equipment Condition 1 and 2; and time limited operation control Conditions 11, 12, 13, 14, 18, 19, 20 and 21
	Fire wash-water generated from extinguishing a fire	Groundwater users/ dependent ecosystems	Seepage through the soil profile to groundwater causing contamination of groundwater.	Siting, composting hardstand, diversion drain, evaporation pond	Moderate	rare	Medium	<p>The Delegated Officer considers that the Applicant's proposed controls of the composting operations occurring on a low permeability hardstand and the grading of the Premises directed towards a leachate/stormwater evaporation pond are likely to be sufficient to manage the risk associated with fire wash waters, which are considered to only occur infrequently and during adverse situations.</p> <p>The Delegated Officer has noted that the applicant proposed to use fire wash water in the composting process. Given the potential for contaminants within fire wash waters, the Delegated Officer does not consider it appropriate that these wash waters are applied to the composting process. A condition has been included with the Works Approval to exclude any fire wash water from fire services/ fire truck for use within the composting process.</p>	Infrastructure and equipment Condition 1 and 2; time limited operation control Conditions 11, 12, 13, 14, 18, 19, 20, 21, 23, 24, 25, and 26

Risk Event					Consequence ¹	Likelihood ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors	Potential pathway & receptor (impact)	Applicant controls					
Disease, pest and vermin	Pathogens	Amenity, human health and environmental values	Through vectors (insects and feral animals) with amenity or health impacts to humans, stock and/ or native flora.	None specified	Moderate	Unlikely	Medium	<p>The risk of impacts from pathogens is considered to be Medium, based on the location of composting activities within the Premises boundary and distance to receptors, as well as the scale and type of operations.</p> <p>The Delegated Officer considers the design and operation of the infrastructure is likely to be insufficient for the prevention of disease, pest and vermin.</p> <p>The Works Approval will include additional conditions regarding the construction of a lockable perimeter fence around premises to prevent animal access.</p>	Infrastructure and equipment Condition 1 and 2; and time limited operational control Condition 11, 12, 13 and 14

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

9. Consultation

Consultation was undertaken as part of assessment the Application for a Works Approval as summarised in Table 13

Table 13: Summary of consultation

Method	Comments received	DWER response
Application advertised on DWER website (27/01/2020)	None received	N/A
Local Government Authority advised of proposal (24/01/2020))	The Shire of Dandaragan replied on 05/03/2020 to advise that a development approval was granted for the compost facility subject to the approval of the DWER works approval application.	Noted.

9.1 Applicant's comments

The Applicant was provided with the draft Decision Report and draft issued Works Approval on 9 October 2020. The Applicant provided comments that are summarised, along with DWER's response, in Appendix 2.

10. Conclusion

Based on the assessment in this decision report, the Delegated Officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

The Delegated Officer has determined that additional controls from those proposed by the applicants have been applied to the Works Approval to mitigate the high-risk designation determined in the risk assessment table by odour and leachate seepage contamination to the environment.

10.1 Summary of additional controls

Table 14 provides a summary of the additional controls from that proposed by the applicant and have been applied to the Works Approval by the Delegated Officer.

Table 14 Summary of additional controls

Item	Applicant proposed controls	DWER proposed condition
Infrastructure and equipment Table 1, item 2 – Bunding for collection of leachate and storm water	Not proposed by applicant	Bunding must be constructed at least 200 mm high from compacted in-situ material around the perimeter of the composting hardstand area.

Item	Applicant proposed controls	DWER proposed condition
Infrastructure and equipment Table 1, item 3 Evaporation pond	Proposed evaporation pond to be constructed with capacity to store 151 m ³ runoff while maintaining a 500 mm freeboard during operations	Proposed to be constructed with capacity to store 550 m ³ runoff while maintaining freeboard during operations. Note this requirement has been reduced to 309 m ² following additional site specific data utilised within a reviewed water balance calculation.
Infrastructure and equipment Table 1, item 5 Perimeter fencing / site security	Not proposed by applicant	Perimeter fence is to be constructed of non-combustible material around entire perimeter of Premises that is at least 1.8 m high and entrance gates can be securely locked.
Infrastructure and equipment Table 1, item 6 Groundwater monitoring wells	Not proposed by applicant	Groundwater monitoring wells are to be constructed; one upgradient and two downgradient from composting activities.
Waste acceptance and throughput restrictions Table 4 - Receipt, handling and storage prior to composting; Animal manure	Proposed animal manure waste shall be stored on hardstand prior to adding into composting windrows	Must direct animal manures accepted at the Premises directly to the composting hardstand and incorporate into a compost windrow within 14 days of receipt
Waste processing specifications Table 5 - Receipt, handling and storage prior to composting; Item (b)	Proposed animal manure waste shall be stored on hardstand prior to adding into composting windrows	Animal manure waste shall not be stored for longer than 14 days before being added to the composting process
Waste processing specifications Table 5 - Treatment by composting and pasteurisation; Item (b)	Proposed Carbon: Nitrogen ration of 15:1 to 40:1 to be maintained during composting and pasteurisation process	Ensure that an input nutrient balance (carbon: nitrogen ratio) of 25:1 to 35:1 is achieved when forming windrows

Item	Applicant proposed controls	DWER proposed condition
<p>Waste processing specifications</p> <p>Table 5 - Treatment by composting and pasteurisation;</p> <p>Item (c) and (d)</p>	<p>Proposed compost windrows will be turned three times and reach temperatures of >55C for three consecutive days after each turning</p>	<p>The core temperature of the composting windrow is maintained between 55 °C and 65 °C during the initial aerobic composting process for ≥15 consecutive days through the process of pasteurisation.</p> <p>Each compost windrow is turned a minimum of five times through the process of pasteurisation.</p>
<p>Waste processing specifications</p> <p>Table 5 - Treatment by composting and pasteurisation;</p> <p>Item (e)</p>	<p>Proposed moisture will be maintained at 30-40 per cent through visible checks during composting and pasteurisation process</p>	<p>Moisture content in the composting piles shall be maintained between 45 and 65 per cent during composting and pasteurisation process.</p>
<p>Waste processing specifications</p> <p>Table 5 - Treatment by composting and pasteurisation;</p> <p>Items (g), (h) and (i)</p>	<p>Proposed composting windrows will be separated by 6 m of cleared ground</p>	<p>Windrows must be separated with at least 6 metres of clear ground or a physical barrier constructed of non-combustible materials.</p> <p>A buffer zone of at least 6 metres of cleared ground must be maintained between stockpile/windrow areas and the boundary fence line.</p> <p>A buffer zone of at least 6 metres of cleared ground separation distance between the final product storage area and composting area will be applied as a fire prevention measure.</p>
<p>Monitoring</p> <p>Groundwater monitoring;</p> <p>Conditions 23, 24, 25</p>	<p>Not proposed by applicant</p>	<p>Conduct groundwater monitoring during Time Limited Operations in accordance with the requirements and record the results of all monitoring activity conducted under those events.</p> <p>Field quality assurance and quality control procedures specified.</p> <p>All groundwater sample analysis, for monitoring undertaken must be undertaken by laboratories with current accreditation from the National Association of Testing Authorities (NATA) for the relevant parameters.</p>

**A/MANAGER WASTE INDUSTRIES
REGULATORY SERVICES**

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

Appendix 1: Key documents

Document title	Reference	Availability
Australian Eggs, <i>Composting By-products on Egg Farms</i> , Enviro Fact Sheet	Australian Eggs, 2018	accessed at www.australianeggs.org.au
Department of Water (January 2017), <i>Northern Perth Basin: Geology, hydrogeology and groundwater resources</i> , Hydrogeological Bulletin Series, Report no. HB1	DoW, 2017a	accessed at www.water.wa.gov.au
Department of Water (June 2017), <i>Badgingarra Water Reserve; Drinking water source protection review</i> , Water Resource Protection Series, Report WRP 174	DoW, 2017b	accessed at www.water.wa.gov.au
Department of Water (August 2013), <i>Liners for containing pollutants, using engineered soils</i> , Water Quality Protection Note Series, Report no WQPN 27	DoW, 2013a	accessed at www.water.wa.gov.au
Department of Water (August 2010), <i>Jurien groundwater allocation plan</i> , Water resource allocation planning series, Report no 27	DoW, 2010a	accessed at www.water.wa.gov.au
Department of Water (May 2009), <i>Environmental Considerations for Groundwater Management in the Northern Perth Basin</i> , Environmental Water Report Series, Report no. 8.	DoW, 2009a	accessed at www.water.wa.gov.au
Water and Rivers Commission (1999), <i>Badgingarra Water Reserve Water Source Protection Plan</i> ; Badgingarra Town Water Supply, Water Resource Protection Series, Report WRP11	WRC, 1999a	accessed at www.water.wa.gov.au
DER, July 2015. <i>Guidance Statement: Regulatory principles</i> . Department of Environment Regulation, Perth.	DER, 2015a	accessed at www.dwer.wa.gov.au
DER, October 2015. <i>Guidance Statement: Setting conditions</i> . Department of Environment Regulation, Perth.	DER, 2015b	
DER, August 2016. <i>Guidance Statement: Licence duration</i> . Department of Environment Regulation, Perth.	DER, 2016a	

Document title	Reference	Availability
DER, February 2017 <i>Guidance Statement: Risk Assessments</i> . Department of Environment Regulation, Perth.	DER, 2017a	
DER, February 2017. <i>Guidance Statement: Decision Making</i> . Department of Environment Regulation, Perth.	DER, 2017b	

Appendix 2: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of applicant's comment	DWER response
Works Approval		
<p>Evaporation Pond Condition 1, Table 1, 3(c)</p>	<p>Rewording of requirement:</p> <p>Applicant has proposed an alternate pond capacity based on the water balance calculations provided. The total pond volume as calculated is 227m² x 1.36m (plus a 0.5m freeboard equals a combined depth of 1.86) = 309 m³, compared to DWER recommendations of 550 m³. The main factors behind this difference are the runoff coefficient and dam evaporation factor:</p> <p>Some additional comments on the pond calculation are:</p> <ul style="list-style-type: none"> • The pond has been sized for a 95th percentile wet year for evaporation only, not a 90th percentile as a storage pond. • The pond is not intended to dry in the same year as a 95th percentile winter season, instead it dries on the second 'average' climate year. • Leachate generation from the composting process has been assumed to be inconsequential (zero). • 50 years of daily climate data for the feedlot location (SILO) as well as a 10% pond safety factor are applied to ensure the pond is not undersized. 	<p>DWER notes that the information provided proposes an alternative capacity to that in the draft licence. Based on the assumptions and supporting information to the new proposed design capacity, the pond capacity is considered to be sufficient and the conditions of the works approval have been reworded to reflect capacity for evaporation pond as proposed by applicant.</p>

Condition	Summary of applicant's comment	DWER response
<p>Groundwater monitoring wells</p> <p>Condition 4</p>	<p>Removal of requirement:</p> <p>Applicant has requested removal of condition to construct and install groundwater monitoring wells and the need for groundwater monitoring at this site. This is based on:</p> <ul style="list-style-type: none"> • The facility having an impermeable hardstand that, as per Condition 2 of the draft Works Approval, will be tested to ensure it complies with the AS 1289. Therefore the inherent risk of groundwater contamination is already reduced as all products are contained within the controlled drainage area via the impermeable hardstand present beneath the compost pad and the wastewater containment infrastructure. • If groundwater flows to Hill River were to occur, it would not happen within the lifetime of this compost facility. Advice from DPIRD's hydrologist team suggests that groundwater flows over that distance would take hundreds to thousands of years, if not more. • Advice from DPIRD's hydrologist team suggests that groundwater in this part of the world is estimated to exceed 100m below ground level. Even at an estimated 50m below ground level as the draft Decision Document suggests, DPIRD maintains that groundwater monitoring via bores is unwarranted at this depth. 	<p>The risk event associated with groundwater pathways have been assessed on the basis that there is a lack of site-specific data on the hydrogeological characteristics between the surface and the deep groundwater aquifer. While DWER note the advice provided by the applicant, site-specific data has not been provided to support this information.</p> <p>In the absence of such data, DWER considers the conditions are reasonable to demonstrate that the controls are effective at preventing pollution.</p> <p>It is noted that the potential emission pathway (as described by Key Finding 3) is identified as a potential surficial aquifer, as such monitoring locations are required to target the potential presence of a permanent or ephemeral aquifer in the soil/weathered rock profile below the hardstand infrastructure.</p>

Condition	Summary of applicant's comment	DWER response
<p>Dust emissions</p> <p>Condition 10</p>	<p>Rewording of requirement:</p> <p>Applicant has requested rewording of requirement to reflect more closely proposed applicant controls.</p> <p>The proposed applicant controls in the Works Approval application are that unsealed access roads could be dampened if dust is causing unforeseen impacts to receptors (and based on the fact that access roads will be used less frequently than typical farm access roads). Maintaining unsealed roads and exposed construction areas in a damp state during operational hours (Condition 10) appears to be an extreme control given the low risk of dust impacting the amenity of receptors that are located a significant distance from the facility.</p>	<p>DWER considers that the roads may be used for activities other than the prescribed activities. The condition has been re-worded to reflect the need to control dust, as needed, during operations.</p>

Condition	Summary of applicant's comment	DWER response
<p>Odour</p> <p>Condition 26</p>	<p>Rewording or removal of requirement:</p> <p>Applicant has requested removal for the requirement for daily and even weekly monitoring based on the following:</p> <p>The DWER risk of odour as a potential emission from this proposed facility has been ranked as high is based on transient receptors (workers or road users) and not permanent residences or public use areas. The impacts of potential emissions on nearby receptors should only consider places where people live or regularly spend time, and not transient receptors. It is acknowledged that process monitoring is required but would expect that the frequency of monitoring is reflective of the inherent risk of odour impacting sensitive receptors (transient receptors excluded). As a comparison, Table B2.4 in the National Environmental Guidelines for Indoor Piggeries (APL, 2018) states that daily monitoring is necessary when the risk level is extreme and preventative actions need to be implemented immediately. Advice received from DPIRD, that does not believe that the apparent risk of odour impacting sensitive receptors is extreme in this case and therefore does not believe daily and perhaps even weekly monitoring is warranted.</p> <p>DPIRD would understand if regular monitoring was required at the commencement of operations to develop baseline/representative data, but this does not appear to the case.</p>	<p>DWER has considered the assessment of risk relating to odour emissions in the basis of the siting of the premises, and on the basis of emissions form similar premises in accordance with the <i>Guidance Statement – Risk Assessments</i> (DER, 2017a).</p> <p>On this basis the conditions are considered to be reasonable for the prevention of odour generation and to demonstrate that the applicant controls are effective at managing the potential consequence associated with any odour generated.</p>

Condition	Summary of applicant's comment	DWER response
Decision Report		
<p>7.4 Applicant controls, Table 10; Odour emissions.</p> <p>Applicant to confirm estimated storage time of animal manure waste feedstocks on hardstand prior to incorporating into composting process</p>	<p>The applicant provided the following comments:</p> <p>The applicant confirmed that the site is prepared with straw and manure prior to spent hen (feedstock) arrival. Then the spent hens are covered straight after dumping.</p>	<p>DWER have noted the response.</p> <p>Existing proposed Condition 18, Table 4 acceptance specification for spent hens remains unchanged.</p>
<p>7.4 Applicant controls, Table 10; Fire wash-water generated from extinguishing a fire emission.</p> <p>Applicant to confirm fire wastewater from fire services/truck is not to be reused in composting process</p>	<p>The applicant provided the following comments:</p> <p>The applicant has confirmed that wastewater from a fire will not be used in the composting process.</p>	<p>DWER have noted the response.</p> <p>Existing proposed Condition 21, Table 5 process requirements for spent hens and animal manure treatment by composting and pasteurization (Item m) remains unchanged.</p>