INTEGRITY AG
& Environment

Whey Management Plan

Plank Road and Roccis Road, Meeking

Prepared for: Brownes Food Operations Pty Ltd

Integrity Ag and Environment
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Disclaimer

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1 Introduction

Integrity Ag and Environment (Aurora) was commissioned by Brownes Food Operations Pty Ltd, to prepare the supporting information for a Department of Water and Environmental Regulation (DWER) licence application for the reuse of whey to land on an agricultural property located in the Shire of Williams. The property is located at 238 Roccis Road, Meeking (the 'site'), approximately 75 kilometres (km) east of Brownes dairy facility in Brunswick Junction and 160km south of Perth, Western Australia (Figure 1).

The site operates as a broad acre agricultural enterprise with significant livestock numbers (sheep) and cereal cropping. Whey application is proposed as a direct substitute for synthetic fertiliser use within the farming operation.

1.1 Background

Brownes Food Operations Pty Ltd (Brownes) own and operate a milk processing facility on the corner of South West Highway and Ommaney Roads, Brunswick Junction. The facility receives milk for processing and manufacture into a range of dairy products for distribution and sale all over Western Australia. The site currently operates under licence L4437/1988/12 issued by the Department of Environmental Regulation (DER). The current licence was issued in November 2013 and expires on 28 November 2024.

Cheese is one of the dairy products that is produced at the site. Cheese is generally produced to utilise an excess of fresh milk during the high milk yielding periods between August and January. Whey is produced as a by-product of the cheese production process, and requires reuse in an environmentally appropriate manner. Whey is a complex biological fluid consisting of nutrients, proteins, salts, lactose and trace elements.

Brownes seeks a licence for the whey spreading area under Schedule 1 of the Environmental Protection Regulations 1987. The sites fall under licence Category 61: Liquid waste facility.

• Category 61	Liquid waste facility: premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated	100 tonnes or more per year

This Whey Management Plan (WMP) details the suitability of the receiving environment for whey disposal, and provides a plan for how whey irrigation will be managed so that it will minimise any negative impacts to the local environment.

Brownes currently undertake whey reuse at a farm in Arthur River under DWER licence number L9134. This operation has been successfully operating since 2018, with the DWER issuing an extension of the current licence in March 2022 to allow for ongoing spreading at the site for another five years, with expiry in 2027. To minimise the operational risk associated with maintaining only one whey reuse site, this document has been prepared to support an application to licence an additional property for the management of whey. An increase in whey production is not anticipated in the short to medium term, with a second licenced farm allowing for increased flexibility timing of whey spreading to work in with the agricultural operations.

1.1 Application Summary

Table 1 provides a brief summary of the key details of the Licence Application. The proposed whey spreading site is located in the Shire of Williams. Under the Town Planning Scheme No. 2 (Consolidated District Scheme), and the site is zoned as rural. All land surrounding the property is zoned rural for at least 5km in all directions from the site boundary.

Table 1. Applicant Details

Applicant details	Information
Licencee	Brownes Food Operations Pty Ltd Ommaney Road, Brunswick Junction 6224
Contact details	Mr Adrian Cream Title: Operations Manager Email Address: adrian.cream@brownesdairy.com.au Mobile: 0429 445 051
Premise Address	238 Roccis Road, Meeking 6392
Land area	1519 ha
Premise Zoning - Shire of Williams Town Planning Scheme No. 2	Rural
Surrounding Land Use Zoning - Shire of Williams Town Planning Scheme No. 2	North - Rural East – 'Rural' West – 'Rural' South – 'Rural'

Planning approval for the spreading of whey to the premise is/is not required from the Shire of Williams. Correspondence confirming this is provided in Appendix A.

2 PROJECT INFORMATION

2.1 Whey Spreading Areas

The Roccis Road property consists of a number of separate lots, with a total area of 1519 ha and has a north entrance from Roccis Road and a southern entrance on Plank Road in the locality of Meeking (Figure 1).

This location has been selected for spreading whey due to the larger farm sizes operated by a single proprietor and the suitability of the soils. A summary of the lots that make up the Roccis Road farm are provided in Table 2, with the enterprise owned and managed by Mr S. Ewan.

Table 2. Landowner Information

Property ID	Area	Legal Landowner
238 Roccis Road (Lot 3972 on DP147866)	839 ha	Derbygrove Pty Ltd
Lot 2970 on DP94319	101 ha	Derbygrove Pty Ltd
Lot 2159 on DP126867	65 ha	Derbygrove Pty Ltd
Lot 2618 on DP141289	80 ha	Derbygrove Pty Ltd
Lot 3146 on DP85002	122 ha	Derbygrove Pty Ltd
Lot 2160 on DP126868	65 ha	Derbygrove Pty Ltd
Lot 2972 on DP84329	134 ha	Derbygrove Pty Ltd
Lot 2161 on DP126869	113 ha	Derbygrove Pty Ltd

The landowners have agreed to the spreading of whey on their land in accordance with this WMP. A copy of the agreement is included in Appendix B.

The site is currently operated as a broad acre agricultural farm, with significant scale livestock (sheep) activities and some cereal cropping. Whey spreading will primarily occur on areas to be used for pasture due to the application period from winter through spring. Some application to cropping areas may occur once crops have been harvested in late spring/early summer.

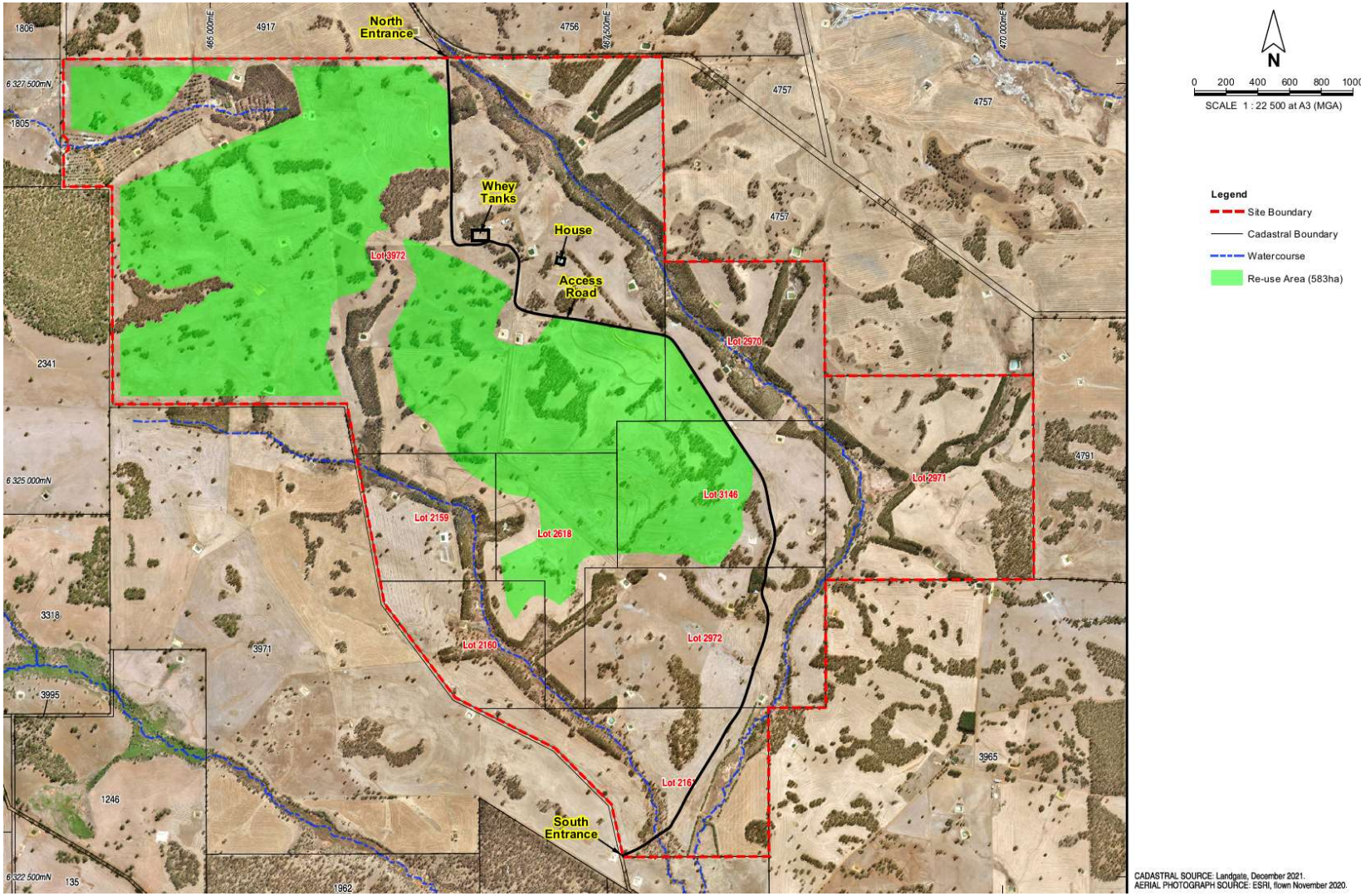

Figure 1. Site Layout

2.2 Whey Volumes

Whey is generated as a by-product of the cheese making process. Whey production varies significantly from year to year, depending on the season, fresh milk contracts, cheese demand and the number of milk suppliers. Whey production has been variable over the last four years as shown in Table 3.

Table 3. Annual Whey Spreading Volumes

	Whey Volume
2018/2019	10.8ML
2019/2020	6.6ML
2020/2021	4.5ML
2021/2022	3.5ML

This WMP demonstrates how 10ML (10,000kL) of whey can be sustainably applied to land for beneficial reuse. Actual whey production volumes are likely to be significantly less than 10ML/year, but to be conservative, this is considered the absolute upper limit for whey requiring reuse.

Whey volumes vary throughout the year, with cheese production generally commencing in late winter or early spring, peaking in late spring and then finishing in mid-summer. Cheese production sometimes occurs at a low level throughout the year to utilise excess milk. Table 4 shows the expected production of the 10ML of whey over a 12 month period.

Table 4. Expected Annual Whey Production By Month

	% Total Annual Whey	Volume Whey (ML)
July	2	0.2
August	5	0.5
September	15	1.5
October	25	2.5
November	25	2.5
December	15	1.5
January	5	0.5
February	2	0.2
March	1	0.1
April	1	0.1
May	2	0.2
June	2	0.2
Total		10

2.3 Whey quality

Whey samples have been collected frequently from whey produced at the Brunswick site. Table 5 provides a summary of the results of the whey sampling since 2019.

Table 5. Historical and Design Whey Quality Parameters

Sample Date	TN (mg/L)	TP (mg/L)	pH	BOD (mg/L)	TDS (mg/L)
23 September 2019	1400	450	4.3	47,000	54,000
25 November 2019	1600	380	4.2	50,000	54,000
22 September 2020	1300	310	4.5	44,000	n/a
8 October 2020	1200	340	5.2	35,000	n/a
28 October 2020	1200	310	4.4	n/a	n/a
9 November 2020	1400	350	4.4	n/a	n/a
30 November 2020	1400	330	4.1	n/a	n/a
18 May 2021	1400	310	4.5	51,000	n/a
25 May 2021	1300	340	4.3	51,000	n/a
21 September 2021	1400	320	4.2	47,000	n/a
21 October 2021	1400	330	4.3	53,000	n/a
Median	1,400	330	4.3	50,000	54,000
Design Whey Quality	**1,400**	**350**	**4.2**	**50,000**	**54,000**

The design whey quality is used to determine the nutrient, BOD and salt loadings to irrigation areas. For the purposes of this WMP, a design water quality is assumed a suitable representation for the expected whey quality in the future.

2.4 Whey Spreading

Whey will be transported daily from the Brunswick site to the Roccis Road farm site in 48,000L tankers. Tankers will be registered controlled waste transporters under the DWER Controlled Waste regulations. The volume of whey is measured and recorded using a flow meter located at the Brownes Dairy site with data recorded by staff in the daily records log detailing the volume of whey leaving the premises. Access to the farm will be from the northern entrance, via the Collie-Williams Road and then Roccis Road.

At the disposal site, whey tankers will unload into one of two 50,000L onsite tanks and be spread around the property using a tractor and spreader. Onsite tanks are centrally located with good access to all parts of the property that will be used for spreading. The volume of the spreader tank is 15,000L. Whey is transferred from the delivery tankers to the sealed storage tank through secure milk transfer procedures.

Spreading is undertaken systematically to ensure an even spread over all parts of the irrigation areas. Photograph A and B show a typical onsite tank and the spreader that will be used for the purpose of

spreading whey. To minimise any odour generation, all whey will be spread within 24 hours of being delivered to site (usually within 12 hours). At the end of whey spreading season, the onsite tanks will be washed out with clean water.

Photograph A: Onsite Whey Storage Tank

Photograph B: Whey Spreader

2 REGIONAL SETTING

2.1 Climate

The Williams area is described as having a Mediterranean climate, characterised by hot dry summers and mild wet winters. Climate data has been sourced from the Bureau of Meteorology averages for the period 1990 to 2022 for Williams (Station number 010655) for rainfall and the Narrogin (Station number 010614) for temperature.

Rainfall in the area is seasonal and is generally confined to the winter months (June to August). Mean monthly rainfall is highest in July at 96.3 mm, lowest in January with 11 mm and an annual average rainfall of 530 mm.

The highest temperatures are usually experienced in January, when the mean monthly maximum temperature is 32.2°C and the mean monthly minimum temperature is 14.6°C. The lowest maximum temperatures occur in July, when the mean monthly maximum and minimum temperatures are 15.3°C and 5.2°C, respectively.

Winds in the area during the warmer months are typically characterised by offshore (easterly) breezes during the morning followed by corresponding onshore breezes (from the southwest) as the land heats during the day and cool maritime air replaces rising hot air over the warm-hot land surface. During the cooler months (May to August) winds are typically from the west/northwest during the morning, swinging to the east/southeast in the afternoon.

2.2 Topography

The general topography of the area is undulating ridges and valleys, with the dominant landform on the property following a north-west to south-east ridge. The maximum elevation is 380mAHD in the northern part of the site, with minimum elevations of 290m AHD found along the creeklines to the west and east (Figure 2). The reuse area generally follows the ridge of the property, allowing for suitable setback from any seasonal waterways and avoiding steeply sloped areas.

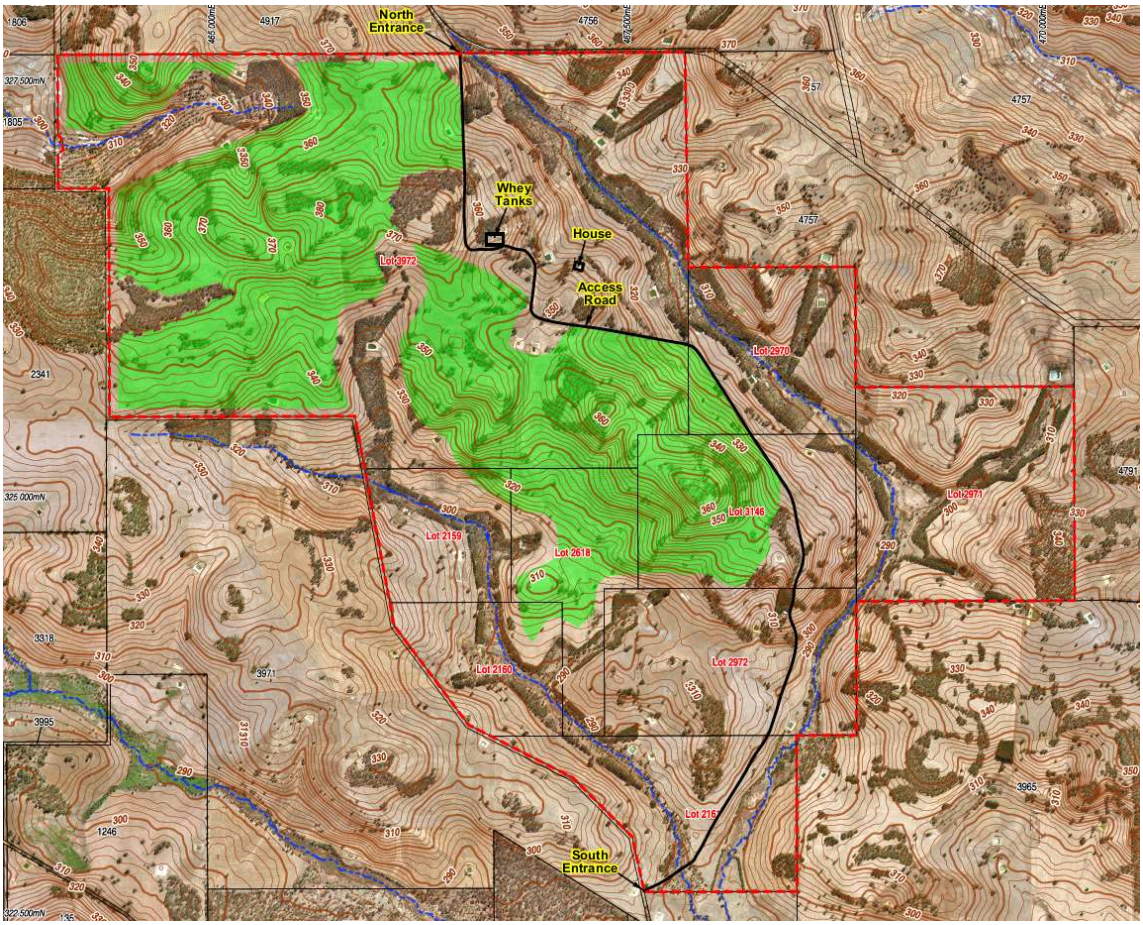

Figure 2. Site Topography

2.3 Geology and Soils

Eight soil types are found across the site as shown in Figure 3, with descriptions of the soil unit types are provided in Table 6. The whey reuse areas are largely restricted to soil types 253EuDMi, 253EuLKu and 253Dk_5.

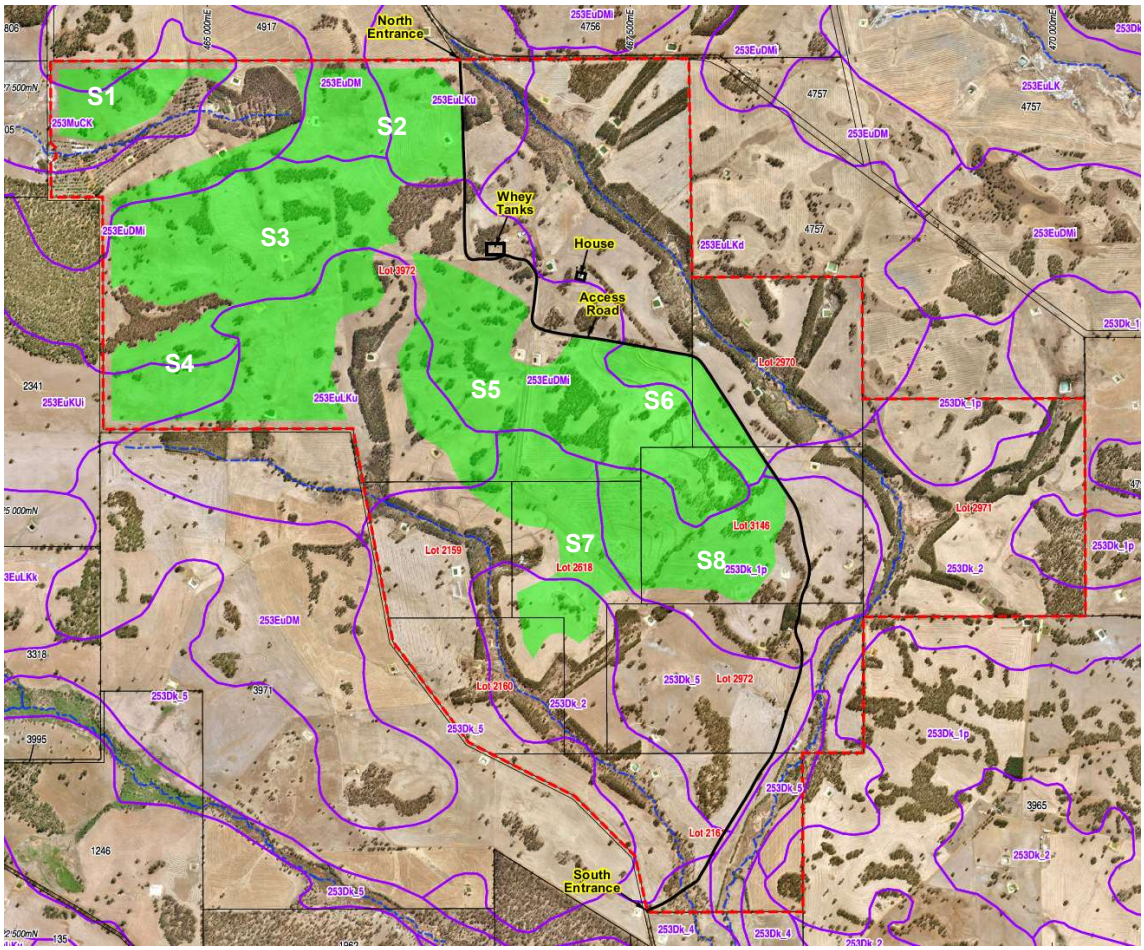

Figure 3. Soil Types and Sampling Locations (DAFWA, 2018)

Table 6. Soil Types within Re-use Area

Soil Unit Name	Description
253EuDM - Dalmore Subsystem	Undulating ridges and hill crests on laterite and granite. Relief 5-20 m, slopes 5-15%. Soils are gravels, loamy duplex and sandy duplex soils.
253EuDMi – Dalmore Ironstone Gravel Ridges	Soil parent material is laterite. Soils are gravels, and sands
253EuLKu - Lukin upstream valleys Phase	Relief 5-20 m, slopes 3-10%.
253EuKUi - Kulikup ironstone gravel flats Phase	Moderately well drained to poorly drained gravels.
253EuLKd - Lukin downstream valleys Phase	Relief 20-40 m, slopes 5-20%. Soils are loamy earths and loamy duplex soils with some gravels and sands.
253MuCK - Coolakin Subsystem (Marradong)	253MuCK - Coolakin Subsystem (Marradong) Minor Valleys bounded by Dwellingup or Norrine units;

	moderate slopes with gravelly and sandy yellow duplex soils; a minor valley floor with sandy alluvium; occasional rock outcrops and laterite spur
253Dk_1p - Darkan 1 steep	Gravelly hill crests and upper slopes with mainly yellowish brown sandy and loamy gravels.Phase Steeper slopes of the gravelly uplands (Darkan 1) with mainly deep sandy gravels and large areas of shallow to moderately deep sandy gravels.
253Dk_2 - Darkan 2 Subsystem.	Slopes of the Darkan System with mainly moderately deep sandy gravels and grey deep sandy duplex soils

2.5 Hydrology

The site located at the junction between two hydrological catchments, with the north-western part of the site draining to the Williams River, a sub-catchment of the Murray River basin, while the southern part of the site is drains to the Hillman River which is a northern sub-catchment of the Blackwood River basin.

The Department of Water (DoW) Water Register (accessed 20 February 2022) indicates the site is not located in an area requiring a ground or surface water licence.

2.6 Hydrogeology

The site is located in the Karri groundwater area, and the Karri subarea. The site is not within a Public Drinking Water Source Area or a Proclaimed surface or groundwater area.

A search of the Department of Primary Industry and Regional Development (DPIRD) groundwater and salinity database showed several bores have been drilled in the northern part of the site. Most of these bores are located along the creek line, with four located within the proposed spreading area. The locations of the bores are shown in Figure 4 with details shown in Table 7.

During site investigations, no groundwater and/or soil moisture was found in any of the test pit holes which were excavated to a minimum depth of 0.5m. Consultation with the land manager, who has lived and worked on the farm for over 10 years suggests that groundwater beneath the site is very limited, and tightly held in the soil profile, so recharge to bores is very slow indicating that the movement through the soil is slow. He has also never detected groundwater in numerous excavations on higher parts of the property to a depth of at least 1.5m in depth.

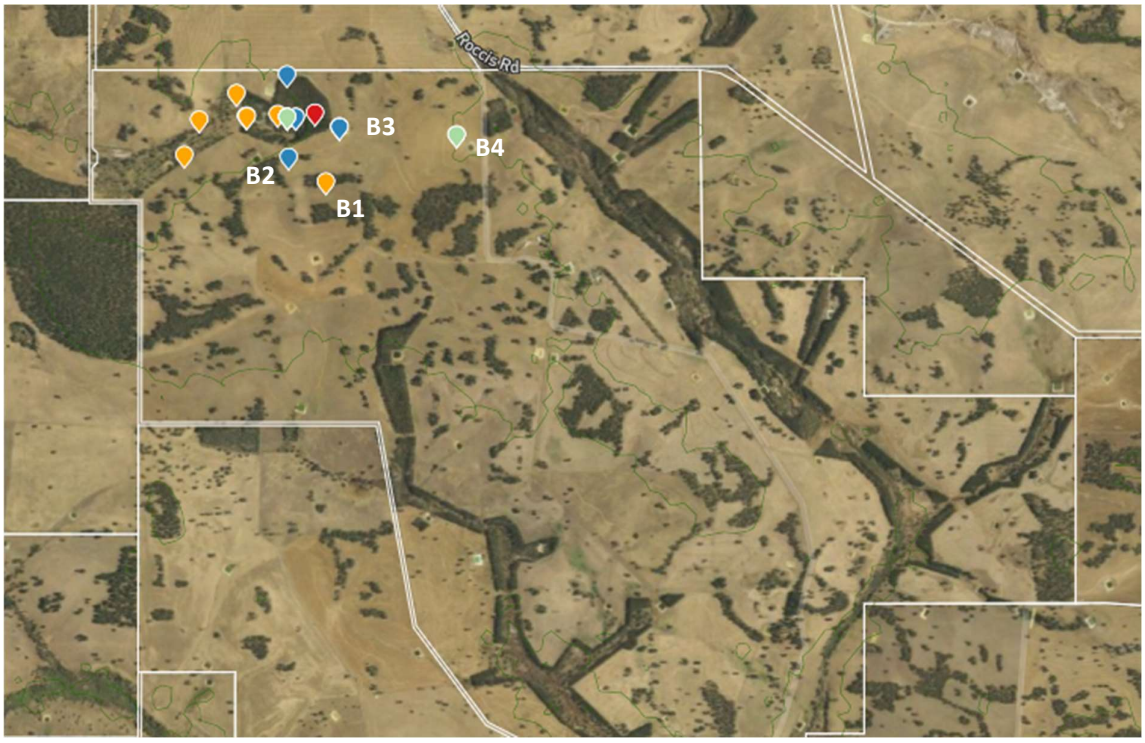

Figure 4. Groundwater Bores (DPRID, 2021)

Table 7. Groundwater Levels (DPRID, 2021)

Bore Name	Date of Sampling	Depth to Groundwater
B1	May 2014	9.27mBGL
B2	May2014	10.3m BGL
B3	March 1997	2.59m BGL
B4	May 2014	1.21m BGL

2.7 Flora and Vegetation

The site is located in the Jarrah Forest biogeographical region, one of 89 bioregions recognized under the Interim Biogeographic Regionalisation for Australia (IBRA). The pre–European vegetation is mapped as Medium Forest and Woodland, with Jarrah (Eucalyptus marginata), Marri (Corymbia calophylla) and Wandoo (E. wandoo) (Beard et al, 2013). The majority of the site is cleared for cropping and grazing, with some remnant vegetation present in in the riparian zones along the creeklines and some isolated stands of parkland cleared trees.

An EPBC Act Protected Matters Report (Appendix C) was generated using a radial buffer of 3 km from the site on 20 February 2022. Two plant species with conservation status were listed as potentially occurring onsite (Table 8).

Table 8. Threated Flora

Species	Conservation Status	
	EPBC Act	***Presence Text***
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat may occur within area

2.8 Fauna

An EPBC Act Protected Matters Report (Appendix C) was generated using a radial buffer of 3 km from the site on 20 February 2022. Species that potentially occur within the site and that are identified as protected under the EPBC Act are listed in Table 9.

Table 9. Threated Fauna

Species	Conservation Status	
	EPBC Act	***Presence Text***
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Eleocharis keigheryi Forest red-tailed black-cockatoo, Karrak [67034]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Zanda baudinii Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Species or species habitat may occur within area
Zanda latirostris Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding likely to occur within area
Bettongia penicillata Woylie [66844]	Endangered	Species or species habitat may occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area

Species	Conservation Status	
	EPBC Act	*Presence Text*
Phascogale calura Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor [316]	Vulnerable	Species or species habitat may occur within area

2.9 Indigenous Heritage

A search of the Department of Aboriginal Affairs' Aboriginal Heritage Inquiry System was undertaken on the 20 February 2022. The closest registered site was classified as 'Other Heritage Place 4648' Koolakin Burials and is located 1.3km west of the northern boundary, and shown in Figure 5.

Figure 5. Aboriginal Heritage Inquiry System Search

2.10 Surrounding Land Use and Associated Buffers

The property is zoned rural under the Shire of Williams TPS No. 2. All land within a five kilometre radius of the site is zoned rural. The dominant landuse in the area is broad acre agriculture, including cropping of cereals (wheat, barley, oats and canola) and the grazing of sheep.

Four isolated rural dwellings are located within 4km of the site. Details of each of these sites are summarised in Table 10.

Table 10. Local Receptors

Address	Distance from Property Boundary	Distance from Reuse Area	Type of Receptor
292 Plank Road, Meeking	0.8 km Southeast	1.7 km	Isolated Rural Dwelling
1086 Pig Gully Road, Williams	2.0 km East	3.6 km	Isolated Rural Dwelling
28 Kelly Road, Williams	2.5 km North	2.6 km	Isolated Rural Dwelling
1743 Collie-Williams Road, Williams	3.2 km West	3.3 km	Isolated Rural Dwelling

3 Whey Application to Land

3.1 Irrigation Area

A total reuse area of 583 ha of the site has been selected as suitable for the application of whey (Figure 1). This area has been identified with consideration to the soil characteristics and buffer distances to surface water ways. Whey application will be undertaken on paddocks dedicated to pasture, with the peak application over spring which coincides with the highest annual growth rates in the vegetation (and highest nutrients uptake rate). Irrigation of the perennial grasses that are already established at the site, including rye grass is proposed. Some late spreading may occur to paddocks scheduled for cereal cropping prior to seeding.

Buffer distances are recommended for application of wastewater through irrigation, in order for irrigation to be undertaken in a manner which will provide minimal impact on the local environment. The Environmental Protection Authority *draft Separation Distances Guidance Statement* (The Government of Western Australia - Environmental Protection Authority 2015) provides buffer requirement for premises on which liquid waste is stored or irrigated. Although whey is not considered a liquid waste, this is the most applicable document to determine buffer distance for the speeding of whey. The recommendation for Category 61: Liquid waste is one kilometre for noise and odour. The site achieves this buffer recommendation from all sensitive receptors, with the closest isolated rural dwelling 1.7 kilometres southeast of the reuse area.

3.2 Soil Characteristics

Soil sampling was undertaken onsite in January 2022. Eight sampling locations were selected from within the reuse area, with samples collected the topsoil (0 to 0.1m) and the subsoil (0.4 to 0.5m) (Figure 3. Soils were analysed for a range of parameters including Phosphorus Buffering Index (PBI). PBI is a measurement of a soils tendency to chemically adsorb phosphorus, with the higher the PBI indicating that the phosphorus binds more strongly to the soil particles and less available for the plant to uptake. High PBI soils present a lower risk of nutrient leaching, and generally require a higher level of phosphorus application to achieve the same level of plant available phosphorus compared with lower PBI soils. Table 11 details the standard categories for phosphors buffering in Australia.

Table 11. PBI Classification

PBI Category	Classification
<15	Extremely low
15-35	Very very low
36 – 70	Very low
71 – 140	Low
141 – 280	Moderate
281 – 840	High
>840	Very High

Source: (Moody 2007)

PBI results from the January 2022 soil sampling and the corresponding PBI classifications are provided in Table 12.

Table 12. Summary of Soil Testing Results

Sample Location	Sample Depth (m BGL)	PBI	PBI Classification*
S1	0.1m	122	Low
	0.4m	140	Low
S2	0.1m	91	Low
	0.4m	112	Low
S3	0.1m	54	Very low
	0.4m	50	Very low
S4	0.1m	121	Low
	0.4m	126	Low
S5	0.1m	129	Low
	0.4m	72	Low
S6	0.1m	208	Moderate
	0.4m	120	Low
S7	0.1m	95	Low
	0.4m	59	Very low
S8	0.1m	127	Low
	0.4m	155	Moderate

Results suggest that the soils on the site have a low capacity to retain phosphorus within the soil profile. These results indicate a satisfactory capacity for retaining nutrients deposited though whey application within the soil profile compared with many of the common soil types within Western Australia.

3.3 Nutrient Loading

Nutrient loading to the irrigation areas aims to apply nutrients at such a rate that they will be utilised by the existing vegetation and minimise leaching of nutrients below the root zone.

Based on a maximum annual whey production of 10ML and the design whey quality as detailed in Table 5, the total nutrient load requiring disposal through irrigation is summarised in Table 13, along with the average nutrient load over 583 ha of available reuse area..

Table 13. Total annual nutrients for application of 10 ML/yr of whey

Parameter	Total Annual Application (kg/yr)	Average Application Rate on 583 ha (kg/ha/yr)
Total Nitrogen	14,000	24
Total Phosphorous	3,500	6
BOD	50,000	86

The Western Australian Department of Water's *Water Quality Protection Note 22 – Irrigation with Nutrient Rich Wastewater* (Department of Water 2008) provides a framework for the permissible nutrient application rates for irrigation for different soil types and receiving environments. The framework allocates a risk category for a site depending on the potential for adverse environmental impacts to occur as a result of nutrient application through irrigation. Table 14 summarises the criteria for the risk category classifications.

Table 14. Soil and receiving environment risk categories

Characteristics of Irrigated Soil	Eutrophication Risk of Surface Waters within 500m of Irrigation Site	Risk Category
Coarse grained soils e.g. sands and gravels	Significant	A
	Low	B
Fine grained soils (PBI above 100) e.g. loams, clays, clay	Significant	C
	Low	D

Due to the location of the site, parts of the reuse area fall into Category B, C and D dependent on the distance from surface water and the PBI of the soil in the area. Based on the risk determined from Table 14, WQPN22 (Department of Water 2008) provides recommended a maximum nutrient application rate for nitrogen and phosphorus as highlighted in Table 15.

Table 15. Nutrient Application Rates for Soil/Receiving Environment Risk Categories

Risk Category	Max. Inorganic Nitrogen (as TN) Application Rate (kg/ha.yr)	Max. Reactive Phosphorus (as TP) Application Rate (kg/ha.yr)
A	140	10
B	180	20
C	300	50

D	480	120

Using the expected annual nutrients requiring spreading shown in Table 13 and the maximum application rates listed in Table 15 for a Category B and C site, the minimum required area for spreading is determined by the phosphorus application resulting and results in a requirement of 175 ha for a Category B loading, and 70 ha area for a Category C loading.

In 2018, as part of the environmental due diligence for the original whey spreading application at Arthur River, Brownes commissioned Soil Dynamics (experienced soil scientists) to undertake a desktop review recommending suitable whey applications using actual data from Brownes whey sampling program. This whey application rate was adopted in the DWER licence for the Arthur River site. Ongoing soil sampling at the site following four years of whey application has not shown any accumulation of salts or nutrients in the soil profile. It should be noted that the original soil report considered the application of 28ML of whey over a 400ha areas, to a site with significantly lower phosphorus retention capacity (PBI) than the current site. A full copy of the report is included in Appendix D.

Soil Dynamics proposed a recommended a whey application rate of 80kL/ha, which corresponds to 108.8kg/ha of nitrogen and 22.4kg/ha of phosphorus. It should be noted that these application loadings are only applicable for one year, with recommendation to move to a new location within the reuse area in the following years.

Table 16 provides a summary of recommended nutrient application rates relevant to the Roccis Road property from WQPN22 (Department of Water 2008) and the Soil Dynamics investigation. Based on a total maximum irrigation volume of 10ML, it is proposed to spread the whey over a 200 ha portion of the dedicated irrigation area, and then the following year spread the whey to a different 200 ha area within the dedicated 583ha irrigation area, meaning whey applications occur approximately once every 3 years in a given area. This corresponds with a whey application rate of 50kL/ha and a maximum nutrient application of 70 kg/ha of nitrogen and 17.5kg/ha of phosphorus per year for one year only. These target nutrient application rates for the site are shown in Table 16.

Table 16. Recommended Loading Rates, Reuse Area Requirements for 10ML Whey and Target Loading

	Total Nitrogen		**Total Phosphorus**		**BOD**	
	Loading	**Area Required**	**Loading**	**Area Required**	**Loading**	**Area Required**
WQPN 22: Category B	180 kg/ha	78 ha	20kg/ha	175 ha	25kg/ha/day	17 ha in November
WQPN 22: Category C	300 kg/ha	46 ha	50 kg/ha	70 ha	25kg/ha/day	17ha in November
Soil Dynamics Recommended Loading Rates	108.8kg/ha	129 ha	22.4kg/ha	156ha		n/a

Target Loading	**70 kg/ha**	**200ha**	**17.5 kg/ha**	**200 ha**	**2.5 kg/ha/day**	**200ha**

The highest BOD loading is likely to occur during peak production, during November. This will result in BOD application rate of 2.5kg/ha per day over the month.

An application of 10ML over a 200ha area corresponds to a hydraulic loading of 50kL/ha or 5mm per year. This application will occur in at least two passes over the irrigation period.

4 Environmental Risks and Management

4.1 Risk assessment

A risk analysis has been undertaken for all aspects of the operation of the whey spreading, in accordance with the procedures outlined in the Australian and New Zealand Standards AS/NZS ISO 31000:2009 Risk Management−Principles and Guidelines and HB 203:2012 (Managing Environment-Related Risk), using DWER's Guideline: Risk Assessment (Department of Water and Environmental Regulation and Government of Western Australia 2017).

Qualitative risk analysis was used to evaluate the significance of emissions and discharges (Table M). The risk analysis was undertaken assuming the proponent controls were in place. The consequence and likelihood descriptors used in Table 17 are the same as those presented in Table 1 – Risk Criteria Table in DWER (2017) guidance. Integrity Ag has determined the risk rating based on the consequence and likelihood of the risk event/emission occurring.

Table 17. Emission and discharges risk assessment

SOURCES OF EMISSION AND DISCHARGE		PATHWAY	RECEPTOR	PROPONENT CONTROLS	POTENTIAL IMPACT	CONSEQUENCE ON RECEPTOR	LIKELIHOOD	RISK RATING
Emission (type and quantity	**Emission event (normal/upset)**							
Whey discharge.	Leak/crack in storage tanks.	Water	Groundwater >2 m BGL.	• Tanks are above ground and of sufficient size to contain wastewater generated. • Any leaks would be immediately visible	Elevated concentrations of nutrients in the vicinity of the leak site. Highly unlikely to affect receptors or ecosystem function.	Slight	Rare	Low
	Excess Irrigation	Water	Groundwater >2 m BGL.	• Whey to be spread evenly over 200ha area each year. • Cumulative nutrient loadings to be calculated monthly to ensure annual loadings are not exceeded. • Log book kept of where spreading has occurred to ensure clear communication of spreading history.	Elevated concentrations of nutrients in the vicinity of the reuse area. Highly unlikely to affect receptors or ecosystem function.	Slight	Rare	Low

Odour emissions	Odour from irrigated whey and storage tanks	Air	Residences located >1.7 km from the reuse area boundary.	Whey will be spread within 24 hours of being delivered to site. Storage tanks are washed with freshwater prior to any periods of disuse. • The whey application rate is an extremely low hydraulic load so it is extremely unlikely that soils will be water logged	No detectable impacts to amenity are expected to residents, once the controls are implemented.	Slight	Unlikely	Low
Noise emissions	Operation of the spreading machinery.	Air	Residences located >1.7 km from the activity boundary.	Spreading will occur during daylight hours only	No detectable impacts to amenity are expected to residents.	Slight	Unlikely	Low

5 Environmental Monitoring and Reporting

5.1 Monitoring

Environmental monitoring is a key component in the success of the overall environmental performance at the site. The proposed monitoring program is summarized in Table 18. With the commencement of irrigation onsite, monthly samples of the whey will be collected when irrigating, and cumulative irrigation loadings determined to ensure nutrient targets are not exceeded. In addition, daily whey production volumes will also be recorded as the whey leaves the Brownes Brunswick operations.

Table 18. Environmental Monitoring Program

Location	Parameters	Frequency
Whey Sample	pH	Annually in November
(collected at Brownes Brunswick)	NOx-N	
	NH4-N	
	TN	
	TP	
	BOD	
	TDS	
	TSS	
Whey Volume (measured at Brownes Brunswick)	Volume of Whey Discharged	Daily

Brownes Food Operations are committed a high standard of environmental performance including compliance with all aspects of this WMP and the ongoing environmental monitoring program.

6 Conclusion

This Whey Management Plan outlines the methodology with which Brownes will utilise the nutrients contained within 10ML of whey through application to land within a 583ha reuse area located on Roccis Road, Meeking. The nutrient and hydraulic loading of the proposed irrigation system have been designed such that the benefits of whey application can be realised as a direct replacement for synthetic fertiliser, without negatively impacting on the local environment. Whey application over a 200 ha area each year will apply less than 70kg/ha of nitrogen and 17.5kg/ha of phosphorus. This application will occur approximately once every three years. The annual hydraulic loading to the area is 5mm total irrigation depth. Reuse of whey to land is not Brownes' preferred method for whey disposal, but is considered an interim measure to ensure that cheese production remains within Western Australia, whilst they continue to explore financially viable options for value adding to the whey product.

7 References

Department of Water (2008) Water Quality Protection Note 22: Irrigation with Nutrient Rich Wastewater.

Department of Water and Environmental Regulation, Government of Western Australia (2017) Guideline Risk assessments. 2017,. www.dwer.wa.gov.au.

Moody PW (2007) Interpretation of a single-point P buffering index for adjusting critical levels of the Colwell soil P test. 55–62.

The Government of Western Australia - Environmental Protection Authority (2015) draft Environmental Assessment Guideline for Seperation Distances between Industrial and Sensitive Land Uses.

Appendix A. Shire of Williams Correspondence

Appendix B. Landowner Letter of Operational Consent

Derbygrove Pty Ltd
238 Roccis Road
MEEKING 6392

Dear Scott,

This letter of agreement sets out the terms and conditions of the operational control to irrigate whey on the Farm, located on Lots 2159, 2160, 2161, 2618, 2970, 2972, 3146 and 3972Meeking, Arthur River.

1 BROWNES RESPONSIBILITIES

1.1 Brownes will be responsible for:

(a) arranging both the timing and the quantities of whey to be delivered to the Farm;

(b) the storage of the whey on the Farm prior to its irrigation;

(c) the running costs of irrigating the whey on the Farm;

(d) the irrigation of whey on the Farm in accordance with the terms and conditions specified in the Licence Application – Whey Management Plan (Integrity Ag and Environment, March 2022) as amended from time to time; and

(e) meeting the sampling and management procedures set out in the in Licence Application – Whey Management Plan.

1.2 Brownes will make available the results of all environmental testing and recording required to be conducted in accordance with the Licence Application – Whey Management Plan at your request.

2 YOUR RESPONSIBILITIES

2.1 The landholders responsibilities include:

(a) consent to the discharge of whey onto the farm in accordance with the terms of the Licence Application – Whey Management Plan;

(b) consent to Brownes and its representatives including contractors (with notice) access to the Farm for the purpose of carrying out irrigation;

(c) consent to Brownes and its representative's accessing the Farm for the purpose of taking samples and managing the irrigation in accordance with the Licence Application – Whey Management Plan and the DWER licence;

(d) consent to Brownes leaving storage tanks on the Farm which will be located in consultation with the manager;

(e) accept that Brownes may require and have access to the Farm at anytime to discharge whey, provided that such access occurs to minimise interference with farm activities; and

(f) provide written notice to Brownes in the event you wish to sell the Farm or lease it to a third party.

3 TERM

3.1 The term of this agreement will be for an initial period of 5 years commencing on 1 July 2022, and twelve months notice shall be given should termination of the contract by either party be requested.

I have read and agree to the terms of this Letter

I. M. Ewen

Signed

IAN MARGER EWEN.

Print Name

DIRECTOR

Position

Date 23/3/22.

Appendix C. EPBC Act Protected Matters Report

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 13-Mar-2022

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	11
Listed Migratory Species:	7

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	3
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity
Peel-yalgorup system	50 - 100km upstream from Ramsar site

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso		
Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely to occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Zanda baudinii listed as Calyptorhynchus baudinii		
Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Zanda latirostris listed as Calyptorhynchus latirostris		
Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding likely to occur within area
MAMMAL		
Bettongia penicillata ogilbyi		
Woylie [66844]	Endangered	Species or species habitat may occur within area
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Phascogale calura		
Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor [316]	Vulnerable	Species or species habitat likely to occur within area
PLANT		
Diuris micrantha		
Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area
Eleocharis keigheryi		
Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Bubulcus ibis as Ardea ibis		
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Chalcites osculans as Chrysococcyx osculans		
Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Extra Information

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

RFA Name	State
South West WA RFA	Western Australia

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed
Not controlled action (particular manner)			
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111

Appendix D. Soil Dynamics Whey Spreading Report