APPENDIX A

Environmental Assessment and Management Plan

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Avon Valley Farm
Free Range Broiler Poultry Farm
Shire of Northam, WA
Environmental Assessment and Management Plan

Prepared For:	Avon Valley Farming RMB 820 JENNACUBBINE WA 6401
Report Number:	AA2017/004
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AHD	Australian Height Datum
APL	Australian Pork Limited
BGL	Below ground level
°C	degrees Celsius
DER	Department of Environment Regulation
DoW	Department of Water
ESA	Environmentally Sensitive Area
kL	kilolitre
km	kilometre
m	metres
meq	milli equivalent
mg/L	milligrams per litre
mm	millimetre
NEGP	National Environmental Guidelines for Piggeries
NMP	Nutrient Management Plan
PBI	Phosphorus Buffering Index
SPU	Standard pig unit
TDS	Total dissolved solids
WQPN	Water Quality Protection Note

GLOSSARY

Free range: Animals that are not closely confined and have some access to the outdoors (RSPCA, 2013a).

Sensitive land use: Land uses sensitive to emissions include residential developments, hospitals, hotels, motels, hostels, caravan parks, schools, nursing homes, child care facilities, shopping centres, playgrounds, and some public buildings. Some commercial, institutional and industrial land uses which require high levels of amenity or are sensitive to particular emissions may also be considered "sensitive land uses". Examples include some retail outlets, offices and training centres, and some types of storage and manufacturing facilities (EPA, 2005). Single residential dwellings are not sensitive land uses in the context of EPA Guidance Statement No. 3 (EPA, 2005).

Separation distances: Distances provided between the operation and sensitive receptors (e.g. residences, recreational areas, towns etc.) are an important secondary measure for reducing the risk of amenity impacts. Separation distances are measured as the shortest distance measured from the operation to the nearest part of a building associated with the sensitive land use.

EXECUTIVE SUMMARY

Aurora Environmental has been engaged to undertake an environmental assessment of Avon Valley Farm, Northam, where Avon Valley Farm Pty Ltd proposes to develop a free-range poultry farm and grow chickens for the meat bird (broiler) market. Broiler poultry are bred as meat birds and free range indicates that the birds have access to open areas during the day (and for safety are confined during the night).

This environmental assessment includes a review of the environmental setting of the site. A review of planning elements is also provided, including zoning, current policies, recommended buffer distances to sensitive receptors, and management strategies to be implemented at the site.

The 2,874 ha property (Figures 1 and 2) currently operates as a grazing and cropping agricultural enterprise and the landowners propose to establish the free range poultry farm on Avon Lot 13 Northam York Road. Lot 13 has been largely cleared, and no additional clearing of native vegetation is proposed.

Site infrastructure will include four modules of six poultry sheds (24 sheds in total). Each module will be serviced with access tracks, water and feed tanks, a work shop and areas to store straw (litter). The sheds, each comprising 160m by 17.3m will be constructed of steel, with doors open for at least 5 hours per day. The floors of the sheds will be concrete and spread with straw bedding. Each shed will contain 44,800 birds for each batch, with 5.79 batches per year. This will result in an output of approximately 6.11 million birds per year. Approximately 1.075 million chickens (of varying ages) will be on the property at any one time.

The process for raising the poultry will be in line with *Meat Chickens, RSPCA Approved Farming Scheme Standards* (RSPCA, 2013). The grow out cycle will be 63 days comprising arrival of day old chicks which will be reared for 21 days prior to being allowed to free range. After approximately 35 more days, the poultry will be large enough to remove for processing. At the end of each cycle, the litter (straw and manure) will be removed from the property over a seven day period, prior to cleaning and spreading of new bedding.

Overall, the environmental setting of the site is considered compatible with the proposed poultry farm based on recommended separation distances set out in *Environmental Code of Practice for Poultry Farms in Western Australia* (WABGA *et al.*, 2004).

The Avon and Mortlock Rivers, located to the west and east of the subject land, respectively are considered the primary environmental receptors. The proposed poultry farm has appropriate separation from these waterways and has adequate vertical separation from the groundwater table. Separation distances to adjacent residences exceed 1000m. The site zoning of 'Rural' is compatible with the proposed poultry farm use.

Based on available information, it is considered that the proposed development can be operated without impacting the health or amenity of surrounding property owners and the wider public.

Various landowner commitments are proposed in order to ensure the site is managed in a manner that minimises opportunity for environmental impacts. Contingencies are proposed, to allow for appropriate responses, should issues be identified. This will allow for review and implementation of improvement options.

1 INTRODUCTION

1.1 PROPOSAL

Avon Valley Farm Pty Ltd is seeking planning scheme consent from the Shire of Northam to establish a free range meat bird (broiler) poultry operation at Avon Valley Farm. Parcels of land included in the land holding are shown in Table 1 and Figures 1 and 2. The 2,874 ha property comprises seven land parcels and currently operates as a grazing and cropping agricultural enterprise.

The landowners propose to establish the free range poultry farm on Avon Lot 13 (1,832.7ha). The lot proposed to be used for the operation is zoned 'Rural' under the Shire of Northam Local Planning Scheme No. 6. The lot has been largely cleared of native vegetation. No additional clearing of native vegetation is proposed.

TABLE 1: LAND PARCELS

Lot/ Location	Parcel Identifier	Area (ha)
Lot 91	P23146	90.234
Lot 92	P23146	50.174
Lot 93	P23146	50.150
Lot 94	P23146	154.17
Lot 13	D94266	1,832.7
Lot 150	D9351	2.8258
Lot 22	P77700	661.70

Broiler poultry are bred as meat birds and free range indicates that the birds have access to open areas during the day (and to prevent predation are confined during the night). Free range areas are fenced (compound fencing) to prevent predation. Day old chicks are transported to the sheds, enclosed and kept warm for 21 days (brooding stage). The young poultry are then allowed to free range during the day until they reach a minimum weight. At this stage, approximately 56 days into the cycle, collection of the birds occurs. Cleaning of the shed then takes up to seven days.

The poultry farm infrastructure will comprise four modules (each containing six sheds) on Avon Lot 13 Northam York Road (1,832.7ha) (Figure 3). Each module will be a minimum of 1,200m apart. Each of the 24 sheds (160m by 17.3m) will be constructed from steel with doors which will be open for at least 5 hours per day (apart from the brooder stage). The floors of the sheds will be concrete and spread with straw bedding. Sheds will be aligned along the contour or on as flat an alignment as possible and oriented to maximise cross ventilation.

Each of the 24 sheds will contain 44,800 birds per batch with 5.79 batches per year. This equates to production of 6,114,240 birds per year (or 1,075,200 at any one time). Each module will contain water and feed tanks, a work shop, a generator for backup power and an area to store straw (litter). Site infrastructure will include access roads.

It is proposed to remove the spent litter, comprising manure and bedding, from the property for beneficial reuse. This will be done using a bobcat type front end loader, with litter placed in a

covered side tipper truck for removal from the site. Litter is not proposed to be stockpiled or composted on site. Dead birds will be buried in trenches which will be immediately backfilled.

1.2 LEGISLATION, GUIDELINES AND POLICIES

Establishment and operation of poultry farms requires approval from the Shire of Northam as indicated by Local Planning Scheme No. 6 where the land use falls under the category of 'Animal Husbandry – Intensive' which is a use that requires consideration and approval by the Shire Council.

Operation and management of issues related to poultry farms is guided by a number of policies and guidelines, listed below and discussed in applicable sections of the document.

Policies and planning documents which are relevant to the proposed development of the site as a free-range poultry farm are identified as follows:

- *Statement of Planning Policy No. 4.3, Poultry Farms Policy* (Western Australian Planning Commission; WAPC, 2003).
- *Draft Guidance Statement – Separation Distances* (DER, 2015).
- *Environmental Code of Practice for Poultry Farms in Western Australia* (WABGA *et al.*, 2004).
- *Health Act 1911.*
- *National Water Biosecurity Manual, Poultry Production* (Department of Agriculture, Fisheries and Forestry, 2009a).

Bird management will be undertaken in accordance with guidance provided by the Royal Society for the Prevention of Cruelty to Animals (RSPCA) in *Meat Chickens, RSPCA Approved Farming Scheme Standards* (RSPCA, 2013).

2 EXISTING ENVIRONMENT

2.1 CURRENT LAND USE

Current land uses on the subject land include:

- A residence;
- Sheep grazing; and
- Cropping.

Most of the farm is zoned 'Rural' under the Shire of Northam Local Planning Scheme No. 6 (Appendix A). Lot 22 (661.70 ha) contains an area zoned 'Research Station' which is also used for sheep grazing and cropping.

Surrounding land uses comprise:

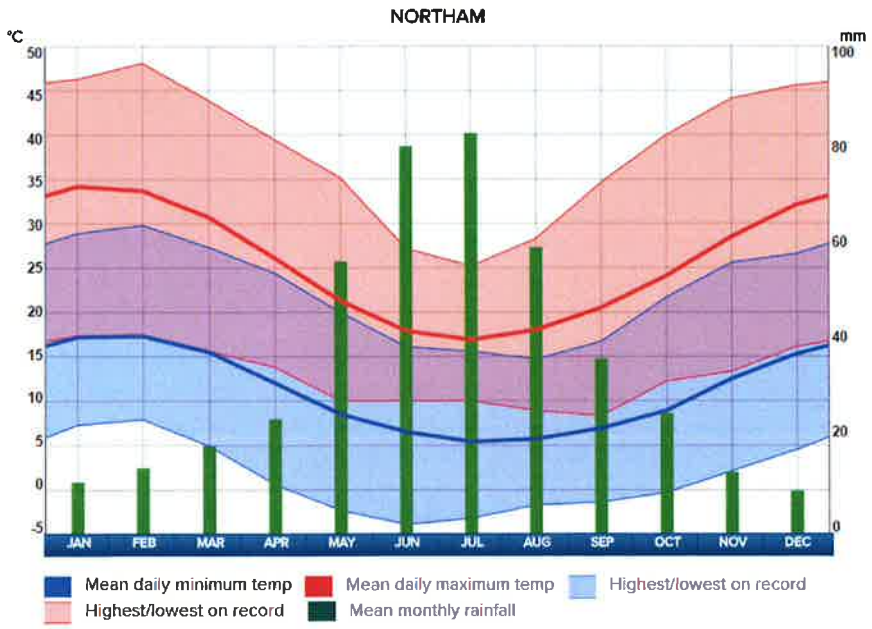
- Northam Townsite to the north;
- Muluckine East Townsite, including rural small holdings and residential land to the east;
- Muresk Agricultural College to the south west; and
- Other rural land uses (mostly grazing and cropping).

The Shire of Northam Local Planning Strategy (Shire of Northam, 2013) indicates that an area south of the current town site is designated for 'Future Residential' use (Appendix B). The southern edge of this area is 2.7km from the nearest proposed module (Module 4)

2.2 CLIMATE

The Northam 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 Northam Weather Station (Plate A; Site number: 10111) for the period 1877 to 2017 (BOM, 2017).

PLATE A: CLIMATE



Source: Weatherzone, 2017: http://www.weatherzone.com.au/climate/station.jsp?lt=site&lc=10111

Rainfall in the Northam area is seasonal and is generally confined to the winter months (May to August). Mean monthly rainfall is highest in July at 82.2 mm. The lowest mean monthly rainfall is 8.9 mm in December. The average annual rainfall is 415.3 mm, with an average of 76.8 rain days per year.

The mean annual maximum and minimum temperatures for Northam are 25.3°C and 10.9°C, respectively. The highest temperatures are usually experienced in January, when the mean monthly maximum temperature is 34.2°C and the mean monthly minimum temperature is 5.4°C in July.

2.3 TOPOGRAPHY

A review of the WA Atlas (Landgate, 2016) topography contours indicates the subject land has plateau areas with relatively gently slopes with high points around 265 mAHD (Figure 3). A sub catchment divide runs from north east to south west, with land sloping down to the east (157 mAHD) and west (204 mAHD). The poultry operations will be located on the higher elevations of the subject land, between 190 m and 265 m AHD. The lowest areas of the subject land are associated with ephemeral drainage lines which drain to the eastern and western boundaries.

2.4 LANDSCAPE AND GEOLOGY

The subject land is located in the Rejuvenated Drainage Zone (with the Darling Range Drainage Zone to the west and the Ancient Drainage Zone to the east). The Rejuvenated Drainage Zone has an active drainage system with north-south flowing branches of the Avon River that meet at Northam and break through the Darling Range to join the Swan River. The landscape is relatively dissected, with variable soils formed from dissected laterite profiles and underlying crystalline rock.

Geologically the area is associated with the Yilgarn Craton which is characterised by features such as faults, dykes, major rock formations and waterways trend NW/SE, E/W or NE/SW. The north-west alignment of major rock bands of the Yilgarn Craton reflects its formation over many hundreds of million years as rafts of land on tectonic plates collided to form bands of gneiss that were intruded by granites. Stresses associated with these events caused cracking and intrusion of the dolerite dykes that occur throughout the craton.

The Northam district contains few sedimentary rocks compared with the Perth basin. Igneous rocks include granite, dolerite, gabbro, quartz and metamorphic rocks such as gneiss, migmatite and banded ironstone that are the parent materials for wind and waterborne deposits, laterites and a range of soils. Outcrops are relatively common in dissected (rejuvenated) areas.

2.5 SOIL TYPES AND LAND CAPABILITY

Department of Agriculture and Food (DAFWA, 2012) soil mapping indicates the subject land contains soil types as shown in Table 2 and Figure 4. The poultry farm is proposed to be located in soil type 256JcYO – Jelcobine York Subsystem.

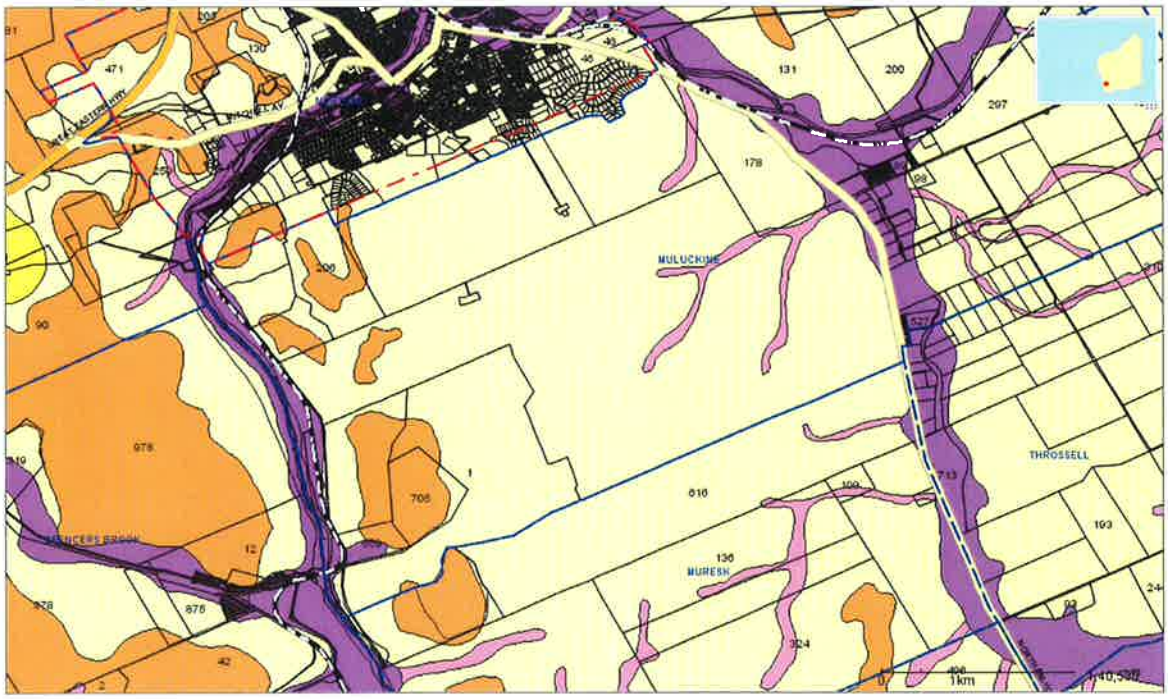
TABLE 2: SOIL TYPES

MAP UNIT	MU NAME	MU SUMMARY DESCRIPTION
256JcYO	Jelcobine York Subsystem	Areas of soils derived from freshly exposed rock. This unit is typified by the red soils of the Avon Valley but also includes areas of similar, but often greyer and lighter textured soils to the east of the valley.
256JcR2	Steep Rocky Hills 2 Subsystem (Jc)	Areas of steep, rocky hills.
256JcHM	Hamersley Subsystem (Jc)	Narrow, minor drainage lines that occur predominantly within the York unit and lead down to major drainage systems such as the Avon and Dale rivers.

Source: Department of Agriculture and Food, Soil-landscape Mapping – Best Available (DAFWA-033), 2017 http://www.nationalmap.gov.au/

Land capability mapping (DAFWA, 2013: Landgate, 2017) indicates that Lot 13 mostly comprises soils which are not considered to be at risk of phosphorus export. Drainage lines within Lot 13 have a moderate risk of phosphorus export.

PLATE 2: PHOSPHORUS EXPORT RISK



Source: Landgate, 2017 (Soil landscape land quality – Phosphorus Export Risk (DAFWA-010) (13-06-2013). Purple shading indicates high phosphorus export risk. Tan and yellow shading indicates moderate export risk. Buff colour indicates low export risk.

2.6 SOIL SAMPLING

Soil sampling was undertaken on Lot 13 in 2014 with results shown in Table 3. Soil sampling locations are shown in Figure 4.

TABLE 3: SOIL SAMPLING RESULTS

Y-P-S	Lat	Lon	Colwell-P	Colwell-K	OC	pH top	Texture	NO3-N	NH4-N	KCl40-S	PBI
14: Howlett's-1	-31.698749	116.7284	32	196	1	5.3	1.5	3	4	9	30
14: Howlett's-10	-31.70185686	116.7211	37	154	0.95	4.4	1.5	2	5	16	28
14: Howlett's-11	-31.70504381	116.7215	44	119	0.62	4.6	1.5	2	8	12	34
14: Howlett's-12	-31.700654	116.7268	45	480	1.49	5.4	2.5	4	5	14	41.8
14: Howlett's-13	-31.70355928	116.7185	39	112	0.86	4.9	2	6	5	12.5	23.2
14: Howlett's-2	-31.70180848	116.7359	54	63	0.82	4.9	2	4	6	13	35
14: Howlett's-3	-31.70421193	116.7305	22	197	0.99	4.8	2	2	4	9	27
14: Howlett's-4	-31.7054554	116.7269	33	294	1.26	4.7	1.5	6	7	11	30
14: Howlett's-5	-31.70619944	116.7291	55	176	1.25	4.8	1.5	7	9	15	21
14: Howlett's-6	-31.70305548	116.7251	33	162	1.59	5.1	1.5	8	7	15	21
14: Howlett's-7	-31.70218459	116.7288	44	147	1.02	5.3	1.5	5	4	10	24
14: Howlett's-8	-31.70024122	116.7244	46	68	1.01	4.9	1.5	4	4	6	24
14: Howlett's-9	-31.70430063	116.7169	41	274	1.07	5.3	1.5	8	4	11	22
14: Pipe in Creek-1	-31.68570728	116.7102	51	125	1.83	7	2.5	7	4	10.5	69.7
14: Pipe in Creek-2	-31.68294728	116.7166	39	217	1.07	5.9	2	21	2	8.7	21.3
14: Airstrip-1	-31.69530238	116.7093	37	371	0.91	5.2	2.5	12	5	7.4	26
14: Airstrip-2	-31.69961096	116.7097	42	275	0.93	4.9	2	15	10	11.5	26.6
14: Trigg-1	-31.68553873	116.6965	63	176	2.09	5	2	22	6	35	37.2
14: Trigg-2	-31.6911131	116.6877	29	195	0.93	5.4	1.5	29	5	8.3	24.3

Interpretation of soil sampling results are included in Table 4. As a farm actively run for cropping and grazing, soil parameters are within expected ranges. Fertilisers are applied annually, depending on crop types and soil testing results.

TABLE 4: SOIL TESTING RESULTS - INTERPRETATION

PARAMETER	RESULT RANGE	COMMENT
Texture	Soils across the site comprise 1.5: sand to sandy loam to 2.5: loam to clay loam	1: Sand, 1.5: sand to sandy loam, 2: sandy loam to loam, 2.5: loam to clay loam, 3: clay loam to clay, 3.5: clay to heavy clay.
Gravel %		Gravel present in some areas
Ammonium Nitrogen (mg/Kg)	2 - 10	Less than 5 is considered low. Relatively low to moderate levels present, indicates that some areas need nitrogen application for agricultural performance. #
Nitrate Nitrogen (mg/Kg)	2 - 29	Less than 5 is considered low. Nitrate-nitrogen concentrations less than 20mg/kg indicate relatively low - moderate levels, usually linked with fertiliser history and previous crops grown (e.g. legumes). #
Phosphorus Colwell (mg/Kg)	22 - 63	The soils at the site have moderate levels of P, indicating a consistent fertiliser history.*
Potassium Colwell (mg/Kg)	<63 - 480	An adequate range for agriculture is 120 – 250. Levels range from low to relatively high across the site for K.#
Organic Carbon %	0.62 – 2.09	In sand, levels less than 0.5 indicate low C, 0.5 – 1.0 indicate moderate C and >1 indicate high. Soil samples indicate moderate and high organic content across the site.
pH Level	4.4 – 5.9	pH in a range of 5 – 8 is considered acceptable. Soils in the district are known to be slightly acidic so 4.4 is in a range acceptable for the area.

Source: * APL (2013) *Environmental Guidelines for Rotational Outdoor Piggeries* Section 14.2.2 and # Government of South Australia, 2016.

2.6.1 Phosphorus Buffering Indices

Phosphorus Buffering Index (PBI) provides a measure of the phosphorus holding capacity of soils. Phosphorus retention is important as it provides an indication of whether nutrients discharged will be bound to soils and held in the soil profile or leached into the environment. High PBI scores indicate a high nutrient retention capability (levels above 100). PBI results for the subject land range from 21 to 69.7 which corresponds to Very, Very Low to Very Low (Table 5). In a cropping environment, lower PBIs indicate that phosphorus is more available and that less needs to be added for crop health.

TABLE 5: PHOSPHORUS BUFFERING CATEGORIES

INDEX	PBI CATEGORY
< 5	Exceedingly low
≤5-10	Exceptionally low
≤10-15	Extremely low
≤15-35	Very very low
≤35-70	Very low
≤70-140	Low
≤140-280	Moderate
≤280-840	High

Source: DAFWA, 2015.

2.7 CATCHMENTS

The southern and eastern portion of the subject land is in the Mortlock East Branch sub catchment. Water from this area flows into the Mortlock River East and discharges into the Avon River just west of Northam (Landgate, 2017). The north and western portion of the subject land is in the Avon Mainstream sub catchment (Plate 3) which flows into the Avon River. The Avon River ultimately discharges into the Swan River.

PLATE 3: SUB CATCHMENTS

Source: Landgate, 2017

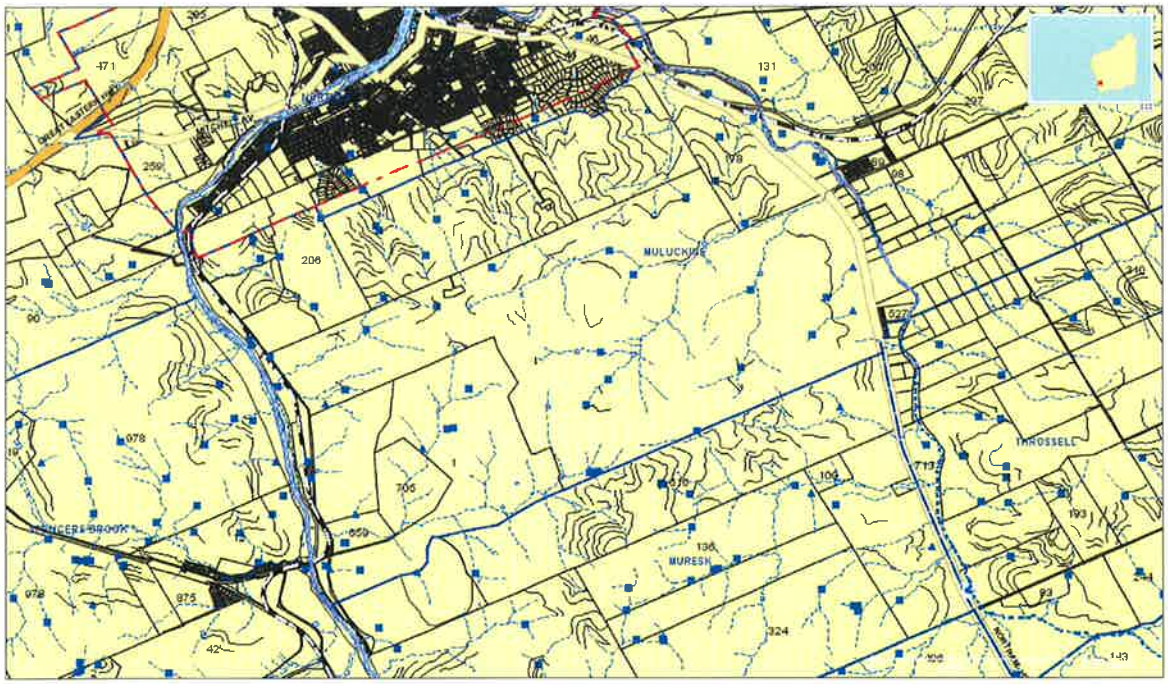
2.8 WATERCOURSES, GROUNDWATER AND WETLANDS

There are no perennial watercourses on the property. There is a poorly defined ephemeral water course within Lot 13 (Plate 4).

The Avon River is located to the west of the property (and 3km from the western boundary of Lot 13). The Avon River has an associated 1 in 100 annual recurrence interval (ARI) or 1% annual exceedance probability (AEP) Floodplain Development Control area (Landgate, 2017; DoW-032, 2016; Plate 1). The proposed poultry farm infrastructure will be in an elevated area, well outside the floodplain development control area.

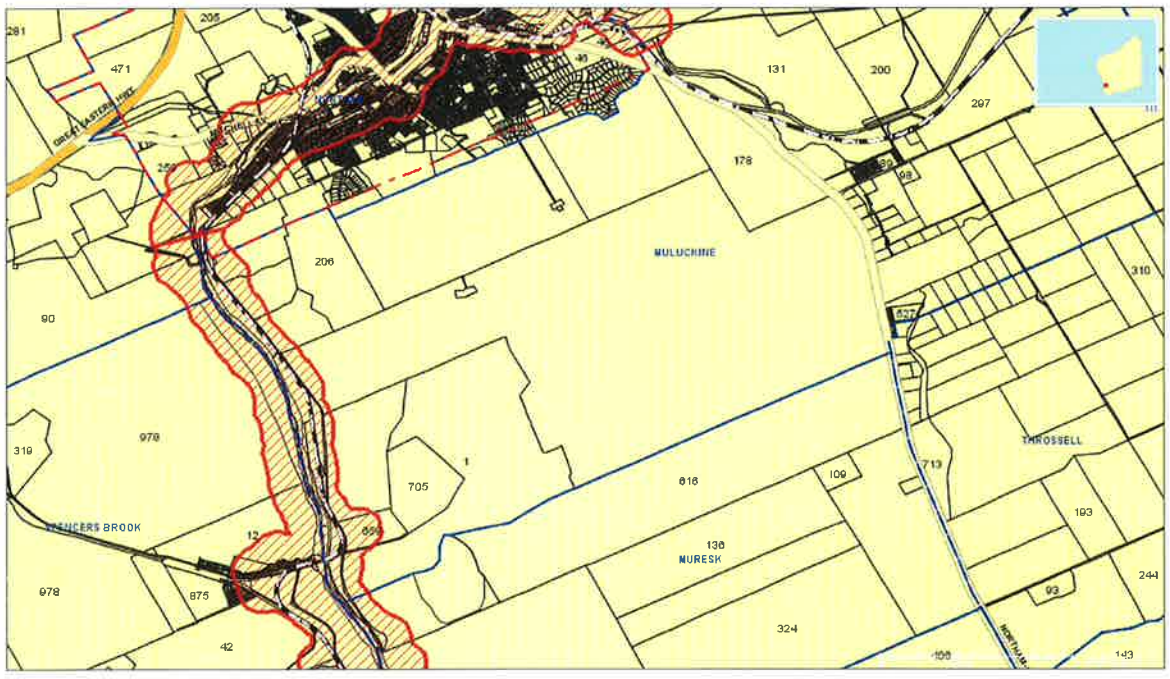
The Mortlock River lies 200m east of the eastern boundary of the subject land.

PLATE 4: DRAINAGE LINES AND WATER FEATURES



Source: Landgate, 2017

PLATE 5: FLOODPLAIN DEVELOPMENT CONTROL AREA



Source: Landgate, 2017

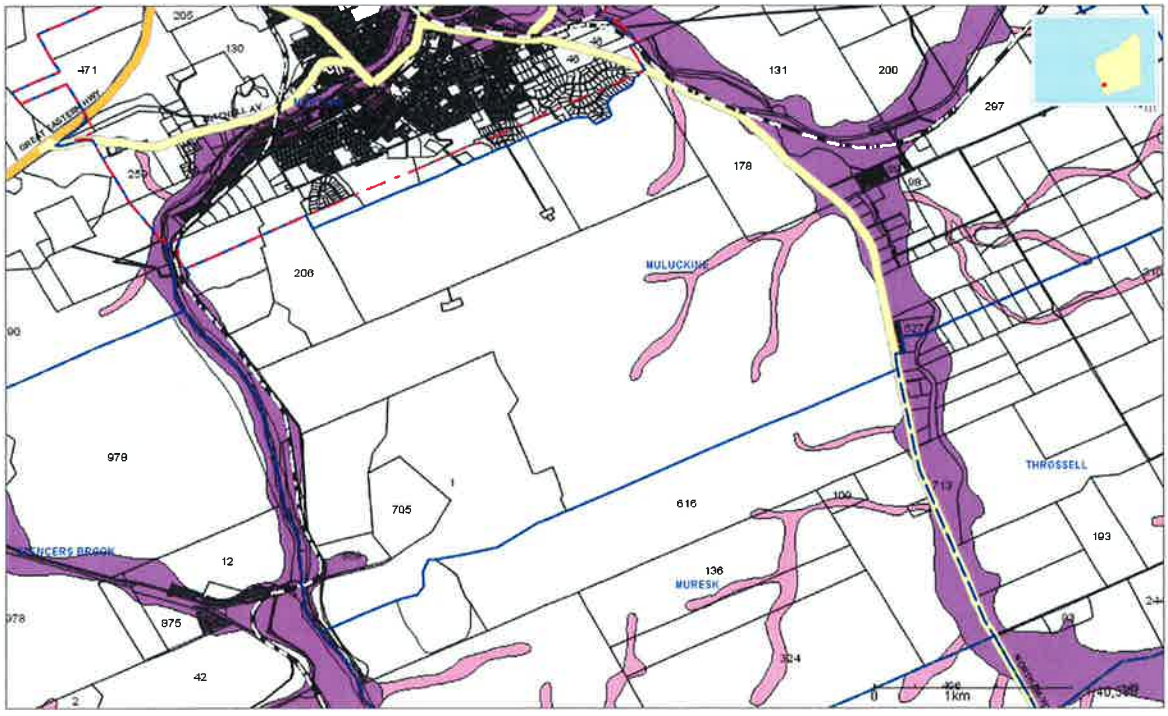
Soil landscape mapping by DAFWA (Landgate, 2017; 2013) indicates that areas associated with the Mortlock East River and Avon River can have a high risk of flooding, with the poorly defined drainage lines on the eastern portion of the subject land having a medium risk of flooding (Plate 5; Flood prone indicated by purple and pink shading). Poultry farm infrastructure will not be placed in flood prone areas.

Significant, low salinity groundwater resources within the Shire are rare (Shire of Northam, 2013). Groundwater quantity and quality decreases from west to east across the Shire in accordance with annual rainfall. On the Darling Scarp in the west, potable groundwater in small quantities can reliably be found in shallow bores and wells sunk through laterite into the granite below. For the remainder of the Shire, groundwater quality is mainly suitable only for stock watering purposes although in smaller catchments, where geological conditions are suitable, small quantities of potable groundwater can be found, however, this is of limited significance.

An investigation to quantify the volume and quality of possible groundwater sources in relation to the subject land is currently being undertaken (Aquageo, 2017). Preliminary results (Aquageo, pers. Comm.) indicate that sufficient resource will be available for the poultry farm. Groundwater at the investigation site was 15m below ground level (approximately 150m AHD; Figure 3), with a minimum separation to groundwater for the four modules of 30m.

The subject land does not contain any wetlands or groundwater dependent ecosystems.

PLATE 6: FLOOD PRONE AREAS



Source: Landgate, 2017 (Soil landscape land quality - Flood Risk (DAFWA-009) (13-06-2013). Purple shading indicates high flooding risk.

2.9 VEGETATION

The subject land is located in the Avon Wheatbelt P2 biogeographical region, one of 89 bioregions recognized under the Interim Biogeographic Regionalisation for Australia (IBRA). The subject land is within the Southwest Botanical Province as described by Beard (1980) and contains Beard Vegetation Unit: York_352.6 which is characterised by Eucalyptus woodland and Acacia mixed open shrubland with *Eucalyptus loxophleba, Eucalyptus accedens, Allocasuarina huegeliana, Acacia acuminata, Hakea preissii, Acacia pulchella, Allocasuarina campestris, Gastrolobium spinosum, Grevillea sp., Leptospermum ellipticum.*

Source: Landgate, 2017 (Native vegetation Extent (DAFWA-001, 2016)

A search of the Commonwealth Department of Environment and Energy's (DEE) database of Matters of National Environmental Significance (MNES) indicated that there could be a Threatened Ecological Community (TEC) in the vicinity of the subject land. The TEC is called 'Eucalypt Woodlands of the WA Wheatbelt' and is described by Commonwealth of Australia (2016) as:

> *Eucalypt Woodlands are found on the flatter landscapes and lower rises of the wheatbelt. The main trees are eucalypts that typically have a single trunk. They occur as a complex mosaic involving about 30 species, including many iconic trees of the Wheatbelt including York gum, Flooded gum, Flat-topped yate, Mallets, Wheatbelt wandoo, Kondinin blackbutt, Lake mallets, Swamp mallets, Salt River gum, Salt salmon gum, Salmon gum, Red morrel, Gimlet, Merrit and Wandoo. The trees present varies from patch to patch. The native understorey is diverse and very variable, ranging from largely bare to grassy to herbs and wildflowers to shrubby.*

The subject land has been mostly cleared for agricultural purposes. Areas with vegetation remaining are shown in Plate 7 and Figure 2. The poultry farm location does not require clearing of native vegetation.

2.10 HERITAGE

The Department of Aboriginal Affairs Heritage database has been sourced (Landgate, 2017). No listed Aboriginal heritage places are known to occur on the subject land. The nearest known sites are associated with the Great Eastern Highway (Site 3522: Northam Hill) and the railway line (Site 4030; Grass Valley 1).

2.11 BUSHFIRE

The Department of Fire and Emergency Services *Map of Bush Fire Prone Areas* (2016) indicates that none of the modules are within areas considered to be 'Bush Fire Prone'.

Source: https://maps.slip.wa.gov.au/landgate/bushfireprone2016/

3 PLANNING GUIDELINES

This section outlines the guidance provided in various planning documents in relation to poultry farms. Where required, additional detail about how management strategies to be implemented at the site to address the guidelines is presented in the following section.

3.1 ZONING

The WAPC *Poultry Farms Policy* states that 'new poultry farms should be located on rural zoned land' (WAPC, 2003). The subject land is zoned Rural, consistent with this policy. In order for the site to be developed as a poultry farm, however, it requires Shire of Northam approval for this use, as intensive animal husbandry (which includes poultry farms) is a discretionary land use under Shire of Northam Local Planning Scheme No. 6.

3.2 SEPARATION DISTANCES

The WAPC *Poultry Farms Policy* states that new poultry sheds are to have buffers of 100m from the boundary of the poultry farm, 300m from any existing or future rural-residential zone, and 500m from existing or future residential zone (WAPC, 2003). The proposal incorporates the required buffers within the subject land boundaries, as shown on Figure 2.

The Environmental Protection Authority (EPA) guidance statement *Separation Distances Between Industrial and Sensitive Land Uses* (EPA, 2005) acknowledges that a code of practice for the poultry industry exists and indicates that buffer distances of between 300m and 1000m are recommended, depending on the size of the poultry farm. This is consistent with the EPA's 2015 Draft Guidance for separation distances.

There is approximately 1.1 km separation between Module 2 and the nearest existing residence at Lot 340 (No. 585) on Northam York Road. Distances from other modules to other neighbouring residences exceeds 1.1 km (as shown in Figure 2).

The *Environmental Code of Practice for Poultry Farms in Western Australia* (WABGA *et al.*, 2004) sets out additional recommended buffer distances between poultry farm infrastructure, adjacent properties and environmental receptors, as summarised in Table 6.

TABLE 6: RECOMMENDED BUFFERS FOR POULTRY FARMS

Facility	Poultry sheds (same farm operator)	Poultry sheds (different Farm operator)	Existing or future residential zone	Existing or future rural residential zone	Farm boundary	Water supply bores	Wetlands, waterways and floodways	Water table
New free to range sheds [1]	20m between enclosures	1000m	500m	300m	100m	50m	200m	3m
Manure storage compounds	Not applicable to this operation							
Burial of dead birds						100m	50m	3m

Facility	Poultry sheds (same farm operator)	Poultry sheds (different Farm operator)	Existing or future residential zone	Existing or future rural residential zone	Farm boundary	Water supply bores	Wetlands, waterways and floodways	Water table
Manure/ litter application to land	Not applicable for this project							

Source: WABGA et al. 2004. Notes: [1] buffer starts 20 m outwards from the shed perimeter.

The proposed poultry farm layout meets buffer requirements for:

- Recommended 1000m separation from offsite commercial or private poultry farms.
- Recommended 50m separation between poultry shed water discharge and groundwater bores.
- Recommended 20m between free-range sheds and enclosures, 200m to waterways, and 3m to groundwater.
- Recommended 100m separation between burial pits for dead birds and groundwater bores, 50m to waterways, and 3m to groundwater.

The above lateral separation distances are all incorporated in the proposed site layout. In addition, the distance between modules is at least 1.1 km, for biosecurity purposes.

Vertical separation distances are also achieved at the site, with a groundwater separation of at least 30m for each of the four modules and the burial site. This allows for a more than adequate vertical separation from the proposed poultry sheds to groundwater and from the base of proposed burial pits to groundwater.

3.3 NUISANCE

Provisions of the *Health Act 1911* would apply to the site if a local government Environmental Health Officer determined that site operations created a nuisance that was not appropriate to site operations. The *Health (Poultry Manure) Regulations 2001* do not apply to the site, as it is not located within a local government area subject to the regulation.

Nuisance issues associated with poultry farms would typically include emission of odour or fly breeding. Given that the nearest residence to the site is more than 1000m from the sheds at their closest point, it is not anticipated that odour issues would arise.

Fly breeding risk is minimal as litter will be removed from site when sheds are cleaned out (without storage on-site).

4 MANAGEMENT STRATEGIES

This section sets out management strategies to be employed at the site in order to manage potential environmental impacts associated with site operations. The proposed site layout is presented on Figure 4.

4.1 ODOUR & NOISE

The nearest residence is located more than 1.1 km east of the nearest shed of Module No. 1. This exceeds the maximum buffer distance of 1000m indicated in the EPA separation distance guideline (EPA, 2005 and EPA, 2015). All site buildings will be set back at least 100m from the subject land boundaries to comply with the requirements of the *Poultry Farms Policy* (WAPC, 2003).

The risk of significant offsite noise or odour impacts is considered to be low due to the distance to the nearest residence (1.1 km to the east). Daytime site noise will generally be in line with that associated with farming activities in a rural area. While some activity will take place at the site at night, such as catching operations and the arrival and departure of associated vehicles, there is not anticipated to be a high level of noise that would result in offsite disturbance.

4.2 LITTER MANAGEMENT

The risks associated with management of litter (fly breeding, uncontrolled runoff, and nutrient infiltration to groundwater) are reduced for this project as all litter from the sheds will be removed from the property for beneficial uses (without on-site stockpiling or storage).

4.3 NUTRIENT MANAGEMENT

While litter will be removed from the sheds at the end of each batch of chickens, some manure will be deposited in the free range areas. Given that the chicks are too small for free ranging for the first 21 days (brooding stage), there is approximately 35 days in each cycle when manure is likely to be deposited. During the 35 day grower phase, the majority of nutrients (90%) are expected to be deposited within the shed structures, with 10% deposited outside during free ranging (as described in *Environmental Code of Practice for Poultry Farms in Western Australia*; WABGA *et al.* 2004). The Environmental Code suggests that 750 kg of manure is produced per 1000 birds over the growing period, so 10% of this equals 75 kg per 1000 birds. As each shed has approximately 44,800 birds per batch, this equates to 3.3 tonnes of manure per batch or 19.1 tonnes per shed per year (based on 5.79 batches per annum). For the 24 sheds, approximately 458.5 tonnes of manure per year will be produced in the free range areas. Table 7 indicates the volumes of manure and nutrient content.

It is proposed to rotate the free range areas available to the chickens from one side of the shed to the other to maintain grass cover. While one side is being used, the other side will have 80% of the manure removed using a bobcat. Manure will be removed from the farm. This rotation will also allow for rehabilitation of the resting free range area. The remaining 20% of manure will be assimilated into the farming system, which, due to its significant size, does not pose a risk to the surrounding environment.

TABLE 7: COMPOSITION OF BROILER MANURE (NO LITTER)

	Total Volume	Total Nitrogen	Ammonium NH4 –N	Total Phosphorus	Potassium
Fresh Poultry Manure (kg/tonne)*		13	5	8.5	5.5
Poultry manure in free range area per batch per shed	3.3 tonnes	42.9 kg	16.5 kg	28.05 kg	18.15 kg
Poultry Manure in free range area per shed per year	19.1 tonnes	248.3 kg	95.5 kg	162.35 kg	105.05 kg
Poultry Manure in free range area. All sheds for one year	458.6 tonnes	5959.2 kg or 3.2 kg/ha/year	2292 kg or 1.25 kg/ha/year	3896 kg or 2.12 kg/ha/year	2521.2 kg or 1.34 kg/ha/year
80% of manure removed from free range area	199 tonnes removed	4767.36 kg	1833.6 kg	3117.12 kg	2016.96 kg
20% of manure assimilated into Lot 13 (1,832.7 ha)	49.9 tonnes	1191.84 or 0.65kg/ha/year	458.4 or 0.25 kg/ha/year	779.28 or 0.42 kg/ha/year	2016.96 or 0.27 kg/ha/year

Source:* Zublena *et al.* 1997.

To illustrate the ability of Lot 13 to assimilate the balance of nutrients, the Department of Water's *Water Quality Protection Note 22 – Irrigation with Nutrient Rich Wastewater* (July 2008) provides some recommended maximum nutrient application rates for nitrogen and phosphorus (Table 8). Although the nutrients are in the form of solid waste rather than in wastewater as specified in the document, the values are useful as a basis for determining a sustainable nutrient loading rate to the soils. Given the soil types and the distance from any surface water bodies, the production area would fall within the Risk Category D. For a Category D site, the suggested application rate for nitrogen and phosphorus is 480kg/ha/year and 120 kg/ha/year (See Table 8) . As Lot 13 is 1,832.7 ha, even if 100% of the free range manure was assimilated, the nutrient loading of nitrogen and phosphorus would be significantly less than the trigger amount (N – 0.25 kg/ha/year and P – 0.42 kg/ha/year, respectively).

The application of nutrients to land in the form of solid waste is unlikely to have negative environmental impacts and will result in improved soil quality and productivity.

TABLE 8: NUTRIENT APPLICATION RATES FOR SOIL/RECEIVING ENVIRONMENT RISK CATEGORIES

RISK CATEGORY	MAXIMUM INORGANIC NITROGEN (AS N) APPLICATION RATE (KG/HA/YEAR)	MAXIMUM REACTIVE PHOSPHORUS (AS P) APPLICATION RATE (KG/HA/YEAR)
A	140	10
B	180	20
C	300	50
D	480	120

4.4 DRAINAGE MANAGEMENT

Management of drainage from the poultry operation will be undertaken to reduce the risk of erosion. The sheds will be constructed along the contour on gently sloping areas to reduce the need for cut and fill.

Runoff from the shed roofs will be directed to the free range area to encourage the growth of grass. This area will be shaped and contoured to prevent ponding of water and to ultimately direct the water to the fenced perimeter, which abuts paddocks that will be used for cropping and grazing on a rotation basis. The paddocks already contain drainage systems established via a direct drilling cropping methodology, which has created micro drainage systems to capture and infiltrate surface water flow. Given the relatively low annual average rainfall in Northam (415 mm) this is considered adequate for prevention of erosion and scouring from movement of surface water.

All internal roads will have adequate drainage to minimise erosion.

4.5 BIOSECURITY

Adequate biosecurity is required on a poultry farm to maintain sanitation, disease control and vermin management and is integral to the health of the flock and quality of the product. This means that access to a poultry farm needs to be limited to authorised personnel with a high standard of hygiene at all times. This free range poultry farm will comply with the *National Farm Biosecurity Manual for Poultry Production* (Department of Agriculture, Fisheries and Forestry, 2009).

4.5.1 Distance between Modules

For biosecurity reasons, there will be a minimum distance of 1000 m between the modules. Hygiene protocols will be implemented for staff and activities that will operate between the four modules, to reduce the risk of spread of disease.

4.5.2 Access to Poultry Areas by Ruminants

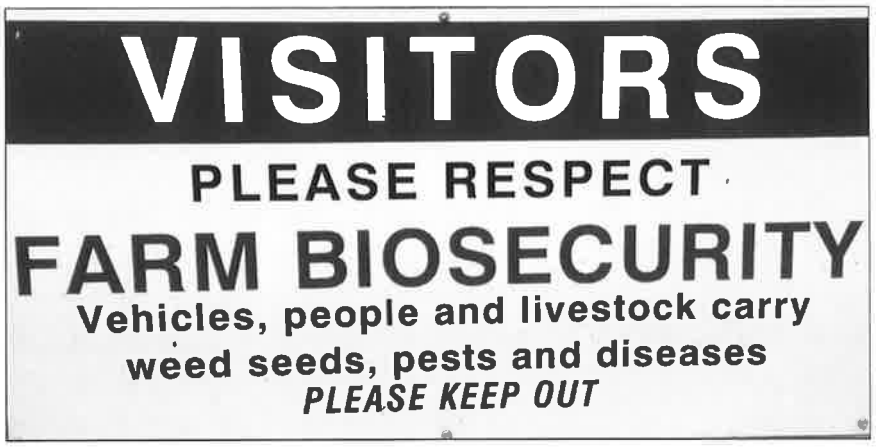
There is a ban on feeding restricted animal material to ruminants to reduce the risk of introduction of Bovine Spongiform Encephalitis (BSE). Chicken manure may contain restricted animal material including feathers, tissue and poultry feed. Grazing animals will be kept out of the free range area through installation of a fence.

4.5.3 Visitor Management

Visitors and their vehicles must remain outside of the designated production areas. There will be an induction process for people who visit the production area.

A sign will be placed close to the entry of the production area to advise visitors of biosecurity requirements (Plate 7).

PLATE 7: BIOSECURITY SIGNAGE



4.5.4 Rodent Control

The main pests of concern in a poultry grower facility are rodents such as the black rat (*Rattus rattus*) and the European mouse (*Mus musculus*). Foxes (*Vulpes vulpes*) may also pose a risk of loss of poultry by predation. The goal of pest management is to reduce pests to an acceptable level. Pest management will be approached in an integrated manner and will be implemented using the following methods:

- Monitoring of pest levels will be undertaken through deploying sampling devices/traps and visual inspections.
- Preventative measures will include:
  - Feed for poultry will stored securely and will only be supplied inside the shelters, to reduce access by pests;
  - Frequent clean-up of spilled food;
  - Reducing shelter for rats and mice;
  - Fencing of free range areas; and
  - Deployment of bait stations.

4.6 BIRD DEATHS, ACCIDENT MANAGEMENT AND EMERGENCY RESPONSE

A mortality rate of 4-6% of chickens per batch is generally allowed for on broiler farms (WABGA *et al.* 2004). This could mean that up to 2,688 birds could be expected to die in a 44,800 batch over the grow-out period. In a year, this could equate to 373,524 birds (for 24 sheds of 44,800 birds and 5.79 batches per year). The highest mortality is generally in the first several weeks when the birds are small.

Due to the location of the site, it is not feasible to have daily pickup of dead birds, as is common in metropolitan areas. Management of dead birds will comprise onsite disposal in a purpose-dug trench in a location near the centre of the property, but as remote as possible from the modules (Figure 2). Lime will be added and the trench backfilled immediately to reduce odours and promote decomposition, with progressive extension of the trench as the active section is filled. The proposed disposal area meets all the buffer requirements outlined in section 3.

Soil samples collected in 2014 indicate a relatively low PBI, showing that soils in this area have a low capacity to retain nutrients. However, as the area is actively used for cropping and groundwater is at least 30m below the ground surface, nutrient contamination from bird burial is considered a low risk.

Mass bird deaths due to factors such as abnormal heat stress or disease rarely occur. However, a plan is required for disposal of the birds should mass deaths occur and management of the issue should the cause be an infectious disease. When disease is the cause of death, the farm owner will obtain a veterinary report and immediately contact the Shire of Northam Environmental Health Officer (EHO). The EHO will assist by reporting the incident to the Department of Agriculture and Food (DAFWA) and provide data to the Department of Health (DOH). These agencies will provide guidance to the landowner on disease control and hygiene, transport and disposal of diseased dead birds.

4.7 CHEMICAL STORAGE & USE

Various chemicals will be kept at the site for use in site operations, such as disinfectants, pesticides, and pharmaceutical products. This is typical of rural operations. Chemicals will be stored in enclosed areas with concrete floors to minimise the risk of spills affecting soil and groundwater, and absorbent materials (e.g. kitty litter) will be kept on site to assist managing spills which may occur. Chemicals will be used in accordance with manufacturer's directions, and containers will be disposed of in an appropriate manner. The main shed (Figure 4) will house the primary chemical storage area. Its location incorporates the recommended 200m buffer to waterways (WABGA *et al.,* 2004).

4.8 RESPONSE TO COMPLAINTS AND CONTINGENCIES

If site operators are contacted in regards to complaints about odour, noise or any other relevant issue, the complaint will be logged (date received, date/time of event of concern, contact person). The potential cause of the complaint will be considered by site managers, and the complainant contacted within one week to provide a response. If repeat complaints are received, management will investigate what site practices are potentially causing the issue and consider modification of these practices in order to resolve the issue. If the complaints do not appear to relate to a particular site activity or weather conditions, it may be necessary to engage council staff to try to reach a resolution with the complainant.

5 SUMMARY AND COMMITMENTS

Development of Lot 13 within the subject land as a free-range poultry farm will require construction of four groups of six sheds, each to house 44,800 chickens. The proposed poultry farm infrastructure layout is indicated on Figure 4.

Poultry will be raised in batches lasting 62 days (nearly nine weeks), and the animals will be taken offsite for slaughter and processing. Poultry farms are required to meet exacting standards to ensure that the end product meets processor and market expectations. This site will comply with poultry management standards set by the RSPCA in *Meat Chickens, RSPCA Approved Farming Scheme Standards* (RSPCA, 2013). It will also meet environmental guidance set out in *Environmental Code of Practice for Poultry Farms in Western Australia* (WABGA *et al.*, 2004).

A review of available guidelines has identified recommendations for separation distances between poultry farm operations (overall, and for specific farm elements) and various receptors. The proposed site layout meets the lateral separation distance requirements identified, including separation from adjacent residences and setback from waterways. The Avon and Mortlock Rivers are considered the primary environmental receptors. As the waterways are located at least 200m from the poultry farm modules, there will be removal of most manure and nutrients, with no surface water vectors, risks to the rivers are considered to be low. In addition, the depth to groundwater is at least 30m below ground surface level. This is well above the recommended minimum separation distance of 2m between surface and groundwater.

Based on a desktop review and assessment of site-specific information about physical attributes, including soil and groundwater conditions, it is considered that the proposed development can be managed to meet desired objectives for its operations without impacting on the environment, or the health or amenity of surrounding property owners and the wider public.

In order to ensure that the site is managed in a way that should minimise opportunity for environmental impacts, the commitments listed in Table 9 are made in support of this proposal:

Disposal of dead birds will be managed onsite via burial with lime into a trench, unless mass bird deaths occur. The proposed disposal area has at least 3m of vertical separation to groundwater, and is located in excess of 200m away from sensitive receptors.

TABLE 9: COMMITMENTS AND RESPONSIBILITIES

ITEM	ACTION	RESPONSIBILITY/ TIMING
Separation distances: Sensitive receptors, waterways, groundwater	Separation distances to be maintained as outlined in: • Environmental Code of Practice for Poultry Farms in Western Australia (WABGA et al., 2004) • EPA, Environmental Protection Authority (2005) EPA Guidance for the Assessment of Environmental Factors - Separation distances between Industrial and Sensitive Land Use. Guidance No. 3, June 2005; and • EPA, Environmental Protection Authority (2015) Draft Environmental Assessment Guideline for Separation Distances between Industrial and Sensitive Land Uses.	Proponent (at all times)

ITEM	ACTION	RESPONSIBILITY/ TIMING
Site security and biosecurity	Installation of a gate and signage at the site entry. Entry by authorized personnel only	Proponent (prior to commencement)
Nutrient, odour, dust and pest management	Removal of spent litter from the subject land for beneficial reuse.	Proponent (at all times)
Drainage management	Site selection for gently sloping locations Design to direct stormwater from roofs through free range areas Surrounding paddocks have inherent drainage management via direct drilling for seeding of crops Internal roads to have adequate drainage to prevent erosion	Proponent (prior to commencement)
Management of pests and predators	Fencing of free range areas (compound fencing) Monitoring of pests, with treatment as required	Proponent (during operations)
Disposal of dead birds	Dead birds disposed of in trenches as per Section 4.6	Proponent (during operation)
Mass death of birds	Mass death to be dealt with as per Section 4.6	Proponent with advice from relevant agencies and authorities (in case of mass death)
Safe storage and use of chemicals	Storage of chemicals in enclosed areas with concrete floors, located at least 200m from waterways. Availability of materials safety data sheets for chemicals used on site. Use of chemicals in accordance with manufacturer's directions.	Proponent (during operations)
Response to complaints	Logging of complaints received, review of associated issues, and documentation of follow-up undertaken. Contingencies for operation modification, if required.	Proponent (during operations)

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