Limitations

Out-Task Environmental (OTE) has prepared this report for use by Meatworks Australia Pty Ltd (MAPL), EiGroup and only those parties who have been authorised in writing by OTE.

This report has been prepared in accordance with the usual care and thoroughness of the consulting profession. This document is based on generally accepted practices and standards at the time of preparation. No other warranty, expressed or implied, is made as to the professional advice provided in this document. This report has been prepared in accordance with the scope of work given in the OTE proposal and for the purpose described in this document. The methodologies adopted by OTE and sources of information supplied by MAPL and EiGroup, and subsequently used by OTE are outlined in this report.

This document was issued on 8 April 2019 and prepared based on the information supplied at the time by EiGroup and MAPL and by the conditions encountered at the time of the respective investigations. OTE disclaims responsibility for any changes that may have occurred after the time of issue of this report.

This Report (Volume 1) and all its attached Figures (Volume 2) and Appendices (Volume 3) should be read in full. No responsibility is accepted for use of any part of this document in any other context or for any other purpose or by third parties. This document does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

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1 Introduction

1.1 Company Legal Entity – The Applicant

The applicant for the new Gillieston meat processing facility is Meatworks Australia Pty Ltd (MAPL), ABN 13 619 105 083, company registered in May 2017 in Prahran (Victoria). The Company Legal Entity Form and ASIC Certificates of Registration are provided in Appendix A (Volume 3 to this report).

1.2 Location of Proposed Works

The proposed facility will be located at 630 Lancaster-Mooroopna Road Gillieston, on rural land about about 14km north west of Mooroopna in regional Victoria as highlighted in Figure 1.

![Figure 1 Location of MAPL Gillieston Meat Processing Facility (Google Maps)](image)

The following three parcels of MAPL land (total 158.5 Ha) represent the “Premises” for the purposes of this works approval application as highlighted in Figure 2 and also shown in Figure 2845 P10 Existing Site Conditions and Farm Property Holdings plan (in Volume 2):

- 630 Lancaster-Mooroopna Rd, Gillieston (Crown Allotment 27 Parish of Mooroopna West) 64.7 ha
- 1100 Mulcahy Road, Gillieston (Lot 2 Lodged Plan LP149981S) 63.7 ha
- 1100 Mulcahy Road, Gillieston (Lot 3 PS331744C) 30.1 ha

Appendix C contains the Certificates of Title and Plan of Subdivision documents for the above Gillieston landholdings.

The meatworks and ancillary works including wastewater treatment plant, ponds and winter storage are to be established on the 630 Lancaster-Mooroopna Rd land parcel shown with the red border in Figure 2. Existing flood irrigation areas across these three parcels not occupied by the new works will be retained for treated recycled water irrigation. About 124Ha of irrigation area will be available for the onsite recycled water scheme as shown in Figure 2845 P11 (in Volume 2).
No new works are proposed to be established on the landholdings with yellow borders as shown in Figure 2. Minor refurbishing improvements will be made to onsite irrigation bays, runoff and drainage systems required to ensure recycled water supply and irrigation is efficient and sustainable.

The site formerly operated as a dairy farm including milking shed operations, holding yards, effluent treatment ponds, and about 125 Ha of flood irrigation paddocks for pasture and fodder production – see Figure 2845 P10 (in Volume 2). Other existing buildings include the original farmhouse, worker cottages, machinery and hay sheds. There are also several stockwater dams, two water supply bores, irrigation farm channels and drains, runoff sumps and pumps across the property.

1.3 Need for Works Approval

EPA Works Approval is triggered by the *Environment Protection (Scheduled Premises) Regulations 2017*, for the following premises activities:

- **D01** – Abattoirs: designed to have a throughput of more than 200 tonnes per year.
- **A03** – Sewage treatment: Premises on or from which sewage (including sullage) effluent, exceeding a design or actual flow rate of 5000 litres per day, is treated, discharged or deposited.

The new facility is designed to process up to 3000 head/day of sheep, with the site operating about 275 days/year. For typical Victorian trade lamb finished hot carcass weight (HCW) of 18-22kg, about 15,000 tonnes/year of meat is expected to be produced, thus triggering EPA Works Approval and Licensing.
In addition, human sewage and sullage generated from staff amenities in the factory and offices is expected to range 5 – 10kL/d, and this therefore also triggers EPA Works Approval/licensing.

Due to the meat processing facility and sewage flows being Scheduled Premises, ancillary activities including wastewater treatment plant (WWTP), sewage treatment plant (STP) and the onsite recycled water irrigation scheme are also triggered for works approval by the regulations.

**1.4 Works Approval Report conformance with EPA Guidance**

This document supports MAPL’s Works Approval Application (WAA) and has been prepared in accordance with State Environment Protection Policy, Waste Management Policy and the relevant EPA guidance as follows:

- Licensing and works approvals – guidance for business and Works approval application checklist accessed on EPA Victoria’s website;
- “Works Approval Application Guideline” (Pub. 1658, June 2017);
- “Selected scheduled premises” prompt sheet for *Animal-derived by-products and food (D01 Abattoirs)* (in EPA Pub. 1659, June 2017);
- Industrial waste resource guidelines (IWRG) including Industrial Water Reuse Guidelines (Pub. No. IWRG632.1, 2017);
- Best practice environmental management guidelines including BPEM Use of Reclaimed Water (Pub. No. 464.2, 2004) and Guidelines for Wastewater Irrigation (Pub. No. 168, 1991);

The proposed works and operations are in accord with the best practice technologies and measures described in meat industry guidance such as: MLA’s “Environmental Best Practice Guidelines for the Red Meat Industry” (published 2007); and AMPC’s “Stormwater Management Framework and Good Practice Guidelines for Meat Processing Plants” (2017).

The EPA Supporting Information Form, signed by MAPL is provided in Appendix B, B.1.

The works approval checklist generated from EPA’s Works approval application checklist was used to develop the structure and content of this document. The checklist is attached in Appendix B, B.2.

This document has also responded to EPA’s letter of 21 June 2017 ("RE: E.I Group Consulting Project Management Pty Ltd – Abattoir – 630 Lancaster-Mooroopa Road, Gillieston, Victoria 3616"), which provided feedback on the Approvals Proposal Pathway Form (dated 24 March 2017) submitted to EPA on 8 June 2017. EPA’s letter confirmed a standard Works approval pathway.

This works approval application provides details of the proposed scheduled activities and associated waste emissions and discharges at the premises, and environmental and public health impact assessments for the proposed meat processing and livestock handling facilities, ancillary works and services, wastewater treatment plant, onsite recycled water irrigation scheme, stormwater systems, by-products and waste management works, air emissions (odour, combustion, greenhouse gas) and noise controls.

Supporting technical information, plans, drawings, wastewater, geotechnical, land capability, air quality, noise, and other specialist reports are provided in Volume 2 Figures and Volume 3 Appendices annexed to this report.
2 Description of the Proposal

2.1 Regional Setting

The proposed meat processing facility will be established at 630 Lancaster-Mooroopa Rd Gillieston on an ex-dairy farm property located as shown in Figure 3.

![Figure 3 MAPL Gillieston Meat Processing Facility Locality Plan](image)

The project is located within Greater Shepparton Shire within the Farm Zone (FZ1), and is surrounded by dairy farming and other irrigated farm properties. Planning Property Reports for each of the properties showing current Farm Zoning (FZ1) and Land Subject to Inundation Overlay (LSIO) are provided in Appendix D.

Nearest rural villages and larger urban centres relative to the premises are:

- Undera (pop.: ~545): ~4km to the north east
- Lancaster (pop.: ~350): ~5km to the west
- Merrigum (pop.: ~670): ~9km to the south west
- Kyabram (pop.: ~7320): ~13 km to the west
- Tatura (pop.: ~4450): ~14km to the south
- Mooroopna (pop.: ~7840): ~14km to the south east.

The property is located within the Central Goulburn Irrigation Area (CGIA), with channel irrigation water supply, groundwater bore licensing and rural drainage services provided to the premises by Goulburn-Murray Water (GMW). The site is located within the Goulburn Broken Catchment Management Region where management of natural waterways and floodplains are co-ordinated by the Goulburn Broken Catchment Management Authority (GBCMA) under the “Goulburn Broken Regional Catchment Strategy” and “Goulburn Broken Regional Floodplain Management Strategy 2018-2028”.
2.2 Overview of Proposed Operations

Meatworks Australia propose to establish a new export sheep processing facility with associated works and services including factory wastewater treatment system, a separate sewage treatment plant, recycled water winter storage ponds and onsite recycled water flood irrigation scheme.

The facility will operate about 275 days/year, processing up to 3000 head of sheep/day, operating Monday to Friday, and some Saturdays. Processing will occur over 1 shift each working day, starting early morning with plant and yard washdown activities finishing mid-afternoon.

The proposed works are currently going through the planning and design phase including GSSC planning application process. Detailed design of the works will occur once EPA, council and all other regulatory approvals are obtained. The primary features of the project are summarised in Table 1.

Table 1 Summary of Proposed Works – Gillieston Meatworks

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy vehicle access</td>
<td>• Heavy vehicle dual land access via new VicRoads approved access point off Lancaster-Mooroopna Rd</td>
</tr>
<tr>
<td></td>
<td>• Livestock trucks – ~5 arrivals per day comprising semi-trailers and B-doubles</td>
</tr>
<tr>
<td></td>
<td>• Refrigerated meat dispatch – ~8 semi-trailer/rigid truckloads per day, light truck local store deliveries ~3 times/week</td>
</tr>
<tr>
<td></td>
<td>• Other heavy vehicle movements (semis, rigid trucks and tankers) including:</td>
</tr>
<tr>
<td></td>
<td>- blood collection and inedible offal to offsite rendering plant (twice daily)</td>
</tr>
<tr>
<td></td>
<td>- paunch waste (daily),</td>
</tr>
<tr>
<td></td>
<td>- other industrial waste skip collection (daily)</td>
</tr>
<tr>
<td></td>
<td>- condemned/deceased animal disposals offsite (daily)</td>
</tr>
<tr>
<td></td>
<td>- skins (twice weekly),</td>
</tr>
<tr>
<td></td>
<td>- manure (daily),</td>
</tr>
<tr>
<td></td>
<td>- LPG tanker (weekly),</td>
</tr>
<tr>
<td></td>
<td>- factory cleaning chemicals and sanitisers (every 1-2 weeks)</td>
</tr>
<tr>
<td></td>
<td>- water and wastewater treatment chemicals (every 1-2 weeks)</td>
</tr>
<tr>
<td></td>
<td>- garbage truck (weekly)</td>
</tr>
<tr>
<td></td>
<td>- other: supplies for office, factory, maintenance, construction materials, diesel fuel, etc (frequency as required).</td>
</tr>
<tr>
<td></td>
<td>• Security gatehouse and weighbridge for livestock truck arrivals</td>
</tr>
<tr>
<td></td>
<td>• Paved driveway, hard stand areas, truck parking and manoeuvring areas</td>
</tr>
<tr>
<td></td>
<td>• Heavy vehicle access and movements onsite on paved areas shaded grey as shown in Figure 2845 P12 (attached in Volume 2 to this report).</td>
</tr>
<tr>
<td>Livestock Unloading and</td>
<td>• Truck manoeuvring to stock unloading ramp to covered elevated pens south side of factory</td>
</tr>
<tr>
<td>Handling</td>
<td>• Sheep overflow pens (uncovered, clay based) to the south of covered pens (contingency use for when covered pens are backed-up or sheep need to be</td>
</tr>
<tr>
<td></td>
<td>held for &gt;24hrs prior to processing</td>
</tr>
<tr>
<td></td>
<td>• Contaminated runoff from above livestock truck manoeuvring and unloading areas and sheep overflow pens drained to contaminated stormwater pond (CSP) for onsite treatment and reuse.</td>
</tr>
</tbody>
</table>

Meatworks Australia Pty Ltd – Gillieston Meat Processing Facility Works Approval Application
<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock holding pens</td>
<td>• Covered and elevated livestock pens (~1400 m²) designed and built to AQIS best practice standards (eg, “Construction and equipment guidelines for export meat”, DPIE/AQIS 1988)</td>
</tr>
<tr>
<td></td>
<td>• Open metal mesh flooring ~2.5m above subfloor to allow sheep manure to pass through to paved and bunded subfloor</td>
</tr>
<tr>
<td></td>
<td>• Subfloor is concrete paved and bunded (300mm high continuous concrete curb, with rollover bund for bobcat access), graded and drained to the green stream wastewater collection system</td>
</tr>
<tr>
<td></td>
<td>• Subfloor manure dry collection daily by sweeper unit/bobcat and transferred to enclosed manure shed onsite for bulk transport offsite for composting.</td>
</tr>
<tr>
<td></td>
<td>• Subfloor washdown daily (after dry manure collection) to green stream for treatment in WWTP.</td>
</tr>
<tr>
<td>Meat processing train</td>
<td>• Sheep delivery from holding pens to restrainer unit</td>
</tr>
<tr>
<td></td>
<td>• Sheep stun and sticking (bleeding) area with blood recovery tank in bunded subfloor area</td>
</tr>
<tr>
<td></td>
<td>• Slaughter room processes designed to produce export quality whole dressed carcasses</td>
</tr>
<tr>
<td></td>
<td>• Slaughter chain comprises: hide/skin removal, evisceration to remove internal organs, trimming and carcass washing. [Note: a boning room is proposed in the future.]</td>
</tr>
<tr>
<td></td>
<td>• Chilling of weighed/graded carcasses in cold storage, prior to loadout</td>
</tr>
<tr>
<td></td>
<td>• Edible offal room processing, packaging and cold storage, prior to loadout</td>
</tr>
<tr>
<td></td>
<td>• Inedible offal to subfloor collection bins for daily trucking offsite for rendering</td>
</tr>
<tr>
<td></td>
<td>• Pressed paunch and casings materials to collection bins</td>
</tr>
<tr>
<td></td>
<td>• Blood to collection tank in subfloor for daily tankering offsite for rendering</td>
</tr>
<tr>
<td></td>
<td>• Red stream wastewater via slaughter floor filter baskets to trade waste drains to WWTP red stream pit</td>
</tr>
<tr>
<td></td>
<td>• Paunch line and casing contents to fan press for daily trucking offsite for composting, with press wastewaters discharged to WWTP green stream pit</td>
</tr>
<tr>
<td></td>
<td>• Skins to onsite salting shed, trucked offsite to offsite customers.</td>
</tr>
<tr>
<td>Carcass Chillers &amp; Cool Store</td>
<td>• 5 separate chiller rooms (5°C) each holding 750 lamb carcasses</td>
</tr>
<tr>
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<td>• 1000 carcass final holding chiller (2-5°C)</td>
</tr>
<tr>
<td></td>
<td>• Cool room (-1 to 6°C) for meat carton products (60 pallet capacity) from future boning room</td>
</tr>
<tr>
<td></td>
<td>• Refrigeration plant: automated closed system liquid recirculation ammonia plant.</td>
</tr>
<tr>
<td>Building ventilation and air-conditioning systems</td>
<td>• Slaughter floor and services areas - evaporative coolers with condensation control</td>
</tr>
<tr>
<td></td>
<td>• Boning room (future) – closed recirculation glycol and ammonia cooling air conditioning systems</td>
</tr>
<tr>
<td></td>
<td>• Packing area – same as for boning but separate system.</td>
</tr>
<tr>
<td>Product Loadout</td>
<td>• Product loadout from holding chiller and cold store</td>
</tr>
<tr>
<td></td>
<td>• Product loadout bay from north side of factory</td>
</tr>
<tr>
<td></td>
<td>• Trucks depart via Lancaster Rd exit (daytime only).</td>
</tr>
<tr>
<td>Offal Collection</td>
<td>• Edible offal collection and processing, packaging in offal rooms and product</td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
</tr>
<tr>
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</tr>
<tr>
<td>Activity</td>
<td>Description</td>
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</tbody>
</table>
| and Processing | dispatch to customers daily.  
• inedible offal collection in covered bins in separate inedible offal rooms below slaughter floor, and daily transport to offsite EPA licensed rendering plants or pet food businesses |
| Blood collection |  
• blood collection system and bunded storage tank  
• tanker transfer pump, isolation valves and manifold  
• daily transport (4 tonne/day) to offsite EPA licensed rendering plant. |
| Skins processing |  
• green skins continuously transferred to bunded skin shed (32 x 30m)  
• mixer/tumbler (10-12 concrete agitator type units) salting and basket drying process with closed loop brine collection and reuse system  
• after salting, skins are left to dry for about ~5 days  
• dried salted skins transport offsite twice weekly  
• excess waste brine (not reusable) transported offsite to EPA licensed sites. |
| Manure handling |  
• dry manure from pens transferred daily to enclosed manure shed (12 x 31m)  
• short-term batch stockpiling inside shed in 3-sided bunkers with a bunded concrete floor drained to sump for pump out to green stream wastewater system  
• offsite transport on special covered/sealed trailers to composters twice weekly. |
| Potable Water Treatment (PWT) |  
• Raw water supply pumped from GMW channel (existing supply point) to new raw water dam (~50ML) north west of factory.  
• PWT plant compound west of factory containing: raw water (up to 3 x 0.25ML) tanks, clean water (up to 4 x 0.25ML) storage tanks, Ultrafiltration (UF) and disinfection units, and pumping systems  
• UF and disinfection (~0.6ML/day capacity) plant to produce potable water to ADWG and AQIS standards for factory poable water supply  
• UF backwash (~78kl/d, ~21.5 ML/yr) to Maturation/Winter Storage Pond 3. |
| Factory trade wastewater treatment plant (WWTP) |  
• Red stream wastewater collection system from sticking area and slaughter chain – discharged to red-pit, then rotary (contrashear type) screen, balance tank and Dissolved Air Flotation (DAF) unit  
• Green stream collection system from sheep pen underfloor washdown, paunch/casings fan press wastewater, truckwash and CSP overflow – all discharged to green-pit, then rotary screen, balance tank and DAF  
• screened red and green streams (~486 kL/d, 136 ML/yr) combined in balance tank, then treated in DAF  
• DAF effluent pumped to (in series): Aeration Pond 1, Settling Pond 2, Maturation/Winter Storage Pond 3 and Winter Storage Pond 4  
• All treatment ponds to be sealed with 500mm clay liners, compacted to $10^{-9}$ m/s permeability specification.  
• red stream screenings to “red” skip for daily offsite transport to rendering plant  
• green stream and paunch/casings fan press screenings to “green” skip for daily offsite transport to compost facility  
• WWTP, STP and pond footprints are shown in Figure 2845 P13 (Volume 2). |
<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contaminated stormwater pond (CSP)</td>
<td>• clay lined pond adjacent to west of sheep overflow pens to receive operational area drainage that may be contaminated (see Figure 2845 P14 in Volume 2), including runoff from:&lt;br&gt;  - livestock truck manoeuvring and unloading areas (paved)&lt;br&gt;  - areas at front of skin and manure sheds (forklift access points - paved)&lt;br&gt;  - sheep overflow pens (earthen clay-based pad)&lt;br&gt;• Overflow from CSP discharged to aerated pond 1 for treatment or to non-potable uses (eg. truck wash, yard washdown) depending on water quality.</td>
</tr>
<tr>
<td>Sewage treatment plant (STP)</td>
<td>• package aerobic STP (separate from trade WWTP) for domestic sewage and sullage from office and amenities (5 – 10 kL/d, up to 2.7 ML/Yr)&lt;br&gt;• aerobic biological treatment process producing Class C secondary reclaimed water quality, discharged to Winter Storage Pond 4.</td>
</tr>
<tr>
<td>Maturation and Winter storage Ponds</td>
<td>• 32 ML Maturation/Winter Storage Pond 3 (~21 ML of this is dedicated winter storage) plus 40 ML Winter Storage Pond 4&lt;br&gt;  [Note: minimum 61 ML total winter storage capacity provided to contain all wastewater for 90th percentile wet year as per EPA “Wastewater Irrigation Guidelines” (Pub. 168, 1991)]&lt;br&gt;• All ponds to be sealed with 500mm clay liners, compacted to 10–9 m/s permeability specification.</td>
</tr>
<tr>
<td>Recycled Water Irrigation Areas</td>
<td>• secondary treated effluent from Pond 4 gravitates to onsite reuse sump, then pumped into irrigation channels supplying to onsite flood irrigation areas&lt;br&gt;• recycled water to be reused onsite – up to ~120Ha of flood irrigation area available. A further 6.6Ha of irrigation area onsite to be developed if needed&lt;br&gt;• all irrigation areas served by internal drainage system to collect and reuse all recycled water runoff via the reuse sump&lt;br&gt;• cut and carry fodder (pasture, lucerne) production and some grazing by sheep to maintain nutrient export from the farm&lt;br&gt;• Refer to Figure 2845 P11 Farm Property Irrigation Areas plan (in Volume 2).</td>
</tr>
<tr>
<td>Rainwater collection</td>
<td>• Factory roof rainwater collection tanks for non-potable supplementary supply (eg. toilet flushing, gardens, yard and vehicle washdown, etc)&lt;br&gt;• Overflow to clean stormwater system and new retention basin</td>
</tr>
<tr>
<td>Fire water system</td>
<td>• Fire services tanks (west of factory near WFP), firewater pumpsets, pipe network to hydrants,hoses and sprinklers around site and complying with local CFA requirements</td>
</tr>
<tr>
<td>Chemical Storage</td>
<td>• Chemicals used for factory cleaning and sanitising: acids, caustics, foaming agents, degreasers, sanitisers (chlorine based), etc&lt;br&gt;• Water and wastewater treatment chemicals : coagulants, polymers, hydrogen peroxide, pH dosing (caustic, acid), etc&lt;br&gt;• Chemicals to be contained in self bunded IBC units or on bunded pallets as per EPA bunding guidelines (EPA Pub. No. 347.1, 2015). No bulk storage tanks.</td>
</tr>
<tr>
<td>Maintenance Area</td>
<td>• machinery and maintenance workshop, spare parts stores (32x 15 m)&lt;br&gt;• open concrete fabrication area&lt;br&gt;• supervisors office, amenities and lunch room</td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Power Supply             | • Powercor upgraded grid supply (1000kVA capacity, 800kVA max. demand, ~54,000 MJ/day electricity usage)  
                          | • onsite transformer for regulating factory power supply                                            
                          | • electrical supply may be supplemented (15-20% offset) by future onsite solar panel project (subject to feasibility assessment and business case)  
                          | • diesel generator unit for emergency backup power.                                                  |
| Hot water supply         | • 12,000 LPG tank filled by local gas supplier                                                  
                          | • Commercial scale LPG fired steel boiler (~3.5 MW, 5 Bar).                                         
                          | • hot water production system to maximum temperature ~85 °C                                       
                          | • 2% evaporative losses, no blowdowns                                                            
                          | • Typical energy consumption 2.4 MW (peak 4.8 MW).                                                 
                          | • Average daily use of LPG ~2000 litres, ~50,000 MJ/Day                                           
                          | • Boiler air emissions: particulates, NOx, SOx and CO << Works Approval triggers.                  |
| Office and Amenities     | • Administrative offices, QA laboratory, staff lunch room and amenities (washrooms, showers, toilets) – sewage and sullage to separate STP. |
| Staff and visitor’s car parking | • Off-street staff car parking area (capacity of 181 spaces) north of factory,  
                                   | 60m south of Lancaster Rd                                                                          
                                   | • Carpark paved with concrete or bitumen, with landscaped areas adjacent                           
                                   | • Staff access from Lancaster Rd, most vehicle movements at start and finish of shifts at 4-5am and 4-5pm |
| Clean stormwater drainage | • clean stormwater diversion system around operational areas that are at higher risk of contaminated stormwater runoff (see Figure 2845 P14 in Volume 2).  
                          | • clean stormwater to flow to existing stockwater dam south east of operational area and a potential new stormwater detention basin (SWB) on the northern boundary of property with overflows to onsite farm drainage system and reuse sump on western boundary for irrigation use onsite  
                          | • wet period overflow from reuse sump to existing GMW drain 6 (Rodney Main drainage catchment)     |

The overall site layout of the operational area of the new meat processing facility and associated works is shown in Figure 2845 P12 (in Volume 2). The balance of land west, east and south of the operational area including the proposed WWTP ponds and existing flood irrigation areas is shown in Figures 2845 P11 and 2845 P13.

General process inputs and outputs and material flows are shown in the conceptual site model in Figure 4, extracted from the Process Planning Report (Lean Projects) in Appendix E.

Further technical details and environmental best practice assessments for the above works and operations are provided in the various Chapters to following in this works approval as well as the Figures (Volume 2) and Appendices (Volume 3) attached.
Figure 4 Gillieston Meat Processing Facility – General Process Flows (Lean Projects)
2.3 Land Use

2.3.1 Choice of Location for New Premises

MAPL selected the Gillieston property for its new meat processing factory in order to be centrally located within the Murray-Goulburn food bowl and close to the Victorian, NSW and South Australian sheep and lamb producers. The site also had ready access via major road links including Goulburn Valley and Hume Highways to link with Melbourne’s livestock markets and Ports for export of quality lamb products.

Key advantages of the site further demonstrating its ideal location for the development include:

- centrally located within an established sheep farming region ensuring reliable supply of stock
- Farming Zone (FZ1) under the Greater Shepparton Planning Scheme (see Figure 5), within which these types of agribusiness developments are allowed and are considered compatible with surrounding rural activities and provide significant economic benefits in the region
- no sensitive receptors or natural waterways in close proximity to the site, adequate separation distances between the factory and nearest urban centres and farm houses, and no likelihood of urban encroachment
- good site access from Lancaster-Mooroopna Road, which is a major road (Vic Roads asset) already extensively used by other livestock vehicles and other heavy agricultural/industrial traffic.
- existing GMW channel water supply – proposed as factory water supply and irrigation shandy water
- existing GMW licensed bores onsite – proposed as contingency factory water and irrigation supply
- adequate electrical power supply available from mains in Curr Rd
- availability of onsite dairy farm dams to be used for livestock drinking water respectively
- available flood irrigation and drainage infrastructure including runoff collection and reuse sumps previously used for dairy shed effluent irrigation
- wet weather and winter drainage infrastructure as well as flood control with access to GMW main drain no. 4 drainage system
- ideal climate and suitable topsoils for sustainable recycled water irrigation
- suitable onsite clays for construction of proposed wastewater treatment and winter storage ponds
- clay substrata and deep watertables providing suitable underlying geology and hydrogeology ensuring low risk to groundwater from wastewater pond seepage and irrigation leaching
- Low environmental and public health risks and minimal potential impacts from facility operations in terms of air quality, odour, dust, noise, surface water, land and groundwater based on the above.

2.3.2 Planning and Other Approvals

The development and surrounding rural lands are in a Farming Zone (FZ1) as shown in Figure 5. The Greater Shepparton Planning Scheme does not prohibit the proposed land use as a meat processing facility. However, the development is subject to a Planning Permit Application (PPA).
A planning permit application No. 2018-218 was lodged with Greater Shepparton City Council (GSCC) on 16 August 2018 use and development of land for an abattoir in the Farming Zone and Land Subject to Inundation Overlay and creation of access to a Road Zone Category 1. It is understood that GSCC has referred the application (on about 14 November 2018) to various internal council departments and external agencies including EPA, GBCMA, VicRoads, etc. It is understood that the planning permit application has not yet been advertised, given that the planning permit and EPA works approval applications are expected to be jointly advertised.

Following GSCC and EPA approvals, MAPL will also seek approvals from VicRoads for creation of a new safe heavy vehicle access and staff access to 630 Mooroopna-Lancaster Rd.

### 2.4 Community Engagement

The site is bordered by local irrigated farms and related agricultural businesses. MAPL and its consulting team has undertaken a range stakeholder engagement programs and activities since 2016 to reach out to neighbouring farmers, local community and relevant agencies.

Key stakeholders for this project include:

- Greater Shepparton City Council: local planning permit and building permits, statutory referral authority for EPA works approval application
- Department of Health: statutory referral authority for EPA works approval application, responsible authority for public health, food safety, pest and vermin control
- GMW: licensing of channel water supply, drainage and groundwater bores onsite
- GBCMA: flood plain management, consents required for potential works in Land Subject to Inundation Overlay (LSIO)
- Agriculture Victoria: livestock handling and welfare, pest diseases and weeds
- AQIS: food export licensing
- VicRoads: approval required for the new access to 630 Mooroopna-Lancaster Rd (VicRoads asset)
- Powercor – electrical power upgrade
- CFA – fire protection and response
- Local farmers and rural residents.

A summary of engagement activities undertaken are summarised in Table 2 below.

**Table 2 Engagement Activities for Australian Meatworks Gillieston Project**

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 Aug 2016</td>
<td>Meeting with GCCC’s senior statutory planner (Tim Watson) to introduce the development and information requirements for planning permit application. Council provided a letter on 10 August 2016 to MAPL outlining its requirements for the application. A representative from EPA was also in attendance at that meeting.</td>
</tr>
<tr>
<td>8 June 2017</td>
<td>Lodgement of Approvals Proposal Pathway Form (dated 24 March 2017) submitted to EPA on 8 June 2017.</td>
</tr>
<tr>
<td>21 June 2017</td>
<td>EPA’s letter of response received on Pathways Form submission informing standard Works approval application pathway.</td>
</tr>
<tr>
<td>29 June 2017</td>
<td>Meeting with EPA (David Lovell) at Carlton to outline the project and works approval application requirements.</td>
</tr>
<tr>
<td>29 July 2017</td>
<td>Letter drop to nearest farming and rural living residents as indicated in map below:</td>
</tr>
<tr>
<td>1 – 4 Aug 2017</td>
<td>1-on-1 meetings and follow-up telephone discussions with 5 neighbours</td>
</tr>
<tr>
<td>Timeline</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2 Aug 2017</td>
<td>Newspaper article about the development in Shepparton News</td>
</tr>
<tr>
<td>2 Aug 2017</td>
<td>WIN TV news story including proponent and CAF consultants interviews</td>
</tr>
<tr>
<td>8 Aug 2017</td>
<td>Newspaper article about the development in the Country News</td>
</tr>
<tr>
<td>14 Aug 2017</td>
<td>Community session at Merrigum Bowls Club – organised and hosted by Square One PR Consultants. Attended by about 30 people including neighbours, businesses and other interested parties. Presentations and Q&amp;A session about the project by MAPL consulting team - CAF, OTE and Kwon architects. Session also attended by ABC Rural media journalist who interviewed CAF and OTE consultants.</td>
</tr>
<tr>
<td>16 Aug 2017</td>
<td>CAF contacted by resident at 825 McKenzie Rd to find out more about the project and putting forward his concerns eg. odour from northerly winds in summer that may affect his tomato packing shed operations (50 employees).</td>
</tr>
<tr>
<td>21 Sept 2017</td>
<td>Meeting at GSCC with council statutory planners, councillors, local politicians, etc. Presentations by MAPL and consulting team (CAF, OTE and Kwon Architects) and Q&amp;A session. Attendees included:</td>
</tr>
<tr>
<td></td>
<td>• Senior Statutory Planner, GSCC</td>
</tr>
<tr>
<td></td>
<td>• Team Leader Business &amp; Industry Development, GSCC</td>
</tr>
<tr>
<td></td>
<td>• Councillors Dennis Patterson and Fern Summer, GSCC</td>
</tr>
<tr>
<td></td>
<td>• Damien Drum, Nationals Party MP</td>
</tr>
<tr>
<td></td>
<td>• Investment &amp; Trade Specialist - Food &amp; Fibre, Hume Region, Regional Development Victoria (RDV)</td>
</tr>
<tr>
<td>27 July 2018</td>
<td>Exchange of email correspondence with EPA (David Lovell) regarding status of WAA and EPA advice on community engagement, WA assessment processes and timing</td>
</tr>
<tr>
<td>17 Aug 2018</td>
<td>Meeting with GSCC – planning permit lodgement meeting.</td>
</tr>
<tr>
<td>13 Sept 2018</td>
<td>Telephone discussion with EPA (Adam Boevink) – update of WAA progress, outline of project assessments being undertaken.</td>
</tr>
<tr>
<td>12 Nov 2018</td>
<td>Meeting at MAPL (EiGroup Braeside) with DEDJTR (Chris Sullivan, Lachlan Carty) and EPA (Adam Boevink) to discuss EPA WA and Council PP application processes status, stakeholder engagement and possible joint advertising.</td>
</tr>
<tr>
<td>5 Dec 2018</td>
<td>Inspection of Gillieston project site by RDV (Wangaratta office rep.), Council, GMW, CMA, CFA, VicRoads, Powercor in company of CAF and MAPL.</td>
</tr>
<tr>
<td>24 Jan 2019</td>
<td>Meeting at EPA Victoria to discuss draft application – attended by EiGroup, OTE consulting team and DEDJTR.</td>
</tr>
<tr>
<td>12 March 2019</td>
<td>Correspondence with GSCC to update Council on status of planning application and works approval, and preliminary responses to GMW and VicRoads letters arising from Council planning referrals.</td>
</tr>
</tbody>
</table>
MAPL will continue to reach out to interested stakeholders and neighbouring landowners and may hold further local community group meetings once the works approval application is lodged with EPA.

In accordance with EPA’s Approvals proposal pathway guidelines (Publication 1560.2), Table A4.2, EPA may conduct information sessions and 20B conferences for standard works approval applications. MAPL is committed to participating in any EPA information sessions including a potential EPA 20B conference.

2.5 Track Record

2.5.1 MAPL

Meatworks Australia Pty Ltd is a newly created legal entity that will operate the factory, wastewater treatment plant, sewage treatment plant and recycled water irrigation scheme.

MAPL has no track record or prior operating history with the EPA. MAPL does not have nor is involved with any other operations in Victoria subject to EPA works approval, licences or notices. The Gillieston project is intended to be MAPL’s first EPA approved and licensed activity.

The land on which the new factory is to be located is on land previously used for dairy farming and irrigated agriculture. There are no known legacy site contamination issues associated with this land.
3 Process and Integrated Environmental Assessment

3.1 Description of Proposed Works

An overview of proposed meat processing facility, associated WWTP and recycled water scheme was provided in Section 2.2. The major elements of the project that trigger works approval and licensing are as follows:

1. Meat processing operations (3000 sheep/day throughput, ~63 tHSCW/d)
2. Potable water treatment (PWT) plant (0.5 – 0.6 ML/d) by UF and disinfection
3. Factory wastewater treatment plant (~0.5 ML/d, ~136 ML/Yr) by DAF, aeration and maturation
4. PWT UF backwash to maturation pond (~78 Kl/d, ~21ML/Yr)
5. Sewage treatment plant for office and worker amenities (~5-10 kL/D, ~3 ML/Yr) discharging to final Winter Storage pond 4
6. Maturation and winter storage ponds producing secondary treated recycled water (~134 ML/Yr after pond evaporation and seepage); and
7. Recycled water beneficial use onsite (~134 ML/Yr) across ~120 Ha of existing flood irrigation areas.

Site layout plans and architectural drawings of the proposed factory, operational area, WWTP and pondage systems and recycled water irrigation areas are provided in the suite of Figures attached to this report in Volume 2. The key figures are listed in Table 3 (see full Figure List cover page at front of Volume 2).

Table 3 List of key site plans and other figures (in Volume 3)

<table>
<thead>
<tr>
<th>Drawing Number</th>
<th>Drawing Title/ Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAF Consulting Drawings:</strong></td>
<td></td>
</tr>
<tr>
<td>2845 P10</td>
<td>Existing Site Conditions &amp; Farm Property Holdings</td>
</tr>
<tr>
<td>2845 P11</td>
<td>Farm Property Plan Irrigation Areas</td>
</tr>
<tr>
<td>2845 P12</td>
<td>Proposed Site Layout Factory &amp; Operational Area</td>
</tr>
<tr>
<td>2845 P13</td>
<td>Proposed Site Layout Wastewater Treatment Ponds</td>
</tr>
<tr>
<td>2845 P14</td>
<td>Proposed Site Layout Stormwater Drainage Plan</td>
</tr>
<tr>
<td>2845 P15</td>
<td>Location of Proposed Development Neighbouring House Locations</td>
</tr>
<tr>
<td><strong>Kwon Architects Drawings:</strong></td>
<td>Factory Buildings drawings, floor plans and elevations:</td>
</tr>
<tr>
<td>TW200</td>
<td>Site Plan</td>
</tr>
<tr>
<td>TW201</td>
<td>Proposed Floor Plan Part 1</td>
</tr>
<tr>
<td>TW202</td>
<td>Proposed Floor Plan Part 2</td>
</tr>
<tr>
<td>TW300</td>
<td>Elevations</td>
</tr>
</tbody>
</table>

Further concept level details of the chosen process technologies, environmental and sustainability measures for the project are provided in the sections to follow, with supporting technical information and plans also provided in the various specialist consultants reports in Volume 3 Appendices.
Detailed information about the proposed meat process and slaughter chain technology are provided in the Lean Projects Processing Planning Report in Appendix E. The wastewater treatment design concept as selected for this project is provided and the ETS Wastewater Treatment Report in Appendix G. These concept designs and plans will be subject to detailed design following completion of the EPA, council, AQIS and other regulatory approvals processes. The approach to detailed design will ensure the same environmental footprint as the concept designs given in this WAA.

3.2 Process and Technology

3.2.1 Choice of Process Technologies

The Gillieston meatworks will be a modern, eco-efficient small stock processing facility that adheres to AQIS requirements for export quality meat production. The facility will focus on production of fully dressed lamb carcasses for export markets, but low numbers of adult sheep may also be processed from time to time.

Livestock will mostly be sourced from Victorian farmers, livestock saleyards and other contracted suppliers that can ensure high quality and clinically healthy animals certified under livestock quality assurance schemes (e.g. MLA and Aus-Meat administered Flockcare programs). Lambs may also be obtained from other south-east Australian states including from South Australia, Tasmania and southern NSW under these industry accepted livestock quality assurance schemes.

Process description, new building and works designs are described in the "Process Planning Report" by Lean Projects (22 October 2018) provided in Appendix E (Volume 3). Lean Projects are a specialist meat processing consultancy with many decades of process, planning, design and operational experience. The selected process technology as described in the Lean Projects report reflects industry best practice.

In deciding on the chosen technologies for this project the following key operational and environmental factors were carefully assessed when considering advantages and disadvantages of alternative options:

- operational factors: water, energy (electricity, gas) and other resource supply availability and usage;
- environmental performance: wastewater and solid waste generation rates, greenhouse gas (GHG) emissions, site suitability for odour and noise management including adequacy of separation distances to sensitive land uses, proximity to natural surface waters, onsite soil suitability for wastewater pond constructability, and land capability for sustainability of recycled water irrigation.

Various technologies were considered, but to ensure project viability the meat processing technology chosen for this project needed to reflect industry-wide eco-efficiency and environmental performance improvements made in recent years both in Australia and overseas. The Gillieston project will be more eco-efficient than red meat processing facilities operating 10-20 years ago with lower water and energy use, lower wastewater, solid waste and GHG generation rates, and therefore lower operating costs and environmental impacts integrated into design and operation.

The Gillieston facility will be a modern contemporary design that meets strict hygiene and food safety standards required for AQIS licensing, and food safety/quality management system certifications for supply to domestic and export markets. The design and operation of the facility also accords with AMPC and MLA environmental best practice guidance and EPA Victoria’s environmental best practice guidelines.

The AMPC and MLA have conducted environmental performance reviews (EPR) of Australian red meat processors since 1998 (at ~5-year intervals), with the latest EPR published by AMPC in 2015. These industry-wide reviews are widely used for benchmarking individual site performance and to support the development of applications for new and expanded red meat processing sites.
The Gillieston facility incorporates water, energy and wastewater eco-efficiencies designed to equal or better the average benchmarks reported in AMPC EPR 2015 and other industry research and literature.

The chosen technologies, operational and environmental advantages of the key stages of the meatworks process from livestock receival and slaughter chain to waste discharge and treatment are summarised in the sub-sections 3.2.3 to 3.2.10.

Further discussion of how the project has applied environmental best practice is provided in section 3.3 having regard to the meaning of best practice and assessment criteria described in relevant EPA and meat industry best practice guidelines. Section 3.3 demonstrates how the chosen process technology, design and operations of the meatworks and associated wastewater treatment system and recycled water irrigation scheme collectively represents environmental best practice and ensures low risk to the environment and public health.

3.2.2 Livestock Holding Pens and Yards

Livestock (3000 head/day) will be delivered into covered elevated sheep pens with holding area of ~1500 m². The yards are steel construction with the sheep standing on steel mesh floor approximately 2.5m above a bunded concrete floor drained to the green stream collection system for treatment.

The covered elevated pens will be designed and constructed in accord with AQIS Construction and Equipment Guidelines 1988, and are considered best practice for the meat industry. The well-ventilated and dry conditions in these pens ensure low stress and improved animal welfare. All livestock are subject to an AQIS appointed Veterinary inspection to ensure the animals are suitable for processing. Covered elevated pens have many environmental advantages including:

- exclusion of direct sunlight and rainfall to protect animals from exposure and becoming wet (odour minimisation)
- good natural ventilation and rapid dispersion of pen odours within the site due to an elevated pen position well-above natural ground level (odour minimisation)
- roofing to maintain dry conditions and prevent rainfall mixing with dry animal manures and urine (contaminated stormwater, wastewater and odour minimisation benefits)
- minimal build-up of manure on mesh (better and cleaner conditions for animals, lower water and chemical use for pre-slaughter washing of sheep)
- efficient collection and containment of dry sheep manure and urine, in passing through mesh to subfloor for daily dry manure sweep followed by washdown to WWTP (odour minimisation)
- lower animal noise due to lower stress pen conditions (noise mitigation).

A backup overflow yard (compacted clay base) of about 1500 m² will be located immediately south of the loading ramp to the covered pens. This area will be temporarily used when elevated pens are full or backed up and/or for animal sorting purposes. This yard will have sun-shading in accord with AQIS requirements to protect sheep from exposure. Rainfall runoff will drain to the contaminated stormwater pond (CSP) proposed adjacent to the west of the yard. The yard will be used as a contingency only. If animals are expected to be held for longer than 24hrs, then they will be released in accord with AQIS requirements onto areas of the farm not being irrigated at the time.

All manure from pens and yards will be transferred daily to onsite manure shed for temporary stockpiling and offsite supply (in bulk or bags) to composters. Any suspect, sick, injured, pregnant, condemned or deceased animals identified by the AQIS inspector will be immediately diverted at the top of the loading ramp to the adjacent suspect pen (outside south east corner of elevated pens). Once in the suspect pen, these animals will be further assessed by the onsite veterinarian for appropriate care.
Animals found unsuitable for processing onsite will be subsequently transported offsite for humane treatment in accord with Australian animal welfare codes. Any suspect pen animal effluents (manure, urine, blood, etc) will be isolated and collected separately (and not discharged to WWTP) for disposal offsite to EPA licensed facilities.

### 3.2.3 Meat Processing

Figure 2845 P12 Proposed Site Layout Factory & Operational Area provides overall layout of the meatworks from the holding pens through to the slaughter floor, chiller rooms and loadout. The Lean Projects report (in Appendix E) provides finer scale details of the slaughter chain room by room – refer to Figure 15-01-TP-01 of that report.

A schematic flow diagram of the meat production train and ancillary processes is shown in Figure 4. The production train involves the following key stages and processes:

1. All animals delivered to pens are subject to ante-mortem health inspections by AQIS qualified veterinarians and inspectors to ensure the safety and suitability of export products for human consumption.
2. Once cleared by the inspector, animals are marshalled down a race and placed into a V-restraining until and then stunned in accord with relevant Australian animal welfare codes and Halal meat preparation and supervision principals.
3. Upon stunning, the carcass is hung for sticking and bled for around ~5-minutes. Blood is collected in an enclosed tank within bunded sub-floor under the bleed room and collected daily.
4. The hide is removed using mechanical pullers. The fresh skins are dropped into loadout room in the subfloor area and transferred by forklifts or trailers to the onsite skin salting shed.
5. Evisceration for removal of paunch contents, internal organs and other unwanted offal materials.
6. Offal is collected in separate rooms for processing as edible and inedible products. Edible offal is packaged, chilled and transported offsite daily to customers specialising these meat products. Inedible offal is transported offsite daily to rendering plants and pet food manufacturers.
7. Paunch and casings wastes are collected in the paunch line and pumped to a screen press that dewater the wastes prior to collection in skip bins for daily transport to offsite composting sites.
8. Carcasses are trimmed and washed to remove excess fat, bruised meat or other unwanted materials. Trimmed are collected in relevant offal rooms.
9. Carcasses are then chilled in 5 separate chiller rooms each holding 750 lamb carcasses, plus 1000 carcass final holding chiller. Carcasses are held in cold storage prior to loadout.
10. A boning and extra cool room (~1 to 6 0C) for meat carton products is likely in the future.
11. Livestock pen and slaughter room, plant and equipment are washed down daily using potable water from onsite WFP. Slaughter room effluent is discharged to red stream pit. Livestock pen and paunch line washdown is to green stream pit. Refer to section 3.2.7 for further details.

The factory will accept up to 3000 head of sheep/day, typically working 5-6 days/week for 50 weeks of the year. The plant will initially produce dressed carcasses only, with a future boning room, cartooned meat packaging and cool room proposed to be added in a few years’ time.

Refer to the Lean Projects report in Appendix E for further details of the proposed meat process train and demonstration of industry best practice in accord with AQIS requirements.
3.2.4 Skin Salting

Fresh skins are transferred to the skin shed (floor area 32m x 30m). The shed is provided with a concrete bunded floor with rollover bund and interception drain and across the forklift entry/exit point. Roller doors will be provided and closed when no forklift movements taking place. The shed is to be located south east of the operational area as shown in Figure 2845 P12 (Volume 2). See also Figure 15-01-TP-01 of the Lean Projects report (Appendix E) for further skin shed details.

The skin shed will have up to 12 concrete agitator type mixer/tumblers for skin salting. Salted skins will be dried in baskets. All waste brine, drying basket drainage and potentially contaminated areas around access door to shed will flow to a closed loop brine collection, pump sump and reuse system. Any excess waste brine that is not reusable will be transported offsite to EPA licensed recycled/disposal sites. Salted skins will be transported 2-3 times/week to customers.

Salt used in skin salting would be contained within the process building drained to the closed loop brine collection system. Salt spills would be dry cleaned.

3.2.5 Manure Handling

Manure dry collected from the holding pens, overflow yards and livestock trucks will be transferred daily to the manure shed (12m x 31m floor area), which will have a concrete bunded floor with rollover bund, three sided concrete bunkers for batch manure stockpiling, and interception drain across forklift and bobcat entry/exit points. Roller doors will be provided and closed when no vehicle movements in/out of shed are taking place. Manure will be temporarily stockpiled inside the shed ready for offsite transport to composters at least 2-3 times/week.

Manure spills would be swept or dry cleaned. No washdown will occur in the manure storage shed.

The manure shed will be an enclosed dry operation and would not produce significant odour. Dry sheep manure typically produces low odours. The shed is located over 500m from nearest residences and any residual odours, which are agricultural in nature would disperse to non-detectable levels offsite.

3.2.6 Potable Water Treatment (PWT) Plant

Specialist water treatment consultants Environmental Technology Solutions (ETS) have undertaken a Potable Water Treatment options assessment and concept design study for this project – see report in Appendix F. The assessment has considered the feasibility and environmental advantages and disadvantages of the following raw water supply and potable treatment options:

(i) use of GMW channel supply only and subsequent ultrafiltration filtration and disinfection,

(ii) bore water only from onsite GMW licensed production bores and subsequent filtration, RO for salt reduction and disinfection,

(iii) channel supply with bore as supplementary or contingency in the event of channel water supply not being available (i.e. due to GMW channel shut down over winter and/or restricted channel allocation during drought), and treatment/disinfection based on (i) and (ii) above according to water source.

Channel water supply and ultrafiltration (UF Option (i) above) was chosen as the water treatment concept because it gives the lowest salinity of water supply, filter backwash and effluent thereby ensuring sustainability of the onsite recycled water irrigation scheme.

Raw water supply will be pumped from the onsite existing GMW channel supply point via a meter into the raw water (up to 3 x 0.25 ML) tanks and/or into a raw water dam (~50ML). The raw water dam (north west of the operational area) will be filled during the irrigation supply season to ensure enough
storage for the winter period when the GMW channel normally stops flowing (i.e. shut down maintenance period from mid-May to mid-August each year).

Raw water from the tanks/dam will then be subject to purification by an onsite UF and disinfection plant, and then stored as potable water in the covered clean water (up to 4 x 0.25 ML) tanks prior to use in the meatworks.

The PWT plant will have capacity to supply 0.5 – 0.6 ML/d of potable water meeting Australian Drinking Water Guidelines (ADWG, Updated in August 2018 by NHMRC) and AQIS stringent water quality standards for meat processing facilities. Potable water will be utilised for the hot and cold water systems in the slaughter room (sterilisers, carcass and plant washdown) and supply to offices and staff amenities (drinking water, showers, toilets, etc).

Location of the PWT plant is immediately to the west of the operational area as shown in Figure 2845 P12 (Volume 2). See the ETS Potable Water Treatment Report in Appendix F for general PWT layout configuration and location plan.

The PWT UF backwash (up to 15% of treated flows) will be directed to Pond 3 (maturation/winter storage). Backwash will contain inorganic silts, residual chlorine and similar salinity as raw channel water. About 52 kg/day of inert silt will be generated by the backwash, at a TSS of about 670 mg/L. The fine inert sediments will settle out and any residual chlorine will be greatly diluted to harmless levels once mixed within the large volume of Pond 3.

**PWT process for bore water supply contingency periods**

If channel water allocations become limited by GMW due to extended dry conditions then bore water supply contingency option (iii) above will be implemented with enough lead time to obtain EPA approval and before GMW’s water restrictions are imposed. The contingency bore supply PWT system would involve integration of RO and pH/hardness buffering plant between the UF and disinfection processes.

The RO plant would also require installation of a backwash collection, storage and disposal system to handle ~130kL/d at a TDS of ~3300 mg/L (typically 4 times bore water salinity). The backwash system would involve collection and pumping to maturation/winter storage pond 3 for blending with the main recycled water flows for subsequent irrigation onsite. Refer to section 5.3 for explanation of how increased recycled water salinity levels are managed during bore water supply contingency periods.

The PWT compound will be concrete paved and will contain water treatment and disinfection chemicals stored in accordance with EPA bunding guidelines (EPA Pub. No. 347.1), either in self-bunded IBCs, or on bunded pallets typically used for smaller containers. Refer to section 3.2.11 for further details of chemical storage arrangements and inventory.

Refer to the ETS PWT report in Appendix F for further details of PWT design options and selected process, as well as the process for bore water contingency periods. The ETS report also contains site plans showing location and indicative layout of the PWT plant compound.

**3.2.7 Factory Wastewater Treatment Plant (WWTP)**

**Wastewater Sources**

Specialist wastewater treatment consultants ETS have undertaken a Wastewater Treatment options assessment and concept design study for this project – see report in Appendix G. The ETS report documents the assessment of options and the concept design for the chosen treatment process. Overview of the selected WWTP process is given below.

The meat process and livestock pen operations are expected to generate about 0.5 ML/d (134 ML/Yr of raw wastewater) excluding PWT UF backwash and sewage flows. The sources of trade wastewater are:
• Red stream: stun/stick area, slaughter floor, offal processing rooms, chillers and future boning room and carton meat process area.
• Green stream: sheep pen subfloor washdown, paunch fan press wastewaters and truckwash.

The raw red stream will contain elevated levels of organic solids, fats, nutrients, cations and anions and micro-organisms, and residues of sanitisers, detergents and other cleaning chemicals. The green stream will contain elevated organics, nutrients and micro-organisms from sheep manure and urine.

In addition to the above, potentially contaminated stormwater will be collected and discharged to the WWTP from the following operational areas:
• WWTP screening and DAF plant compound, including waste bin storage areas;
• Livestock unloading areas and ramps leading up to pens.

Stormwater runoff from the sheep overflow pens (clay-based pad) will be discharged to the CSP, which will be periodically pumped to Aerated pond 1. Section 3.2.8 provides further details.

PWT UF backwash will be discharged directly to Pond 3 – details were provided in section 3.2.6.

Note that sewage and sullage generated from offices and staff amenities will be treated in a separate sewage treatment plant (STP). Section 3.2.9 provides further concept design details.

**Pre-treatment – Screening and DAF**

The raw red and green streams will be separately screened through rotary type screens to reduce organic solids as well as organic nutrients in solid form.

Screened green and red streams are then combined and discharged to a DAF unit designed to provide further reduction of organic solids, FOG (fats, oil and grease) and organic nitrogen. The DAF is also designed to reduce phosphorus via a coagulant and polymer dosing system.

Further details of the proposed screens and DAF systems are provided in section 5.1.3. Technical specifications for the proposed screening systems and DAF are provided in Appendix H.

Red stream and green stream screenings will each be collected in watertight “red” and “green” skips located within the WWTP compound. Red stream screens Green stream screenings will be collected in for offsite transport to compost facility. DAF solids will be collected in a DAF solids tank for offsite transport to a rendering plant or composting depending on quality.

Effluent from the DAF unit will be discharged to an extended aeration pondage system comprising the following features and functions:

| Aerated Pond 1 (10ML) | • Receives DAF effluent and infrequent CSP overflows  
| | • Provided with 4 x 15kW surface aerators with combined power 60kW  
| | • The ETS WWTP report specifies a minimum 6.5ML capacity and 49kW design aeration duty to handle peak BOD loads. Proposed pond provides extra ~54% pond volume and ~22% aeration capacity over and above design. |
| Settling Pond 2 (2.6 ML) | • Receives aeration pond flows for settlement of biological sludges  
| | • Clear water overflow to Maturation/Winter Storage Pond 3  
| | • Settled (activated) sludge transfer back to Aerated Pond 1  
| | • The ETS WWTP report specifies a minimum 0.9ML capacity to provide settling function. Proposed design provides extra 1.7ML pond volume. |
| Maturation/ Winter Storage Pond 3 (32 ML) | • Receives clear water from Pond 2 and also backwash from PTW UF plant.  
| | • Variable operating depth (1 – 3.5m) – highest in winter/spring, lowest in summer/autumn.  
| | • Minimum operating capacity of 10ML (as per ETS design) provides maturation |
function to further reduce BOD, nutrients and pathogens.

- "Floating" 22 ML over maturation volume is designed for winter storage.

### Winter Storage

<table>
<thead>
<tr>
<th>Pond 4 (40 ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receives flows from pond 3, as well as treated wastewater from STP.</td>
</tr>
<tr>
<td>Pond 3 floating winter storage (22 ML) in combination with Pond 4 (40 ML) provides enough capacity to contain recycled water for 90th percentile wet year.</td>
</tr>
<tr>
<td>EPA water balance calculations (Appendix M) require a minimum of 61 ML.</td>
</tr>
</tbody>
</table>

The indicative footprint of the WWTP compound (screening plant and DAF) and wastewater ponds are shown in Figure 2845 P13 (Volume 2). A schematic site model of the proposed meat process, associated works, by-product flows, waste emissions and discharges to WWTP is shown in Figure 4.

Process calculations and flow diagrams for the wastewater treatment ponds are provided in the ETS report in Appendix G. The wastewater ponds will be provided with process monitoring controls including flow and quality (DO, pH and temperature) to ensure adequate DO levels (> 0.5 – 2 mg/L) and low odour emissions. Final effluent is expected to be to Class C standards suitable for onsite irrigation.

The aeration capacity (60kW) provided in Aerated Pond 1 provides about 22% over and above that needed to meet the expected oxygen demand from average BOD loads in raw effluent. Residence time in the aerated pond exceeds the minimum required to treat the expected BOD and nutrient loads to achieve secondary treated recycled water and without causing offsite odour.

### WWTP Best Practice Assessment

Alternative wastewater treatment options considered and the chosen best practice wastewater process technology for this site has been discussed in the ETS report. The primary reasons for choosing pretreatment (screening plus DAF) and extended aeration were as follows:

- Pretreatment (screening and DAF) to rapidly reduce solids thereby minimising pondage footprint, odour (and no need for an anaerobic pond stage);
- Effluent is maintained aerobic (positive DO) to ensure low odour risk;
- Reliability of operation control of aeration system including provision of additional capacity to ensure final effluent quality BOD and nutrient objectives are met for sustainable irrigation onsite;
- Future proofing and ability to handle variable pollutant loads and augment process capacity following unplanned wastewater pollutant load changes or other contingencies;
- Cost effectiveness (capital and operating), commercial availability and operational experience and efficiency of chosen aeration system.

Integration of a covered anaerobic lagoon to the WWTP process was considered as an option but was not found to be beneficial or viable due to:

- additional lagoon footprint;
- significant additional infrastructure including lagoon cover, biogas collection/flaring or biofiltration system to capture and treat biogas flows;
- insufficient biogas potential to justify a high capital cost co-generation system; and
- associated high capital and operating costs, operating complexity risks.

The chosen WWTP process is fully consistent with industry best practice for the red meat processing industry as described in MLA’s “Environmental Best Practice Guidelines for the Red Meat Industry – Module 3 Wastewater” (2007). In particular, Table 8 of the MLA 2007 guidelines state that best practice for irrigation disposal to land would consist of:
• Solids and grease removal by processes including rotary screens and DAF
• Chemical treatment including chemical precipitation in pretreatment such as a DAF
• Aeration, settlement and maturation ponds to achieve further reductions in BOD, solids, nutrients and pathogens.

In addition, MLA 2007 also states that water quality monitoring, contingency planning, and effective operator training and resourcing are fundamental components of best practice. All of these features are incorporated in the WWTP design for this project and therefore the chosen WWTP technology is considered to meet the definition of environmental best practice for local site conditions.

Further technical details of the wastewater treatment concept design, including raw wastewater flows and loads, and expected recycled water quality for reuse onsite is provided in the ETS report in Appendix G, and further discussed in Section 5 later in this WAA report.

All treatment and winter storage ponds will have at least 500mm freeboard, and sealed with 500mm thick clay liners compacted to meet permeability specification of $10^{-9}$ m/s. Baseline geotechnical assessments, soil bore logs and NATA laboratory testing have confirmed that there is adequate quality in-situ clay material onsite for construction of the wastewater ponds including clay liners. Refer to geotechnical reports provided in Appendix H.

### 3.2.8 Contaminated Stormwater Treatment

The contaminated stormwater pond (CSP) will receive potentially contaminated runoff from operational areas including from:

• external paved surfaces including livestock truck manoeuvring and overflow pen unloading areas,
• skin shed and manure shed entry/exit access areas (potential vehicle tracking of wastes)
• sheep overflow pens (earthen clay-based pad).

The CSP will be clay lined and located immediately to the west of sheep overflow pens (currently the existing dairy shed effluent pond). CSP will be utilised for non-potable uses such as external yard washdown or truckwash depending on quality. CSP overflows will be pumped to Aeration Pond 1.

### 3.2.9 Sewage Treatment

About 5 – 10 kL/d (~2.7 ML/Yr) of sewage and sullage is expected to be generated from office and amenities (toilets, washrooms, showers, lunchroom kitchen, etc).

A proprietary package sewage treatment plant (separate from the factory WWTP) will be provided for treatment of domestic sewage and sullage. The process will comprise an aerobic biological treatment process producing Class C secondary standard suitable for discharge to the winter storage pond 4 and subsequent irrigation onsite mixed with the treated factory wastewater (~157ML/Yr) representing about 1.6% of total recycled water to be managed and irrigated onsite.

Refer to section 5.2 and Appendix H for details of the options and concept design for the proposed STP.

### 3.2.10 Recycled Water Scheme

Winter storage pond 4 is expected to provide recycled water of Class C standard, and fit-for-purpose for onsite irrigation of pasture and fodder on existing flood irrigation areas. Given the elevated nutrients in the recycled water, a cut-and-carry fodder farm enterprise is proposed to ensure nutrient export from the farm. This will be supplemented by sheep grazing (eg. of stubble) at low stocking rates.

Recycled water irrigation supply would be drawn from Pond 4 and transferred by pipe or channel to the existing reuse sump on the western site boundary. The sump contains a diesel irrigation pump located...
at the southern end of the sump. Recycled water would be pumped into the onsite farm channel network to deliver the water to the target irrigation paddock via channel outlet points.

Recycled water will be mixed (“shandied”) with GMW channel supply to manage nutrient and salt loads on the irrigation areas in accord with water/nutrient balances and salt leaching requirements to ensure sustainable recycled water use and farm productivity.

The recycled water will be used on existing flood irrigation areas, which were also used for many decades by the previously dairy farmer to disposed of dairy shed effluent. About 120 Ha of laser graded flood irrigation land is available taking into account loss of some irrigation areas for the new wastewater pondage system. The Farm site plan showing wastewater pondage system footprint, reuse sump, farm channel and drainage systems and available irrigation areas are provided in Figure 2845 P11 Farm Property Irrigation Areas (Volume 2).

The farm has been extensively laser graded as part of a whole farm plan (WFMP). As a key purpose of the WFMP the reuse sump is designed collect irrigation runoff for irrigation reuse onsite. Therefore, any irrigation runoff of recycled water (including stormwater coming into contact with recycled water) will also be able to be intercepted and reused onsite.

A Land Capability Assessment (LCA) has been undertaken Ag-Challenge Consulting (March 2019) including baseline agronomic soil testing in September 2017 - report is provided in Appendix L. The LCA report concluded that onsite soil and land conditions are suitable for use of recycled water irrigation, subject to shandying with GMW channel water, soil and fodder monitoring and management. MAPL will employ a farm manager with appropriate irrigation and cropping management skills to ensure effective and compliant operation of the onsite recycled water scheme.

Water balance calculations have been undertaken to confirm adequate irrigation area and winter storage is available onsite for the 90th percentile wet year. Calculations are provided in Appendix M.

An irrigation management plan (IMP) will be prepared in accord with EPA’s reclaimed water guidelines EIP checklist (Pub. No. 464.2). The IMP will outline procedures and checklists for irrigation and runoff control, livestock restrictions, water use recording, soil (nutrient and salt) testing, annual reporting, and roles and responsibilities for the MAPL and the farm manager.

Further discussion of the recycled water supply scheme onsite is provide in Chapter 6 of this WAA report, and also in the LCA report (Appendix L).

### 3.2.11 Chemical Storage

Chemicals used for factory cleaning and sanitising, water and wastewater treatment systems are expected to include acids and caustics, foaming agents, detergents, degreasers, chlorine-based sanitisers and other specialist food grade chemicals.

A list of cleaning chemicals, sanitisers, etc to be used in the meat process is provided in Table 4 (from Section 21 of the Lean Projects Report, Appendix E).
Table 4 Typical chemical list, bunded container volumes

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Function</th>
<th>Typical Product</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy Duty Alkaline Cleaner</td>
<td>Hook &amp; Roller Alkali</td>
<td>Alkileen</td>
<td>200L</td>
</tr>
<tr>
<td>Sodium Hydroxide</td>
<td>Effluent Treatment</td>
<td>Caustic Soda Pearl</td>
<td>40 x 25kg</td>
</tr>
<tr>
<td>Inhibited Acid Cleaner</td>
<td>Hook &amp; Roller Acid</td>
<td>Hook</td>
<td>200L</td>
</tr>
<tr>
<td>Heavy Duty Foaming Detergent</td>
<td>Descale detergent</td>
<td>Hygiene Plus</td>
<td>200L</td>
</tr>
<tr>
<td>Heavy Duty Chlorinated Alkal</td>
<td>Main Foaming Detergent</td>
<td>Hypofoam</td>
<td>1000L</td>
</tr>
<tr>
<td>QAC Sanitiser</td>
<td>Main Sanitiser</td>
<td>Sante</td>
<td>200L</td>
</tr>
<tr>
<td>Antimicrobial Hand Soap</td>
<td>Hand Soap</td>
<td>Slick</td>
<td>200L</td>
</tr>
<tr>
<td>Acid pH Adjuster</td>
<td>Effluent Treatment</td>
<td>Sulphuric Acid 98%</td>
<td>1000L</td>
</tr>
</tbody>
</table>

The ETS Wastewater (WWTP) and Potable Water Treatment (PWT) reports in Appendices F and G respectively have also provided typical water treatment chemical inventory and tank sizes. The following chemicals will be self-bunded or stored on bunded pallets within the WWTP and PWT compounds as relevant:

1. **PWT:**
   - Liquid chlorine and liquid coagulant: 2 x 1000L IBC, one in use and one spare
   - If bore water is used as contingency a Reverse Osmosis (RO) process would be installed. This would require use of 200L drums of sodium hydroxide, citric acid and anti-scalant for membrane cleaning. Re-order point at 100 litres.

2. **WWTP:**
   - Proprietary coagulant for DAF dosing - 2 x 1000L IBC one in use, one spare
   - Proprietary Polymer for DAF dosing – 1000 kg in 25 kg bags
   - Hydrogen peroxide for effluent pond odour mitigation (contingency use): 1000 IBC.

All chemicals will be contained in self bunded IBC units or on bunded pallets as per EPA bunding guidelines (EPA Pub. No. 347.1, 2015) and located in the operational areas where they are needed. All chemical containers will be appropriately labelled, MSDS registered in the onsite chemical register prior to use onsite. All bunded chemicals will be provided with isolation valves and drip trays for containment of potential spills, drips and leaks. Chemical spills will be collected and disposed of in accordance with onsite spill response procedures (to be developed prior to licensing), with offsite transport and disposal to EPA licensed facilities.

### 3.2.12 Hot water system – Air Emissions

Hot water for factory uses (sterilisers, washdown, etc) will be provided by a LPG fired 3.5 MW, 5 Bar commercial scale steel boiler producing maximum water temperature of 85°C. The boiler will have ~2% evaporative losses and produces no blowdown water.

Typical energy consumption is 2.4 MW (peak 4.8 MW). Average daily use of LPG is anticipated to be ~2000 litres/day (~50,000 MJ/Day).

The chosen hot water boiler uses high performance reverse flame technology with high thermal efficiency (>91%) and focus on fuel savings, low flue gas temperature and reduction of polluting emissions (CO and NOx). Typical daily emissions from boiler are expected to be:

- Particulates: PM$_{2.5}$ <0.3kg/d, PM$_{10}$ <0.1 kg/d
- NOx <5 kg/d, SOx <0.5 kg/d, CO <0.76 kg/d, VOC <0.1 kg/d.

LPG combustion air emissions are well below EPA Works Approval/Licensing daily mass rate triggers.
3.3 Environmental Best Practice

This section provides discussion of how the Gillieston meatworks proposal represents environmental best practice in accord with the following EPA guidance:

- "Demonstrating Best Practice – Guideline" (Pub. 1517).
- *D01 Abattoirs* prompt sheet in "Selected Scheduled Premises Prompt Sheets” (Pub. 1659); and
- Section 5.4 of "Works Approval Application Guideline" (EPA Pub. 1658);

EPA publication 1517 provides explanation of “best practice”, referring to definitions given in State environment protection policy (SEPP). The following SEPPs provide definitions of “Best Practice”:

- SEPP Waters: *best practice means the best combination of techniques, methods, processes or technology used in an industry sector or activity that demonstrably minimises the environmental impact of that industry sector or activity.*

- SEPP Air Quality Management: *The best combination of eco-efficient techniques, methods, processes or technology used in an industry sector or activity that demonstrably minimises the environmental impact of a generator of emissions in that industry sector or activity.*

SEPP also defines “minimise” as: *adoption of measures (including those listed in the wastes hierarchy), which reduces the impact of any activity or waste on beneficial uses.*

A summary of EPA Best Practice Guideline Requirements and responses in this Works Approval Application are provided in Table 5.
## Table 5 EPA Best practice guidance – responses in this Works Approval Application

<table>
<thead>
<tr>
<th>EPA Best Practice Guideline Requirement</th>
<th>Response in this Works Approval Application</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EPA Publication 1517 - Table 1 Examples of best practice and continuous improvement requirements in statutory policies</strong></td>
<td></td>
</tr>
<tr>
<td>SEPP (Noise N-1), Cl.19 (when replacing or installing new equipment). Use quietest equipment available when replacing or installing new equipment.</td>
<td>Best practice measures described in Noise Assessment Chapter 9 and WMG noise assessment report (Appendix P):</td>
</tr>
<tr>
<td><strong>Note:</strong> SEPP (N-1) doesn’t apply in regional Victoria. EPA NIRV guidelines 1411, 1412 (Section 4 Best-Practice Noise-Control Measures), 1413 apply.</td>
<td>- Proposed modern plant design and technology, enclosed meat processes and mitigation strategies ensuring low noise emission.</td>
</tr>
<tr>
<td></td>
<td>- WMG report confirms compliance with NIRV recommended maximum noise levels (RMNL).</td>
</tr>
<tr>
<td></td>
<td>- Based on above best practice measures and assessment there is low risk of unwanted/nuisance noise from the project.</td>
</tr>
<tr>
<td>SEPP (Waters of Victoria), Cl. 3 (in definition of ‘best practice’ and ‘minimise’), Cl. 28(3)(c) (new wastewater discharges). New discharges require best practice.</td>
<td>Best practice measures described in Chapters 5 (Wastewater and Stormwater Management) and 6 (Land and Groundwater), Ag-Challenge LCA report in Appendix L and EPA Water Balance Calculations in Appendix M:</td>
</tr>
<tr>
<td><strong>Note:</strong> now SEPP (Waters), Cl.6 (same definitions of best practice and minimise). Previous Cl.28(3)(c) not in new SEPP (Waters). This clause was intended to apply for new wastewater discharges to surface waters.</td>
<td>- All wastewater to be discharged to onsite beneficial reuse scheme in accordance with EPA publications 464.2 and 168.</td>
</tr>
<tr>
<td></td>
<td>- Adequate winter storage and irrigation area provided in design to contain all wastewater onsite up to the 90th percentile wet year as required by EPA publications 464.2 and 168.</td>
</tr>
<tr>
<td></td>
<td>- No discharge of wastewater to surface waters proposed except under exceptionally wet conditions (exceeding 90th percentile).</td>
</tr>
<tr>
<td></td>
<td>- Only clean agricultural runoff to be discharged to GMW drain, which is a manmade agricultural drain with lower environmental sensitivity compared to natural surface waters.</td>
</tr>
<tr>
<td></td>
<td>- Combination of above best practice assessment and lower environmental sensitivity of GMW drain represents low risk to surface waters.</td>
</tr>
</tbody>
</table>

Meatworks Australia Pty Ltd – Gillieston Meat Processing Facility Works Approval Application
<table>
<thead>
<tr>
<th>EPA Best Practice Guideline Requirement</th>
<th>Response in this Works Approval Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPP (Groundwaters of Victoria), Cl. 12 (prevention of groundwater pollution). Undertake all practicable measures to prevent pollution of groundwater.</td>
<td>Best practice measures described in Chapter 6 (Land and Groundwater), Geotechnical Report in Appendix H and Ag-Challenge LCA report in Appendix L:</td>
</tr>
<tr>
<td>Note: now SEPP (Waters), but old Cl.12 not in new SEPP.</td>
<td>• Meat process buildings, manure and skin sheds, WWTP and STP compounds and waste skip areas are within concrete lined bunded floors. Elevated livestock holding pens have concrete lined bunded subfloor. Blood tank is within bunded area.</td>
</tr>
<tr>
<td>SEPP (Prevention and Management of Contamination of Land), Cl. 17(2) (prevention of contamination of land). Apply best practice to any transport, storage or handling of any chemical substance or waste.</td>
<td>• All wastewater treatment and storage ponds to be sealed with 500mm compacted clay liner meeting permeability specification 10^{-9} m/s.</td>
</tr>
<tr>
<td></td>
<td>• All chemicals to be securely stored in accordance with EPA Bunding Guidelines 347.1 with use of self-bunded IBCs and bunded pallets as relevant (see section 3.2.11 of this WAA).</td>
</tr>
<tr>
<td></td>
<td>• Recycled water irrigation controls on water, nutrient and salt loads and shandying with channel water as per irrigation management plan (EIP in accord with EPA Publication 464.2).</td>
</tr>
<tr>
<td></td>
<td>• Combination of above best practice measures represents low risk to groundwater.</td>
</tr>
<tr>
<td>SEPP (Air Quality Management), Cl. 18 (general requirements), Cl. 19 (management of new sources of emissions). Apply best practice and continuous improvement for all relevant indicators; reduce to maximum extent achievable for ‘Class 3’ indicators.</td>
<td>Best practice measures described in Chapters 5 (Wastewater management) 7 (Air Emissions) and 8 (Energy and GHG Emissions), and ETS WWTP report in Appendix G, ANE Air Quality (Odour) Assessment Report in Appendix O:</td>
</tr>
<tr>
<td></td>
<td>• Proposed modern plant design and technology, enclosed meat processes and mitigation strategies ensuring low odour and dust emissions</td>
</tr>
<tr>
<td></td>
<td>• Pre-treatment (screening and DAF) and fully aerobic WWTP and STP technology proposed as per MLA/AMPC best practice guidelines with additional capacity in WWTP design to ensure low odour risk</td>
</tr>
<tr>
<td></td>
<td>• ANE Odour modelling report confirms compliance with SEPP (AQM) 1 Odour Unit GLC at nearest sensitive land uses (&lt;1-2 OU at site boundaries).</td>
</tr>
<tr>
<td></td>
<td>• Based on above best practice measures and assessment there is low risk of offensive offsite odour from the project.</td>
</tr>
<tr>
<td>EPA Best Practice Guideline Requirement</td>
<td>Response in this Works Approval Application</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>EPA Publication 1659 Selected Scheduled Premises Prompt Sheet: Animal-derived by-products and food - D01 Abattoirs</td>
<td>Separation distance assessment described in Chapter 7 (Air Emissions), Section 7.2:</td>
</tr>
<tr>
<td>Best practice for pollution controls</td>
<td>• The Gillieston meatworks and associated WWTP and irrigation area complies with the following recommended separation distances given in EPA Publication 1518:</td>
</tr>
<tr>
<td>• ensuring an appropriate separation distance of at least 500 metres (EPA publication 1518)</td>
<td>• Closest private residence is 510m from WWTP ponds and 570m from the abattoir building (loadout area) (see Section 7.2.1, and Figure 2845 P15 in Volume 3)</td>
</tr>
<tr>
<td>• for onsite composting, refer to EPA publication 1588.</td>
<td>• No onsite composting proposed – all manure and paunch wastes to be transported offsite for reuse by EPA approved composting businesses.</td>
</tr>
</tbody>
</table>

**Energy/Water Use:**
- installing efficient refrigeration system.

**Best practice measures described in Chapters 4 (Water use) and 8 (Energy and GHG Emissions) and Lean Projects process planning report in Appendix E:**
- Proposed modern eco-efficient plant design and technology with inherent water and energy use efficiencies that are consistent with MLA/AMPC industry best practice environmental performance benchmarks (refer to section 4.3)
- Energy efficient refrigeration (and heating for hot water) is proposed as detailed in the Lean Projects Report.
- A future solar project is planned subject to business case feasibility study.

**Air:**
- collecting animal wastes and storing in an enclosed area
- enclosing odour-emitting wastewater treatment components
- processing materials for rendering or processing

**Best practice measures described in Chapters 5 (Wastewater management) 7 (Air Emissions) and 8 (Energy and GHG Emissions) and 10 (Waste management), and ETS WWTP report in Appendix G, ANE Air Quality (Odour) Assessment Report in Appendix O:**
- Dry sheep manures collected daily from holding pens and transferred to enclosed manure shed for temporary stockpiling. Shed provided with roller doors that are closed when no vehicle access. Sheep manures have low odour potential when maintained in a dry state. Manure transported offsite at least twice daily
<table>
<thead>
<tr>
<th>EPA Best Practice Guideline Requirement</th>
<th>Response in this Works Approval Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>transporting them from site daily</td>
<td>• Skins are transferred to enclosed skin shed for salting and transport offsite to customers ~2 times/week. Shed provided with roller doors that are closed when no vehicle access. Salted skins have low odour potential. No green skins will be stored.</td>
</tr>
<tr>
<td>• for rendering activity refer to D02</td>
<td>• Pre-treatment (screening and DAF) and fully aerobic WWTP and STP technology proposed as per MLA/AMPC best practice guidelines with additional capacity in WWTP design to ensure low odour risk</td>
</tr>
<tr>
<td>of odour emissions.</td>
<td>• All screenings are transported offsite daily, and DAF solids are held in enclosed tank prior to offsite transport/disposal.</td>
</tr>
<tr>
<td></td>
<td>• All edible offal will be packaged, chilled and transported offsite daily to customers</td>
</tr>
<tr>
<td></td>
<td>• Inedible offal will be temporarily held in enclosed skip bins and transported offsite daily to EPA approved rendering plants. No rendering will occur onsite.</td>
</tr>
<tr>
<td>• avoiding livestock delivery between</td>
<td>Best practice measures described in Noise Assessment Chapter 9 and WMG noise assessment report (Appendix P):</td>
</tr>
<tr>
<td>10pm &amp; 7am</td>
<td>• Proposed modern plant design and technology, enclosed meat processes and mitigation strategies ensuring low noise emission.</td>
</tr>
<tr>
<td>• engineering to reduce noise</td>
<td>• WMG report confirms compliance with NIRV recommended maximum noise levels (RMNL).</td>
</tr>
<tr>
<td>generation or enclosure of noisy</td>
<td></td>
</tr>
<tr>
<td>areas and/or activities.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Water - Stormwater run-off management:</td>
<td>Best practice measures described in Chapters 4 (Water Use), 5 (Wastewater and Stormwater management), 6 (land and groundwater) and 10 (Waste management) and Lean Projects report in Appendix E:</td>
</tr>
<tr>
<td>• collecting stormwater for reuse, by</td>
<td>• factory and office building rainwater roof collection proposed for non-potable supply to amenities (i.e. toilet flushing) and garden watering.</td>
</tr>
<tr>
<td>putting roofs over building structures</td>
<td>• All manures, skins, WWTP screenings, offal and waste skip bins will be stored on concrete lined and bunded areas draining to the WWTP or closed loop system (i.e. in manure and skin sheds)</td>
</tr>
<tr>
<td>• handling all solid and liquid</td>
<td></td>
</tr>
<tr>
<td>wastes on sealed, free-draining</td>
<td></td>
</tr>
<tr>
<td>areas</td>
<td></td>
</tr>
<tr>
<td>• preventing leachate (from onsite</td>
<td></td>
</tr>
<tr>
<td>composting) or contaminated</td>
<td></td>
</tr>
<tr>
<td>wastewater running to surface</td>
<td></td>
</tr>
<tr>
<td>drains that run to surface waters</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### EPA Best Practice Guideline Requirement
- transporting hides and skins in watertight bins on trucks fitted with drip catchment trays.

### Response in this Works Approval Application
- Stormwater runoff from potentially contaminated operational areas will drain to the WWTP or to the CSP. CSP overflows will be discharged to the Aerated pond. There will be no composting onsite.
- The site has a whole farm plan enabling potential irrigation area runoff to be collected in onsite reuse sumps and recycled to the irrigation distribution system.
- Green skins will be transported from the meatworks to the skin shed by forklift on sealed pallets or trailers. Salted skins will be transported offsite to customers.

#### Wastewater:
- minimising wastewater generation
- collecting and treating process wastewater, using minimum secondary treatment to achieve Class C wastewater quality as specified in Table 1 of the EPA publications 464 and/or IWRG632
- collecting and securing transportation of blood, or dried onsite (EPA D02 licence required).

Best practice measures described in Chapters 4 (Water Use), 5 (Wastewater and Stormwater management), 6 (land and groundwater) and 10 (Waste management), Lean Projects report in Appendix E, ETS WWTP report in Appendix G, and STP process design in Appendix H:
- Proposed modern eco-efficient plant design and technology with inherent water use efficiencies and low wastewater generate rates that are consistent with MLA/AMPC industry best practice environmental performance benchmarks (refer to section 4.3)
- The factory WWTP and STP are both designed to produce Class C reclaimed water
- Blood will be collected in an enclosed/bunded blood tank and transported offsite daily to EPA approval rendering facilities. No blood drying will take place onsite.

#### Land and groundwater
- reusing treated wastewater sustainably on land in accordance with EPA publications IWRG632 and/or 464, or discharged to sewer
- where appropriate, monitoring soil and groundwater in irrigated land.

Best practice measures described in Chapter 6 (Land and Groundwater), Section 13.1 (Environmental Monitoring Programs), and Ag-Challenge LCA report in Appendix L:
- recycled water (combined WWTP and STP flows) is to be beneficially irrigated onsite in accord with an irrigation management plan (IMP or EIP as per Publication 464.2 and IWRG632)
- recycled water will be shandied with GMW channel water to ensure sustainable nutrient and salt balance is achieved. This is best practice nutrient salinity management consistent with whole farm plan principles for shandying of higher salinity runoff and groundwater on other irrigated farms in the district.
<table>
<thead>
<tr>
<th>EPA Best Practice Guideline Requirement</th>
<th>Response in this Works Approval Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>• recycled water, soil and groundwater (from existing production bores onsite) will be monitored in accordance with a risk-based environmental monitoring program and the onsite IMP.</td>
<td></td>
</tr>
<tr>
<td>• the onsite flood irrigation scheme is best practice because it incorporates whole farm plan principles including runoff collection drains and sumps, irrigation scheduling according to water and nutrient balances, leaching fraction for soil salinity control, cut-and-carry fodder production to utilise nutrients applied, and monitoring.</td>
<td></td>
</tr>
</tbody>
</table>

**Waste:**

- properly storing, treating (optional) and disposing animal wastes
- designing adequate composting facility (refer to A07) for onsite composting of animal wastes.

Best practice measures described in Chapter 10 (Waste management) and Lean Projects report in Appendix E:

- All manures, skins, offal and waste skip bins will be stored on concrete lined and bunded areas draining to the WWTP or closed loop system (i.e. in manure and skin sheds)
- offal and skip bin wastes are transported offsite daily to EPA approved facilities including rendering plants and composters
- Blood will be collected in an enclosed/bunded blood tank and transported offsite daily to EPA approval rendering facilities.
- Manures are transported offsite at least twice weekly to composters
- Salted skins are transported offsite ~2 times/week to hides and skins businesses.
- No composting will take place onsite.
In summary, Table 5 above and the details of proposed works provided in this works approval application including supporting technical information in the appendices clearly demonstrates how the chosen process technology, design and operations of the meatworks and associated wastewater treatment system and recycled water irrigation scheme collectively represents environmental best practice that ensures low risk to the environment and public health.

The proposed works fully satisfies key EPA best practice guidelines including:

- EPA’s best practice guidance described in publications 1517, 1658 and 1659;
- EPA’s Environmental best practice guidelines for Industrial Water Reuse (IWRG632.1), Use of Reclaimed Water (Pub. 464.2) and wastewater irrigation (Pub. 168); and
- EPA’s Recommended Separation distances for Industrial Air Emissions (Pub. 1518).

The proposed Gillieston meatworks and operations fully align with the best practice technologies and measures described in MLA and AMPC meat industry best practice environmental guidelines listed below, which are widely recognised as the best practice benchmark across Victoria and other Australian states and territories:

- “Environmental Best Practice Guidelines for the Red Meat Industry” (MLA 2007) including Modules for:
  1. Meat processing
  2. Energy
  3. Wastewater
  4. Waste solids
  5. Odour
  6. Effluent irrigation

Further details and discussion of Best Practice for specific works and features of the project are provided in the following Chapters, sections and appendices of this WAA:

- **Meat processing technology**
  - Chapter 3, Section 3.2
  - Lean Projects Report Appendix E
- **Eco-efficiency – water, energy, wastewater loads**
  - Chapters 4 and 5
  - Lean Projects Report Appendix E
- **WWTP and STP technology**
  - Chapter 3, Sections 3.2.7 and 3.2.9
  - Chapter 5, Sections 5.1 and 5.2
  - ETS WWTP report Appendix G
  - STP concept design Appendix H
- **Recycled Water irrigation scheme**
  - Chapter 6, Sections 6.3 and 6.4.6,
  - Chapter 12, section 12.3
3.4 Integrated Environmental Assessment

The Gillieston meatworks project will be a state-of-the-art facility incorporating industry best practice, water and energy use efficiencies, and reduced wastewater loads equal to or better than the environmental performance benchmarks reported by the Australian meat industry including those published by MLA and AMPC in 2015.

Meat processing plants are significant users of water and energy given the high standards of hygiene, sanitation and refrigeration inherently associated with meat production for human consumption. The primary waste streams are wastewater and some solid waste as well as greenhouse gas emissions from energy/fuel usage. Meat processing wastewater has high levels of organics, fat and nutrients and moderate salinity and therefore requires effective treatment to avoid odour and ensure effluent reuse to land is sustainable and does not impact on soils, surface water or groundwater. Manure and paunch wastes are suitable for composting and subsequent beneficial use as organic fertiliser on land. Because most inedible by-products from meat processing have established recycling industries (e.g. rendering, pet food, tallow, composting, fertiliser, hides and skins, etc) only a small quantity of non-recyclable solid waste from the meatworks will require disposal to landfill (see section 10 for further details).
Increasing costs for water, energy and waste disposal are key drivers for meat processors to improve operational efficiencies to reduce production costs. This in combination with higher environmental standards and community expectations is resulting in continuous improvement throughout the industry and development of processes incorporating reduced resource consumption and environmental emissions, and lower operating and maintenance costs.

The highest energy demands for the facility will be for refrigeration, chilling, cool store, hot water system and the WWTP. This is to be offset by energy efficiencies built into process design, energy saving devices and future solar energy project onsite.

The facility will utilise about 0.5 - 0.6 ML/d of low salinity water supplied from GMW channel and treated in the PWT plant and not place demand on the local GVW potable supply system. MAPL will also utilise licensed bore water as a supplementary or contingency water supply, but only during periods when channel water allocations are restricted.

The use of water efficient fixtures and fittings and trigger nozzles on hoses will ensure reduced water use and wastewater generation but at same time assuring high cleaning standards for meat processing plant and equipment and assurance of export quality meat products.

To ensure recycled water quality objectives are met and control of odour to prevent offsite impacts at sensitive receptors the WWTP will incorporate an additional 22% aeration capacity (i.e. over and above the minimum aeration duty required to meet daily pollutant loads).

The supply of recycled water to the irrigation areas also helps to offset demands on GMW channel supply by supplying and alternative water source for irrigation. The nutrient value in the recycled water also provides a supplementary source of nutrients for farm pastures, thereby helping to reduce reliance on inorganic/organic fertiliser and associated costs.

The meat, offal and blood by-products generated from the facility will be beneficially used by the pet food and rendering industry. Skins will be utilised by the hides and skins industry. Paunch waste and manures will also be reused by composters and local farmers. This ensures avoidance of disposal of these by-products to landfill for better environmental and sustainability outcomes.

The overall environmental outcome for the Gillieston project is a modern meat processing facility operating to industry best practice and conforming to State Environment Protection Policy, Waste Management Policy, EPA approval and licensing requirements and relevant EPA best practice guidelines.

Further assessment of discharges and emissions to air, water and land, waste management and associated environmental impacts, eco-efficiencies, pollution prevention and management plans are discussed in the Chapters 4 to 13 to follow.
4 Water Use

4.1 Water uses in factory processes

The factory water demand is expected to be around 512 kL/day (~134 ML/Yr), based on forecast water use by Lean Projects provided in Appendix E. A typical daily water use breakdown is as follows:

- Holding pens (underfoot washdown) and Truckwash: 15 – 20%
- Slaughter floor (sterilisers, washdown, carcass wash): 40 – 50%
- Offal processing: 10 – 20%
- Other plant and equipment cleaning: 15 – 20%
- Plant services such as:
  - hot water boiler makeup
  - drinking, kitchen and amenities
  - toilet flushing
  - fire services, testing and top-up
  - landscape garden watering
  - other minor uses.

The above factory potable water needs will be supplied from the PWT plant. Non-potable uses (holding pens, truck wash, WWTP screen wash, wet paunch pumping to filter press, etc) can be supplied from recycled water from the CSP and Maturation Pond/Winter Storage Pond 3.

4.2 Potable Water Use for Office and Worker Amenities

The PWT plant will supply onsite offices, kitchens, worker showers, hand basins, laboratory, drinking water, etc. To help reduce PWT demands, rainwater will also be collected from factory and office roofs and held in rainwater harvesting tanks for toilet flushing and garden uses.

Water efficient fixtures will be installed to optimise potable water demands for these amenities. Potable water demand for these non-factory uses is expected to be around 5 – 10 kL/day (i.e. for 20 office staff and 50 factory staff at 15 – 25 l/p/d, plus 35-65 l/p/d shower usage, based on EPA Publication 500). This usage for onsite amenities will be the basis for sewage volumes to be treated onsite (refer to description of potential STP process options in section 5.2).

4.3 Meat industry water use efficiency benchmarks

The abattoir meat process train will be subject to detailed design by Australian specialists in meat processing equipment. The concept level process described for this works approval is based on modern technology approved by AQIS for export small stock processing facilities. The process incorporates water use efficiency consistent with MLA and AMPC eco-efficiency best practice guidance.

Water usage rates for the Gillieston project will be within the benchmark range and lower than the average benchmark as reported in the AMPC “Environmental Performance Review: Red Meat Processing
Sector 2015 Final Report*. The AMPC EPR reports an average of 8.6 (range of 5.7 – 12.7) kL/HSCW (cattle equivalents) across 14 integrated facilities most of which included onsite rendering and cattle processing. Adjusted to remove rendering water use (1.38 kL/HSCW) and to reflect small animal processing (1.16 correction factor upwards) and the average water use benchmark becomes 8.4 kL/HSCW (small animal equivalents), which is the relevant benchmark for the Gillieston project.

The Lean Projects report in Appendix E conservatively forecasts daily factory process water use at about 512 kL/day. For 3000 head per day and typical 21kg HSCW this gives a usage rate of about 8.1 kL/HSCW, which is less than the AMPC benchmark average for small stock processing sites.

In summary, key water-use efficiencies to be implemented for the MAPL Gillieston project include:

- Production of carcass only uses less water per HSCW than sites with boning facilities;
- Water efficient fittings, trigger nozzles and jets on cleaning equipment
- Reuse of steriliser water
- Installation of sensors on washers and timers at hand washing stations
- Given the staging of the project, MAPL will be able to identify water use efficiencies prior to the second stage commencement of boning room and carton meat operations where use of CIP systems with rinse recovery can be implemented for reduced water demand for washdown;
- reuse of liquid recovered from paunch/casings fan press for wet paunch/casings pumping;
- closed loop skin salting process to recover brines for reuse in the tumbler;
- water efficient boiler with no blowdowns or bleeds with low water makeup requirements;
- PWT UF backwash to the raw water feed tank for reuse via the PWT, or otherwise discharged to winter storage for irrigation reuse;
- reuse of treated recycled water from winter storage pond 3 and/or the CSP for non-potable uses around the factory including:
  - holding pen subfloor, external paved yards washdown and truckwash,
  - wet paunch/casing pumping to fan press,
  - WWTP screen wash and DAF scraper wash, and
  - other external uses not requiring potable water quality and involved in meat processing;
- office and factory roof rainwater collection for toilet flushing;
- onsite irrigation reuse of treated wastewater and stormwater for production of pasture and fodder;
- recycling of runoff from irrigation areas and general farm drainage via onsite drains and sumps around the property – re-irrigated onsite.

After commissioning and commencement of operation, MAPL expects greater water use efficiency gains and reductions in wastewater generation rates over time as process improvements are made. MAPL will set aspirational water use targets for the Gillieston facility to enable comparison with AMPC and MLA eco-efficiency targets and industry benchmarks.
5 Wastewater and Stormwater Management

5.1 Factory Wastewater Treatment System

ETS has prepared a Wastewater Treatment Report (provided in Appendix G) evaluating WWTP technology options and the reason for the chosen wastewater treatment process design for this project. An overview of wastewater sources, proposed treatment process, operational controls and recycled water quality is given below.

5.1.1 Wastewater Sources

Sources of wastewater from the factory and associated operations, and discharge pathway to the wastewater treatment system are provided in Table 6. Overall meatworks wastewater flows will be about 90% of potable water intake, due to internal recycling and evaporation losses.

Table 6 Factory wastewater sources and typical (average) flows

<table>
<thead>
<tr>
<th>Factory wastewater source</th>
<th>Discharged to</th>
<th>Typical Flow rate (kL/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory red stream: cleaning/washdown of meat processing equipment, stick/bleed area, slaughter floor, offal processing rooms, chillers and future boning room.</td>
<td>Red stream pit</td>
<td>381</td>
</tr>
<tr>
<td>Green stream: sheep pen underfloor washdown, paunch and casings fan press wastewaters, truckwash and some external yard washdown</td>
<td>Green stream pit</td>
<td>105</td>
</tr>
<tr>
<td>Potable Water Plant UF backwash (15% of raw water feed rate, contains inert silt and disinfection residues)</td>
<td>Raw water feed tank, raw water dam, or Maturation/Winter Storage Pond 3</td>
<td>78</td>
</tr>
<tr>
<td>Operational area contaminated stormwater (~5000m²): external paved surfaces for livestock truck manoeuvring and livestock unloading areas, skin shed and manure shed external vehicle access areas, sheep overflow pens (earthen clay-based pad).</td>
<td>Contaminated stormwater pond (CSP). CSP overflows to Aerated pond 1</td>
<td>Rainfall derived flows (~1-2 ML/Yr)</td>
</tr>
</tbody>
</table>

Average wastewater flow (green and red stream) is forecast to be about 486 kL/d discharged to the WWTP pre-treatment phase (screening plant and DAF). The red stream represents ~80% of the flow, and the green stream ~20%.

In addition, about 78kL/d of PWT UF backwash containing inert silts from channel supply and chlorine disinfection residues will be discharged as follows:

(i) raw water feed tank and/or raw water dam for re-treatment in the PWT plant and subsequent potable use; and/or

(ii) discharged to the Maturation/Winter Storage Pond 3 where it will mix and settle within the main recycled water flows for onsite irrigation reuse.
To prevent CSP overflow, excess water will be intermittently transferred to aerated pond 1 for treatment – this is likely to occur on days when meat processing is not occurring. Depending on rainfall runoff and amount of CSP recycling throughout the year, about 1-2 ML/Yr of CSP water is assumed to require treatment via the aeration pond.

The brine waste stream generated from the skin salting process is not represented in Table 6. This liquid brine will be contained and recycled in a closed loop system within the bunded skin shed.

The above trade waste sources and flow paths to the WWTP are shown conceptually in Figure 4 - from Lean Projects report in Appendix E. The locations of the proposed wastewater pre-treatment compound including red and green pits, screening and DAF plant, wastewater pondage system and CSP are shown in Figure 2845 P13 (Volume 2). A WWTP conceptual process flow diagram is provided in the ETS report in Appendix G.

5.1.2 Raw Wastewater Characteristics

Literature Search – Small-stock abattoir wastewater characteristics

The predicted factory wastewater quality characteristics are given in Table 7 consistent with that expected for newly constructed modern small stock processing facilities designed and operated to AQIS standards and MLA/AMPC industry best practice guidelines. These forecast pollutant loads are based on water quality data as reported in Australian literature (e.g. MLA, AMPC, Victoria University, etc) and for existing eco-efficient sheep processing facilities in Victoria (commerce-in-confidence data).

The basis for determining factory wastewater quality including underlying literature review, water quality data sources and MLA industry benchmark analyses are discussed in the Lean Projects report (Appendix E) and ETS report (Appendix G). The literature reports a wide range of pollutant concentrations for key parameters including organics, solids, nutrients and salinity. It must be noted that much of the available data is dated (over 15-20 years old) and related to integrated abattoirs that usually process significant proportion of cattle and pigs, and also which carry out rendering onsite.

The existing published data sources report higher wastewater loads being representative of older meatworks operations having lower water use efficiency and less rigorous waste minimisation practices, processing larger animals and including high strength rendering wastewaters.

More recent publicly available data that is directly applicable to small-stock (lamb) facilities excluding rendering under Australian conditions is not readily available and tends to be commerce-in-confidence. Key references reviewed for estimating pollutant flows and loads are as follows:

- “Review of Removal of Fats, Oil and Greases from Effluents from Meat Processing Plants”, AMPC 2015
- “Wastewater Treatment for a Small Scale Integrated Abattoir”, Butler B. (Johns Environmental), MLA 2014
- “Cleaner Production Assessment in Meat Processing”, UNEP and Danish EPA 2000.
• “Effluent Treatment Ponds”, Green J., CSIRO Meat Research Laboratory, 1992

Various Works Approval Applications as submitted to EPA as public documents were also reviewed for relevant wastewater quality data that has been previously accepted by EPA:
- Poowong Abattoir (GBP Australia) 2011 and 2015 (WA66187 and WA126872)
- Pyramid Hill Abattoir (Aussie Meats) 2009 (WA66902)
- Bacchus Marsh Abattoir (Lincoln Valley) 2008 (WA62868)
- Donald Abattoir (Goodvale Pastoral) 2007 (WA62630)
- Wangaratta Meat Processing Facility 2007 (WA61039)
- Cranbourne Abattoir (Wagstaff Cranbourne) 1997 (WA31237).

Raw meatworks wastewater (prior to screening) is reported to vary widely due to presence of meat solids, fats, oils and grease. MLA 1991 reported BOD ranging 700 – 4000 mg/L, COD 1300 – 7500 mg/L, Total SS 200 -1200 mg/L, TKN 100 – 1000 mg/L. More recently, the 2015 AMPC EPR reported average untreated wastewater quality for 14 participating red meat processing facilities (all mixed abattoirs, 12 with rendering) as: BOD 2657mg/L, FOG (Fats, Oil & Grease) 1780 mg/L, Nitrogen 250mg/L, and Phosphorus 33mg/L.

Given the high variability and uncertainty with adopting average raw wastewater values, it is more conventional to quote water quality after pre-treatment (post-screening). Lean Projects report provided post-screen wastewater data for a Victorian lamb abattoir with very similar meat processing technology and pre-treatment (screens, DAF) as that proposed for the Gillieston project.

Given the publicly available literature and data is based on old less efficient abattoirs often incorporating rendering, this has resulted in conservatively high pollutant loads being adopted for this project.

**Adopted wastewater characteristics**

This project has adopted the levels given in Table 7, which lists the average daily wastewater quality expected post-screening and post-DAF prior to discharge to the aeration pond. These wastewater quality characteristics were adopted by agreement with MAPL and assumed for the ETS WWTP concept design report (Appendix G).

Peak BOD/COD values post-screening are anticipated to be of the order of 2500/5000 mg/L respectively.

Effluent TDS is expected to be <1000 – 1100 mg/L including both organic and inorganic forms. Inorganic component of the TDS is expected to be <500 – 600 mg/L. This is on the basis that channel water will supply potable water to the factory from the existing onsite GMW licensed supply point. Typical channel water salinity in this region is 50 - 60 mg/L.

If bore water is required to be used to supply potable water during contingency periods, it would be taken from the “south bore” onsite (bore no. WRK007365). NATA laboratory testing of samples taken in late September 2018 indicate a TDS of about 820 mg/L, total sodium 200mg/L and total chlorine 260 mg/L. Therefore, based on recent bore testing and Table 7 values, the total TDS of factory wastewater could be around 1100 – 1300 mg/L, and total sodium about 367 mg/L.
Table 7 Factory wastewater quality characteristics (average) – after screening and DAF

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Combined Green &amp; Red Streams Concentration (mg/L or as stated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Post Screening</td>
</tr>
<tr>
<td>Chemical Oxygen Demand (COD)</td>
<td>300</td>
</tr>
<tr>
<td>Biological Oxygen Demand (BOD₅)</td>
<td>1500</td>
</tr>
<tr>
<td>Suspended Solids (SS)</td>
<td>500</td>
</tr>
<tr>
<td>Total Nitrogen (TN)</td>
<td>200</td>
</tr>
<tr>
<td>Total Phosphorus (TP)</td>
<td>50</td>
</tr>
<tr>
<td>Free Oil &amp; Grease (FOG)</td>
<td>500</td>
</tr>
<tr>
<td>Total Dissolved Solids (TDS)</td>
<td></td>
</tr>
<tr>
<td>Sodium</td>
<td>175</td>
</tr>
<tr>
<td>pH</td>
<td>6.5 – 7.5</td>
</tr>
</tbody>
</table>

### 5.1.3 Factory wastewater treatment process

The ETS report in Appendix G provides the design concept and functional specifications for the proposed WWTP process to handle the expected factory wastewater flows and loads.

The proposed mechanical/biological treatment train comprises the following stages:

- **Screening** (Coarse Screen + Contrashear)
- **DAF** (chem. dosing to reduce P)
- **Aerobic Digestion** (Aerated Pond 1)
- **Settling & AS recycle** (Pond 2)
- **Maturation/Winter Storage** (Ponds 3 & 4)

The red and green streams are combined after screening and DAF pretreatment and then pumped to the extended aeration pondage system as follows (in series):

- Aerated Pond (1),
- Settling Pond (2),
- Maturation/Winter Storage Pond (3); and
- Winter Storage Pond (4).

The whole WWTP process train is designed to produce secondary treated water suitable for onsite flood irrigation with restricted access for livestock and the public. A WWTP process flow diagram is provided in Figure 6 (from the ETS WWTP report).

**Screening Systems**

Shaker screens, fan press units, rotary wedge screens, static screens and screw systems are all best practice options used in the meat industry. The type of solids screening system is not critical to the WWTP functional design. The key parameters that form part of the functional design is that solids greater than 0.5mm in size are prevented from entering the downstream treatment processes.
Figure 6 Wastewater Treatment Plant Process Flow Diagram (ETS 2019)
Note that large solids from the slaughter floor washdown are initially collected via floor basket screens prior to reduce solids carryover to the red stream drains. In addition, dry sweeping/clean-up procedures will be first carried in the holding pens, external yard and truckwash areas prior to washdown to reduce solids loads to green stream drains.

The raw red and green streams will discharge to separate pits and then be pumped over parallel coarse screens for large solids removal followed by a 0.5mm rotary screen as discussed below. It is proposed to provide separate "Contrashear" rotary type screens for each of the red and green streams.

The operation of Contrashear screening systems are discussed in the Lean Projects report in Appendix E. The Contrashear is a rotary 0.5mm wedge wire screen drum that filter solids from the influent water. Flow passes into the internal feed tank and overflows the weir. The internal feed tank has the function of controlling velocities and reducing the force of the flow onto the wedge wire drum. The effluent water flows on to the screen face and aims to dewater between the “3” and “6” o’clock positions. The screened effluent waters pass through the element under gravity, trapping the solids on the screen face whilst the cleaned liquor passes through the screen element.

The collected solids are discharged via the screen drum mouth into a skip bin for daily removal offsite.

After the screens, the red and green streams are combined into a 35kL balance tank. Expected screened and combined wastewater quality from the balance tank is given in Table 7.

Further technical specifications for the screening plant and equipment are provided in Appendix H.

**DAF Unit**

Screened wastewater from balance tank then passed through the DAF system.

Dosed and un-dosed DAF systems are best practice technology in modern Australian meat plants. They are more commonly installed for facilities discharging trade waste to sewer. But DAF technology is increasingly seen in rural based meatworks that do not have access to sewer and that rely on land-based reuse systems with further downstream wastewater treatment.

A DAF typically involves injecting a high pressure (~400 kPa) stream of liquid, containing high levels of dissolved air (usually recycling treated DAF effluent via a pressurised saturator) into the raw waste water stream. When the pressure is released in the DAF tank, the dissolved air forms a mass of very fine air bubbles. These bubbles attach to particles and fat globules and lift them to the surface, where they form a float of aerated material. The floating material is scraped off for disposal or reprocessing and the clearwater underneath is discharged.

At Gillieston the DAF will incorporate chemical dosing to reduce phosphorus from the combined red and green wastewater stream. A duty/standby pump set shall transfer waste water from the balance tank to the DAF plant at a fixed rate of approximating 21kL/hr.

Coagulant and polymer dosing shall be dosed into the DAF process to precipitate and float suspended solids, oil and grease and phosphorous. Floated solids shall transfer to a sludge hopper for disposal off site (eg. for rendering or composting depending on quality).

Clear water from the DAF outflow shall transfer to a 10kL holding tank, where pH adjustment can occur if necessary. A duty/standby pump set shall transfer waste water to the aeration lagoon at a fixed rate approximating 21kL/hr.

The expected plant performance would produce a significant reduction in organic, solids, FOG and nutrient loadings on the biological treatment process. The expected wastewater quality from the DAF is given in Table 7.

Further technical specifications for the DAF plant are provided in Appendix H.
**Extended Aeration Pondage System**

The extended aeration process will start with an aeration pond with 4 x 15 kW surface aerators installed. ETS has specified the following design capacities for the aeration pond to functionally treat expected organic and nutrient loads:

- minimum 49 kW of aerator duty (over 24 hours) to satisfy the oxygen demand from assumed average BOD load;
- >5 – 10 days hydraulic residence time (HRT) to achieve secondary treatment objectives;
- minimum 6.5 ML functional volume and base area of >2209m² to allow adequate spacing and coverage of the aerators;
- activated solids return from the settling pond.

The proposed construction of Aeration Pond 1 will require incorporation of 3:1 internal batters (recommended in geotechnical reports – see Appendix J) resulting in capacity at top water level (TWL) of about 9.9ML. The extra constructed capacity will provide about 1.5 times the minimum required design HRT. The aeration system will provide an additional 40% aeration capacity over and above the minimum required. Supporting engineering process calculations and suggested layout of the aerators in Pond 1 are provided in the ETS report (Appendix G).

The operation of the treatment system relies on extended aeration biological treatment in Pond 1, followed by sufficient settling time in Pond 2 to enable clear water to be discharged to Maturation/Winter Storage Pond 3, and return of activated sludge from Pond 2 to Pond 1. Aeration will operate 24hrs per day, with aeration rates matching organic loads and maintaining positive dissolved oxygen (DO > 0.5 - 2 mg/L).

Aerated Pond 1 will overflow by gravity to the Settling Pond 2. Sufficient settling will occur by plug flow across the Pond 2. If required to facilitate batch settling, the flows from the Aerated Pond can be isolated via an infeed isolation valve. This will require sufficient freeboard to be maintained in the Aerated Pond for the scheduled batch settling time (typically 6 to 24 hours).

At or near completion of each batch settling phase, activated sludge will be pumped back to the Aerated Pond. A transfer pump and pipeline will be provided for this purpose. Within 12 months of commencement, excess biomass will build up in the ponds requiring activated sludge pump-out and offsite transport to EPA approved disposal or beneficial re-use sites.

Settling Pond 2 design as specified by ETS is: minimum base dimensions of 20m x 15m, depth 3m, and 0.9 ML capacity. Once 3:1 internal batter slopes are incorporated in construction, the Settling Pond will have a surface area at TWL of 60m x 30m x 3.5m, and capacity of about 2.6 ML. Therefore, the settling pond provides 6 times the surface area and about 2.9 times the minimum capacity specified by ETS to ensure effective solids settling.

Clear water from the Settling Pond 2 shall flow to the Maturation/Winter Storage Pond 3 under gravity. A portable submersible pump can facilitate discharge from either the Aeration or Settling Ponds if required. Clear water from Pond 2 flowing into Maturation/Winter Storage Pond 3 is expected achieve the water quality given in Table 8.
Table 8 Treated Factory Wastewater Quality from Settling Pond 2

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Concentration (mg/L or as stated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Oxygen Demand (BOD₅)</td>
<td>&lt; 100</td>
</tr>
<tr>
<td>Suspended Solids (SS)</td>
<td>&lt; 30</td>
</tr>
<tr>
<td>Total Nitrogen (TN)</td>
<td>&lt; 96</td>
</tr>
<tr>
<td>Total Phosphorus (TP)</td>
<td>&lt; 6</td>
</tr>
<tr>
<td>Free Oil &amp; Grease (FOG)</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>TDS</td>
<td>&lt; 1100</td>
</tr>
<tr>
<td>Sodium</td>
<td>175</td>
</tr>
<tr>
<td>pH</td>
<td>6.5 – 7.5</td>
</tr>
</tbody>
</table>

**Maturation Pond and Winter Storage**

Further biological (aerobic and facultative) digestion processes and settling of wastewater will occur in the Maturation/Winter Storage Pond 3 (capacity 32 ML) as well as Winter Storage Pond 4 (capacity 29 ML). Pond 3 will operate with a variable water level and provide a combined maturation pond and winter storage and function, and also provide settling for silty backwash (TSS ~670 mg/L) from the PTW UF plant.

This pond will have a minimum operating capacity of 10ML and minimum operating depth of 1m (as per ETS design) to provide the maturation function to further reduce BOD, nutrients and pathogens. Depth is expected to be highest in winter/spring (up to TWL 3.5m), and lowest in summer/autumn (but >1m).

This pond will receive clear water (BOD <100 mg/L) from the Settling Pond. BOD surface loading rate will be <5gBOD/m²/d at minimum pond surface area of ~1 Ha corresponding to the 1m minimum operating depth.

There will be a “floating” 22 ML over the minimum maturation volume designed as part of total winter storage capacity required (refer to Water Balance calculations discussed in section 6.3.2).

Detention times in Pond 3 will range from 16 to 50 days, and across Ponds 3 and 4 from 16 to 94 days (autumn to spring). Lowest detention times correspond to late autumn when pond 3 is at lowest design level and pond 4 is empty, and highest when ponds 3 and 4 are close to being full in late winter/early spring.

Note that Winter Storage Pond 4 will also receive Class C quality effluent (5 – 10 kL/d) from the onsite STP treating sewage and sullage from site offices and amenities (refer to section 5.2).

Nitrogen concentrations are expected to reduce slightly across the maturation and winter storage ponds (3 and 4) through ammonia volatilisation, biological uptake, algal production, algal solids settling and dilution by UF backwash. Some phosphorus concentration reduction is also expected through settling, biological uptake, precipitation and dilution with UF backwash. Lower nutrient levels in recycled water are anticipated in winter and spring when ponds 3 and 4 are close to full. Nutrient levels similar to that discharged from settling pond 2 are expected in late autumn.
5.2 Sewage Treatment Plant

Sources and Flows
About 5 – 10 kL/D of sewage and sullage is expected to be generated from office and amenities (toilets, washrooms, showers, lunchroom, kitchen, etc). Forecast flows and loads (see Appendix M) were calculated as per “Code of Practice for Small Wastewater Treatment Plants” (EPA Pub. 500, 1997).

Technology Options Review
A number of package treatment system suppliers were contacted as part of options assessment, concept design and costing. Best practice treatment process options capable of producing Class C quality effluent include:

1. trickling filters
2. rotating contactors
3. activated sludge processes
4. membrane bio-digestion
5. aerated ponds followed by settling/maturation ponds
6. primary, secondary/facultative and maturation ponds.

The STP will be subject to a design and construct tender during detailed design phase. MAPL will select a tender with a suitable STP process from the above options that best fits the site based on expected recycled water quality assurance, environmental performance, operating and maintenance costs. The chosen STP design will apply best practice in accordance with EPA’s Best Practice Environmental Management guidelines: “Code of Practice for Small Wastewater Treatment Plants” (Pub. 500).

Selected STP Process
The STP (separate from the factory WWTP) will comprise an activated sludge package treatment plant designed and manufactured by AUBIN Environmental (Melbourne) capable of producing Class C secondary standard. The multi stage sewage treatment is based on the activated sludge process and includes the following stages in series: grease trap, collection pit and pump well, septic tank (primary treatment), aerated treatment, anoxic de-nitrification, gravity clarification and UV disinfection.

A process flow diagram for the proposed STP is shown in Figure 7. Further technical specifications and performance details for the package plant as supplied by AUBIN are provided in Appendix I.

![Figure 7 Proposed STP Package Plant (AUBIN Environmental)](image-url)
The secondary treatment stages are built into a plug and play package that is housed in a 6 metre (20 foot) shipping container. All plant and equipment are manufactured and tested in Melbourne before being transported to site for installation.

The treatment capacity of one unit suitable for the Gillieston project is shown in Table 9. The quality of treated water from the STP is expected to meet Class C recycled water quality objectives (12-month medians) as shown in Table 10. STP effluent will be discharged into winter storage pond 4 and highly diluted with the factory WWTP flows.

### Table 9 STP System Capacity (AUBIN Environmental)

<table>
<thead>
<tr>
<th>System Capacity</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic</td>
<td>18.5 kL/day</td>
</tr>
<tr>
<td>BOD</td>
<td>15.7 kg/day</td>
</tr>
<tr>
<td>Ammonia</td>
<td>1.5 kg/day (as N)</td>
</tr>
</tbody>
</table>

### Table 10 STP Effluent Quality (Class C from EPA Publication 464.2)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Median limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.coli</td>
<td>1000 org/100ml</td>
</tr>
<tr>
<td>pH</td>
<td>6 – 9 (90th percentile range)</td>
</tr>
<tr>
<td>BOD</td>
<td>20 mg/L</td>
</tr>
<tr>
<td>Suspended solids</td>
<td>30 mg/L</td>
</tr>
</tbody>
</table>

Note that the STP also applies best practice with a de-nitrification stage for nitrogen reduction. Dosing can be added for phosphorous removal if required. STP effluent total nitrogen is expected to be <10-20mg/L and total phosphorus <10mg/L. TDS is forecast to be around 500 mg/L.

The treated sewage will be diluted about 60:1 with factory WWTP effluent in Pond 4 (i.e. 98-99% WWTP flows and 1-2% sewage). Final combined recycled water quality is discussed in the next section.

### 5.3 Final Recycled Water Quality

After mixing of WWTP, PTW plant backwash, STP and CSP flows the final recycled water salinity and nutrient levels from winter storage pond 4 are forecast to be as shown in Table 11.

### Table 11 Recycled Water flows, nutrients and salinity concentrations, and mass loads

<table>
<thead>
<tr>
<th>Source Treatment Path</th>
<th>Daily</th>
<th>No. of Days</th>
<th>Annual</th>
<th>TDS load kg/yr</th>
<th>TN kg/yr</th>
<th>TP kg/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel/Water Supply</td>
<td>kl/d</td>
<td>Days/yr</td>
<td>Ml</td>
<td>mg/l</td>
<td>mg/l</td>
<td>mg/l</td>
</tr>
<tr>
<td>Red Stream</td>
<td>381</td>
<td>275</td>
<td>104.8</td>
<td>1055</td>
<td>95</td>
<td>956.3</td>
</tr>
<tr>
<td>Green Stream</td>
<td>105</td>
<td>275</td>
<td>28.9</td>
<td>1055</td>
<td>95</td>
<td>2743.1</td>
</tr>
<tr>
<td>WWTP Stormwater</td>
<td>5</td>
<td>0.4</td>
<td>0.1</td>
<td>30463.1</td>
<td>5.5</td>
<td>158.8</td>
</tr>
<tr>
<td>Op Area Stormwater</td>
<td>10</td>
<td>1.5</td>
<td>153.9</td>
<td>95</td>
<td>5.5</td>
<td>2.1</td>
</tr>
<tr>
<td>WFP Backwash</td>
<td>78</td>
<td>275</td>
<td>21.5</td>
<td>1179.8</td>
<td>0.5</td>
<td>2.1</td>
</tr>
<tr>
<td>Sewage</td>
<td>9.7</td>
<td>275</td>
<td>500</td>
<td>1338.8</td>
<td>5.5</td>
<td>10.7</td>
</tr>
<tr>
<td>Overall</td>
<td>588.7</td>
<td>275</td>
<td>159.7</td>
<td>900</td>
<td>80.3</td>
<td>579.7</td>
</tr>
</tbody>
</table>

The final recycled water quality to be supplied from Pond 4 to the irrigation areas onsite is expected to meet Class C secondary treatment standards as per EPA guidelines (Publication 464.2) as follows:
Impact of Algae

Note that the above recycled water quality does not reflect the potential impact of algae, which can temporarily increase BOD, SS and pH. Algae is expected to grow over time in Ponds 3 and 4 with highest risks of an algal bloom during the warmer months and when Pond 3 is operating at lower depths. However, algae is not a significant operating constraint for flood irrigation or cut-anything-carry fodder production systems.

Algal growth in irrigation water supplies is a common occurrence in GMW’s channel system and can be routinely dealt with as an operational matter. Any blue-green algal (BGA) blooms will be managed (including temporary livestock access restrictions) in accord with BGA guidance from GMW and Agriculture Victoria including the Victorian Government’s Blue-Green Algae Circular (2016-17). Should blue-green algal bloom occur in the ponds, any grazing livestock can routinely be restricted from flood irrigation areas until water is absorbed by soils.

Recycled Water Irrigation Sustainability - routine Channel Water Supply to Factory

The impact of recycled water nutrients and salinity in terms of suitability for irrigation have been assessed in the LCA report by Ag-Challenge – see Appendix L. The nutrient and salinity loads from application of 100% (undiluted) recycled water are not expected to cause soil or pasture productivity problems in the short to medium term. However, for long-term sustainability Ag-Challenge considers that recycled water should be shandied with channel water to optimise nutrient and TDS loads on irrigation areas.

Ag Challenge has recommended that the recycled water be shandied with channel water to achieve the following targets: Total Dissolved Solids (TDS) < 750 mg/L, Phosphorus <7 mg/L, Nitrogen <65 mg/L.

On the above basis, a 1:1 shandy of recycled water and channel water will be applied in the long-term to achieve nitrogen targets for longer term sustainable irrigation.

Bore water supply contingency - Recycled water salinity management

During bore water supply contingency periods this would result in gradual short-term increase in overall recycled water salinity. If bore water was 100% in use for more than 12 months, recycled water TDS could increase up to about 1600 mg/L. During these contingency periods, bore water (TDS ~820 mg/L) or channel water (TDS 50 – 60 mg/L, when available again) would be used to shandy the recycled water to reduce salinity levels for irrigation. Contingency periods would be short-term, and once channel water supply returns the overall recycled water salinity available for irrigation would reduce again to the long-term target TDS of 900 mg/L given the low salinity of UF backwash discharged to Pond 3. The winter storage pond 4 is to be routinely emptied by end of irrigation season, which ensures recycled water salinity does not build-up in the long-term.

In summary, the recycled water from the wastewater treatment system is expected to be fit-for-purpose for safe and sustainable irrigation reuse onsite in accord with EPA guidelines and SEPP (Waters of Victoria), subject to shandying, soil and cropping management practices as described in the Ag-Challenge report (Appendix L). Further discussion of the proposed onsite recycled water scheme is provided in Section 6.3.
5.4 Stormwater Management

5.4.1 Existing Stormwater Drainage

Stormwater runoff from the property including old dairy shed compound and irrigation areas discharges to a network of internal farm drains and reuse sumps as part of a whole farm plan. The previous dairy shed effluent system and cattle holding yards drained to the still-existing dairy shed effluent ponds on the south side of the compound. General stormwater around the dairy shed compound and farm houses drained to separate clean dams also to the south.

For many decades, previous dairy shed pond effluent and stormwater was beneficially used across onsite irrigation areas, mostly on the paddocks west of the dairy shed compound.

General farm drainage including irrigation area runoff is collected in an interconnected network of farm drains, various dams and reuse sumps onsite as shown on the Farm Property Plan Irrigation Areas Figure 2845 P11 (Volume 2). As part of the whole farm plan, this runoff would normally be reused onsite for irrigation during irrigation season and allowed to drain offsite into the GMW drainage system during winter and also during periods of extended rainfall and flooding.

The GMW channel and drainage network within and around the MAPL property is shown in Figure 8. The property is connected to GMW drain no. 6 at the overflow point from the reuse sump in the south west corner of 630 Lancaster-Mooroopna Rd. GMW drain 6 discharges into the Rodney Main drain, which then continues north for about 16km ultimately discharging into Wells Ck just upstream (~1km) of its confluence with the Goulburn River.

![Figure 8 GMW Channel and Drainage Network (GMW 2015) - MAPL farm highlighted in red](image-url)
5.4.2 Proposed Stormwater Drainage Systems

The meatworks operational area (about 4Ha) will comprise new buildings, roofed structures and paved hardstand areas associated with livestock pens, meat processing operations and ancillary works, which will increase runoff from this part of the site. The stormwater systems for the factory site will be subject to detailed design to incorporate best practice measures consistent with the "Urban Stormwater Best Practice Environmental Management Guidelines" (CSIRO 1999).

The design will incorporate stormwater recycling for irrigation onsite as the primary means of minimising litter, suspended solids, nutrients, pathogens and other pollutant carryover to the GMW drain, and to also maintain overall farm stormwater discharges at predevelopment levels.

The Stormwater Management Plan (Figure 2845 P14 in Volume 2) shows at a conceptual level the contaminated stormwater catchments and drainage pathways to the CSP, and clean stormwater catchment flows to the new clean stormwater basin (north of operational area) and existing clean stormwater dam (south east of operational area).

The existing dairy shed ponds are proposed to be refurbished (expanded where necessary) and utilised as a contaminated stormwater pond (CSP) for collection of potentially contaminated runoff from operational areas including:

- external paved areas used for livestock truck manoeuvring and unloading,
- skin shed and manure shed external vehicle access areas, and
- sheep overflow pens (earthen clay-based pad).

CSP water may be utilised for onsite yard washing, truckwash and other non-potable uses subject to water quality. To provide reserve capacity for stormwater runoff collection, the CSP water will be pumped periodically to Aeration Pond 1.

Clean stormwater from the operational area including overflows from roof rainwater collection system will be discharged the existing stockwater dam south east of the operational area and to a new stormwater basin (SWB) on the northern boundary. Clean stormwater collected may be used for stockwater and other non-potable uses, with overflows discharging to onsite farm drains and ultimately into the main reuse sump on the western boundary for irrigation uses or discharge to GMW drain 6.

The existing irrigation runoff drainage system and reuse sumps will be desilted, cleaned of vegetation and refurbished to ensure any recycled water irrigation runoff can be efficiently collected for subsequent re-irrigation onsite during the warmer months.

5.4.3 Protection from Flooding

There are two zones within the property that are subject to a “Land Subject to Inundation Overlay” (LSIO) in the Greater Shepparton Planning Scheme (see property reports in Appendix D). One area is along the northern parts of 630 Lancaster-Mooroopna Rd, the other is through the middle of 1100 Mulcahy Road, Gillieston (Lot 3 PS331744C). The GBCMA advise that the LSIO approximately aligns with the 100-year ARI flood level based on the 1950 floods.

The proposed meatworks buildings and structures will be built south of the LSIO and above the 100-year ARI flood level. The GBCMA has provided advice to council in response to the planning application that the 100-year ARI flood level is estimated at 106.7m AHD where the proposed meatworks is to be established. As required by the GBCMA, all building floor levels will be >300mm above the 100-year ARI flood level, whilst the top of crest of all wastewater ponds will be >450mm above this flood level. Locations of buildings and plant and proposed floor levels are subject to detail design subject to issue of all council permits and EPA approvals.
As stated earlier a new clean stormwater basin (SWD) may be established within the LSIO to the north of the operational area as shown in Figure 2845 P14 (Volume 2). The basin will be excavated fully below ground and will not have any above ground embankments obstruct overland flood flows. SWB would be of the order 2 – 4 ML capacity but this is to be confirmed during detail design phase when hydrological modelling assessments will be undertaken to inform stormwater system design.

5.4.4 Spill Management

The onsite contaminated and clean stormwater ponds will provide the ability to contain any unplanned spills of contaminated waters or wastewater, blood, brine, chemicals, fuels or other contaminated runoff that might occur outside the wastewater collection system catchments. MAPL operators will isolate any accidental spills close to the source to stop ongoing unplanned discharges to stormwater drains. Should a spill reach the CSP or clean stormwater ponds, subject to assessment of water quality the ponds would be pumped out to the WWTP for treatment or transported offsite for disposal at EPA licensed facilities.

There is a very low risk of spills of brine, chemicals and/or fuels to the stormwater ponds. However, in the unlikely event of this, these ponds may require offsite tankering if there is unacceptable risk to the biological systems in the WWTP and/or to irrigation areas (i.e. risk of potential plant, soil damage). Any spills of organic material captured in the stormwater system and/or stormwater ponds considered to be non-toxic to WWTP biomass will be isolated and cleaned out with all recovered spill materials and flushing waters discharged to the onsite WWTP system – either to the red/green screening plant as appropriate or if no significant settleable solids pumped directly into aeration pond 1.

5.4.5 Surface Water Impacts

There are no natural waterways near the MAPL site. GMW operates an extensive network of manmade open drains to provide drainage and flood controls to properties across the irrigation district. The nearest GMW drain (No. 6) runs through the middle of the southern allotment (1100 Mulcahy Road, Lot 3 PS331744C) and then up its western boundary. The MAPL property has a GMW approved connection to this drain on the western boundary as shown in Figure 8.

From here GMW drain 6 flows into the Rodney Main drain about 800m to the west. Rodney Main Drain then continues north for about 16km ultimately discharging into Wells Ck just upstream (~1km) of its confluence with the Goulburn River.

The quality of stormwater ultimately discharging the MAPL property having regard to the above stormwater management (capture, detention, management and recycling) measures is expected to be equivalent or better than that for the pre-existing onsite dairy farm operations.

MAPL stormwater quality is also expected to be commensurate with runoff from other rural properties (upgradient and downgradient) in the catchment that also drain into GMW drain no. 6.

As a result, the proposed MAPL meatworks, WWTP and recycled water operations pose a very low risk of negative water quality impact on GMW’s Rodney Drainage System and nearest natural waters (Wells Ck and Goulburn River ~16km downstream).
6  Land and Groundwater

6.1  Land Impacts

The proposed meatworks incorporates industry best practice design and operation to AQIS standards to ensure all meat production processes meet high food safety and hygiene standards. To achieve meat quality assurance certifications for export and domestic markets the facility must incorporate high standards of housekeeping and cleanliness through daily washdown, sanitation, staff training and awareness, auditing, inspection and maintenance procedures. Due to the high standards required by AQIS and the organic nature of wastes produces, the operations of the Gillieston facility pose an inherent low risk of harm to land from routine operations and potential spills.

6.1.1  Operational Area

The Overall Site Layout showing the proposed operational area and wastewater ponds are provided in Figure 2845 P13. The operational area covers an area of about 4 – 5 Ha where the various new buildings, offices, paved areas and other structures are proposed. Breakdown of the total area covered by each of the main new construction elements are:

- Factory slaughter room, cool rooms building and loading bays ~2100 m²
- Covered Elevated sheep holding pens ~1500 m²
- Overflow pens ~2400 m²
- Skin shed ~960 m²
- Manure Shed ~371 m²
- Workshop, supervisor’s office ~480 m²
- Paved hardstand around buildings ~7000 m²
- Paved carpark ~3600 m²
- Office Buildings ~650 m²
- WWTP (screens, DAF) plant compound and STP compound ~800 m²
- PWT Plant and Storage Tank compound ~400 m²
- Fire Tanks area ~200 m².

The balance of the operational area is for landscaping, drains, laydown areas, etc.

CSP and clean stormwater dam south of the operational area, and new north clean stormwater dam will each occupy an areas of about 3500-4000 m².

In addition to above areas, the proposed wastewater treatment ponds will occupy a construction footprint of about 5 – 6 Ha, located to the west of the operation area as shown in Figure 2845 P13.

6.1.2  Containment Systems for Land and Groundwater Protection

Primary containment systems designed to ensure low risk of land or groundwater pollution are summarised in Table 12.

No products or chemicals are stored on earthen or gravelled areas and consequently there is a negligible risk of contamination of land onsite. There will be no liquid wastes, sludges or solid waste disposal to any land on the premises. Refer to further discussion on waste management in Chapter 10.

As discussed in Section 5.4.2, potentially contaminated stormwater from the operational area will drain the CSP. Clean catchment areas will flow to the clean stormwater pond and/or to a possible new SWB. The Stormwater Drainage Plan Figure 2845 P14 (in Volume 2) shows at conceptual level the proposed contaminated and clean stormwater catchments and respective pondage/detention basin systems.
### Table 12 Land and Groundwater Protection Measures – Containment Systems

<table>
<thead>
<tr>
<th>Potential Waste Source</th>
<th>Primary Containment Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory slaughter room, cool rooms building and loading bays</td>
<td>Enclosed building with impervious surfaces (AQIS hygiene standards), discharge to enclosed trade waste system (red steam pit).</td>
</tr>
<tr>
<td>Covered Elevated sheep holding pens</td>
<td>Roofed, concrete bunded subfloor, drains to WWTP (green stream pit)</td>
</tr>
<tr>
<td>Overflow pens</td>
<td>Clay base (compacted by animals), drains to contaminated stormwater pond (CSP), which overflows to WWTP aeration pond.</td>
</tr>
<tr>
<td>Livestock truckwash</td>
<td>Concrete lined, sloped, bunded and drained to WWTP green stream pit.</td>
</tr>
<tr>
<td>Blood Tank</td>
<td>Appropriately enclosed/lined blood tank located within concrete lined and roofed bunded area drained to WWTP red stream pit.</td>
</tr>
<tr>
<td>WWTP screening and DAF plant compound, STP compound</td>
<td>Concrete bunded areas draining to sump, factory wastewater spills sludges/solids pumped to green/red pit as relevant, stormwater pumped to aeration pond 1, sewage spills pumped to inlet of STP.</td>
</tr>
<tr>
<td>Skin salting shed</td>
<td>Roofed, concreted bunded floor, drains to concrete lined sump, closed loop brine collection/reuse system. Spills and excess brine not reusable for process will be trucked offsite to EPA licensed facilities.</td>
</tr>
<tr>
<td>Manure Shed</td>
<td>Roofed, concreted bunded floor, drains to concrete lined sump. Dry process, dry sweeping, no washdown.</td>
</tr>
<tr>
<td>PWT plant compound</td>
<td>WFP compound fully paved and treatment chemical storage tanks (likely self-bundled IBCs) bunded as per EPA Bunding Guidelines as described for all other chemical tanks below.</td>
</tr>
<tr>
<td>Chemical Storage Tanks</td>
<td>Self-bundled IBC units or bundled pallets for factory cleaning and sanitation chemicals, liquid fuels, water and wastewater treatment chemicals, etc. Concrete bunded area will be established if bulk chemical tanks are installed (not currently proposed). Bunding as per EPA Bunding Guidelines (Pub No. 347.1, 2015).</td>
</tr>
<tr>
<td>Workshop</td>
<td>Small quantities of lubricating, hydraulic oils, cleaning chemicals, etc contained in a roofed and bunded areas (eg. self bunded pallets, self bunded IBCs).</td>
</tr>
</tbody>
</table>

Wastewater ponds will be clay-lined and provided with a 500mm freeboard to prevent seepage and unplanned overflows – refer to further details in Section 6.4.5. Exceedance of winter storage capacity is to be managed by scheduled onsite irrigation of recycled water during irrigation seasons, which is to be discussed further in Section 6.3.

### 6.1.3 Spill Containment and Response

In the unlikely event that a spill migrates beyond the operation area, then site supervisor would implement spill response procedures and isolate the spill within local stormwater pits, drains and/or the stormwater ponds where any spill residues (likely to be diluted within the pond) could be contained and then assessed for appropriate disposal onsite or offsite.
Depending on source of spill and assessment of contaminants clean-up procedures would be promptly undertaken with pits, drains and ponds cleaned out as relevant and contaminated waters or wastes transferred to the WWTP or tankered offsite for disposal to EPA licensed facilities.

Cleanup of residues of spills of brines/salts from skin salting, chemicals or fuels would likely require offsite disposal to prevent salt loads and toxics effects to the WWTP biomass. Spills of organic materials of animal origin such as blood, raw wastewaters, treatment sludges, contaminated stormwater, etc would be managed by return of these non-toxic wastes to the front end of the WWTP process.

In summary, the new operational works area will be designed, constructed and controlled to ensure low risk of land (and groundwater) pollution by providing the containment and spill management systems as described above for wastewaters, liquid wastes, skin salting salts and brine, blood, chemicals, fuels, etc.

### 6.2 Geotechnical Investigations

Geotechnical investigations were undertaken across the area of the proposed wastewater treatment ponds. The purpose was to determine soil and subsoil profiles and engineering properties of the onsite soils for construction of clay liners for the proposed wastewater ponds. The geotechnical report by B.M. Civil Engineers is provided in Appendix J.

The geotechnical report states that Geological Survey Maps of Victoria indicate that the site is within an area having recent Quaternary fine-grained alluvium of the Shepparton Formation, with deposits of varying clay, silt and sand content laid down in discontinuous lens-like structures. There can be varying combinations and layer thicknesses of these soil types in this area.

In early October 2018, eight (8) boreholes in the area of the proposed ponds were drilled to depths of 4 metres. The borehole drilling indicated quite similar soils across the area. Typical soil profile was 100mm of topsoil overlying brown clays (CH, CI engineering classification) with trace sand and gravel down to 4m. No groundwater or infiltration was encountered to the 4m drill depth of these bores, consistent with historic data from the Victorian groundwater database search as discussed in section 6.4 (see search data and maps in Appendix K).

The soils encountered in boreholes by B.M. are consistent with the soils found by hand auger methods by Ag-Challenge for the LCA Report (refer to section 6.3.4 and Appendix L).

#### 6.2.1 Suitability for construction of wastewater ponds and clay liners

Permeability testing was undertaken on remoulded core samples from natural soils sampled from the 4 of the test boreholes, at various depths below the surface. The samples were prepared at close to optimum moisture content and compacted to around 98% of standard maximum dry density. The testing was undertaken in accordance with test method AS 1289.6.7.3.

Results of laboratory testing confirmed very low permeabilities ranging from \(3 \times 10^{-11}\) to \(6 \times 10^{-11}\) m/s. All samples met EPA’s Publication 464.2 wastewater pond clay liner specification of \(<1 \times 10^{-9}\) m/s.

All new wastewater ponds will be clay lined with at least 500mm of compacted clay liners designed and constructed to achieve the EPA permeability specification of \(<1 \times 10^{-9}\) m/s.

All ponds will be wetted and/or partly filled with fresh water from GMW channel or bore water to protect the liners from drying out prior to commencement of wastewater discharge into the ponds.

All ponds will be constructed with minimum 500mm internal freeboard. Internal pond surfaces that are exposed (expected to be above waterline for all or significant periods) will be provided with rock beaching, geotextile or other protection system to prevent wind-wave erosion. External surfaces of embankments will be grassed for control of erosion by rainfall.
6.3 Recycled Water Reuse Scheme

6.3.1 Reuse Scheme Description

The WWTP and winter storage ponds will produce Class C quality recycled water suitable for onsite flood irrigation during the irrigation season (spring to autumn) to meet plant water and nutrient demands. Recycled water is expected to be stored over the winter when plant water demands are low.

Farm Property Plan Irrigation Areas (Figure 2845 P11 in Volume 2) shows the existing flood irrigation areas, farm channel and drain infrastructure and reuse sumps. The recycled water scheme will utilise the existing farm channel distribution infrastructure and flood irrigation areas established by the previous dairy farmer (last used 3-4 years ago).

The previous dairy farm operation held GMW licensed channel allocations of around 400 ML/Yr, which may have varied with additional water purchases and during water restrictions. In addition, the farm has two GMW licensed irrigation bores with allocations of 576 ML/Yr for the South Bore, and 75ML/Yr for the North Bore. The dairy farm typically used ~400ML/Yr of channel water plus ~200ML/Yr of bore water for dairy shed operations, stock watering and irrigation.

Channel water will be supplied for factory water via the PWT plant, and also for shandying recycled water to reduce recycled water nutrient and salt concentrations before irrigation. The south bore (TDS ~820 mg/L - most recent tests in September 2018) may supply raw water for the factory during contingency periods when GMW channel water allocations are restricted. The south bore may also be used for shandying recycled water. The higher salinity in the north bore (TDS ~2200 mg/L) is not considered suitable for factory or irrigation shandy uses.

There is an existing diesel pump at the south end of the main reuse sump that delivers water to all the flood irrigation areas onsite. The pump will be fully serviced and tested, and any required repairs undertaken prior to commencement of recycled water pumping.

Recycled water quality will be transferred by a new pipeline from Winter Storage Pond 4 to the reuse sump, and then pumped to the on-farm channel system for delivery to the target irrigation area, controlled by a series of channel weirs and outlet gates. Recycled water will be shandied with GMW channel water within the on-farm channel system to meet the irrigation water quality target as described in the LCA report (Appendix L).

The runoff reuse collection system serves the whole property and collects runoff from all irrigation areas as part of a whole farm plan, which is recognised as agricultural industry environmental best practice for flood irrigation systems (refer to next section). Stormwater drainage including any recycled water runoff would flow to the main reuse sump on the western boundary for return to the irrigation system.

6.3.2 Flood Irrigation Distribution System and Scheduling

Recycled water application will utilise the existing flood irrigation areas shown on Figure 2845 P11 Farm Property Plan Irrigation Areas (attached in Volume 3).

Flood irrigation systems involve dividing the paddock into bays separated by parallel earthen bunds or border checks. Recycled water and channel water shandy is delivered to the target irrigation paddock by internal farm channels, which have outlet gates at regular intervals serving each border check bay. From the channel outlets water spreads out as sheet flows down the bay slope between the border checks. See Figure 9 (photo) of a typical channel outlet to a flood irrigation bay.
Flood irrigation frequency across individual is typically every 2-4 weeks at beginning and end of irrigation season when there is lower plant water demand, and around weekly during peak of summer during highest plant demand. Plant demand (evapotranspiration) can range from <1-2 mm/day in winter to up to 10-15mm/day during summer heat waves. Refer to Figure 10 for typical variation in plant demand over the year.

Scheduling of each irrigation event involves checks on soil moisture and crop condition (usually by observation) and forecast weather conditions (rainfall and temperature) and water budget calculations to determine soil and plant water deficit since previous irrigation (or last significant rainfall event).

Flood irrigation is scheduled when soil moisture deficit is determined to be about 30 to 50mm, which typically represents about one week’s plant demand (evapotranspiration) during summer. Required recycled/channel water shandy irrigation volumes will be calculated to refill the soil deficit plus about 5 - 10% extra to ensure adequate coverage of each flood irrigation bay and allowance for leaching fraction. Each irrigation event is typically about 40 to 50mm over the bay.

Irrigation application times will vary from 2 to 6 hours from shortest to longest bay lengths respectively. Cut-off time of the flow from the farm channel outlet onto the bay is judged from operator experience and observed rate at which water is advancing down the bay. The rule-of-thumb cut-off is when the irrigation wetting front has reached about $\frac{1}{2}$ to $\frac{2}{3}$ the length of the bay.

Some runoff is desirable to ensure that the whole bay is irrigated uniformly for optimal pasture production. However, high levels of runoff (greater than say 5 – 10 % of the scheduled application) are an indicator that water may have been on the bay surface longer than necessary with potential for waterlogging and/or excessive leaching through the crop root zone. Runoff (containing residual nutrients and salts) will be collected in the onsite drainage system, eventually flowing back to the reuse sump where it will be pumped to the onsite farm channel irrigation distribution system.

### 6.3.3 Water Balance calculations

Water balance calculations were undertaken in accordance with EPA’s Guidelines for Wastewater Irrigation (Pub. No. 168, 1991). The results of these calculations are provided in Appendix M.

The water balance calculations have relied on published climate data from Bureau of Meteorology (BoM) weather stations as follows:

- Rainfall: Tatura Institute of Agriculture and Tatura Theiss (weather stations 81049 and 81114)
- Evaporation: Tatura Institute of Agriculture (weather station 81049).
Note that there were a small number of data gaps in the monthly rainfall dataset for weather station 81049 that were backfilled using the data for equivalent months from the dataset for the nearby weather station number 81114. The hybrid rainfall dataset derived from 81049 and 81114 weather stations and used in the water balance calculations is considered representative given the proximity to the Gillieston area and consideration of the full range of climate conditions (from wet years to drought years). The accuracy of the water balance calculations is not significantly impacted by the minor data limitations.

Water balance calculations were undertaken for the last 20-years in accordance with the water budget calculation method described in EPA’s “Guidelines for Wastewater Irrigation” (Pub. No. 168, April 1991). EPA’s water balance calculations are used to determine the minimum winter storage capacity and irrigation area needed to contain all wastewater on land in the 90th percentile wet year as required by EPA publication 168.

The 20-year EPA water balance calculation is considered reasonably accurate for concept design and winter storage and irrigation water balance purposes. The model runs over the last 20 years using actual monthly rainfall and average evaporation to calculate the minimum required winter storage capacity and irrigation area needed to contain all effluent for at least 18 of the last 20 years. The 20-year water balance can account for actual seasonal and climatic variations from year to year and enables winter storage capacity to be optimised to reflect specified irrigation area available.

A range of cropping enterprise options are under consideration to optimise water use demands and crop nutrient uptake to satisfy EPA’s design requirement for 90th percentile wet year land containment. For a 100% pasture enterprise option, the average year irrigation demand would be about 6.6 ML/Ha/Yr, reducing to about 6 ML/Ha/Yr in a 90th percentile wet year based on EPA water balance methods and crop factors. The monthly variation in rainfall, evaporation and pasture irrigation demand in an average year is shown in Figure 7.

![Climate and Irrigation Demand (Pasture) Gillieston Region](image)

**Figure 10 Climate and Pasture Irrigation demand in the Gillieston Region**

Under consideration is a 50% lucerne and 50% pasture cropping enterprise to achieve both higher water and nutrient uptake. The irrigation requirement for this lucerne/pasture mix would be ~8.1 ML/Ha/Yr on average and ~7.4 ML/Ha/Yr for the 90th percentile year.

Total volume of recycled water generated is expected to be almost 160 ML/Yr (combined factory WWTP, CSP, PWT backwash and STP flows). Taking into account wastewater pond evaporation and potential seepage, the total annual volume available for onsite irrigation is estimated to be about 135 ML/Yr. Note these volumes do not account for possible recycling from pond 3 for non-potable uses.

There is about 118 Ha of existing laser graded flood irrigation land available on the farm after loss of about 5 – 6 Ha of existing irrigation area for raw water dam and wastewater ponds. An additional 6.5 Ha can be developed for contingency purposes if required.
The 20-year model predicts that for 135 ML/Yr available wastewater, a minimum 61 ML winter storage capacity is needed to contain all effluent in the 90th percentile year, provided that all of the 118 Ha is irrigated during the 90th percentile wet year.

A total of 62ML winter storage capacity is provided in Pond 3 and Pond 4. This excludes the 10ML maturation minimum operating capacity in Ponds 3. A further ~5ML is available in the main reuse sump to provide additional security for containment during extended wet periods.

The water balance calculations predict that only about 18 Ha of irrigation area is needed to meet annual plant water demand in an average rainfall year. However, the minimum irrigation area needed to match recycled water nutrient loads to plant nutrient demand in an average year is around 45 Ha based on nitrogen loads, and about 30Ha based on phosphorus loads. In the 90th percentile wet year the irrigation area needed to be used to ensure recycled water containment onsite is limited by rainfall rather than nutrient loads.

In summary, there is adequate winter storage proposed and available irrigation land onsite to safely and sustainably contain and utilise recycled water volumes and nutrients from the Gillieston meatworks.

### 6.3.4 Land Capability Assessment

This section provides an overview of the land capability assessment undertaken by Ag-Challenge LCA reported in March 2019 and attached in Appendix L (Volume 3). The LCA report has investigated the soil types and baseline agronomic properties of the soils across the irrigation areas, and provided management recommendations for the safe and sustainable use of recycled water onsite.

Ag-Challenge has also described how the onsite flood irrigation scheme, which incorporates a runoff collection and reuse system as part of a whole farm plan is representative of environmental best practice and is widely recognised by the agricultural and irrigation industry and also in EPA Victoria guidelines (464.2 and 168) as a best practice irrigation system.

#### Soil Types and Condition

The soil profile across the property were found to mostly consist of reddish brown duplex soils, with surface soils comprising well-structured and permeable reddish brown and yellow brown loams overlying well-structured medium to heavy clays (B horizon) having much lower permeability. These soils were found to have low baseline nutrients and salinity levels and are expected to be highly productive under recycled water irrigation.

Baseline soil tests conducted in September 2017 by Ag-Challenge found the following existing agronomic conditions:

- subsoils on this property have relatively low permeability (0.06 m/day or 60 mm/day), but at the proposed low recycled water application rates this does not present a significant constraint.
- surface soil phosphorus levels were mostly within the range capable of achieving optimum pasture growth, with only paddock 3 having slightly elevated P above the levels at which 100% of plant growth is expected. Phosphorus in the subsoils was very low.
- The soil has a moderate ability to bind and retain phosphorus (PBI of 167 in B1 soil horizon (0.2 – 0.3m) ensuring ~100 years onsite soil adsorption from recycled water applications.
- soil salinity levels were mostly low, with only paddock 3 having slightly elevated topsoil salinity and saline deeper subsoils (70-80cm depth).
- soil sodicity was mostly low (less than 3-5% ESP), with paddock 3 having slightly sodic topsoils and sodic subsoils, and paddock 10 having slightly sodic subsoils.
soil pH was found to be moderately acidic in all topsoils, tending to slightly alkaline in subsoils and strongly alkaline in deep soils corresponding to the B2 horizon of these duplex soils.

Potassium levels were adequate, at 100% of biological optimum growth levels, possibly due to historic dairy effluent irrigation (known to be high in potassium).

Site Suitability for Recycled Water Use

The LCA report confirms site suitability for recycled water use from the Gillieston meatworks subject to shandying of recycled water to control nutrient and salt loads, in combination with good irrigation and farming practice to ensure productive soils and cropping. Recycled water volumes, nutrient and salt loads can be readily managed by irrigation controls, appropriate summer crop selection, harvesting (cut and carry) for nutrient export, soil monitoring, supplementary fertiliser and soil gypsum applications, good site drainage, and runoff collection and reuse.

Based on the expected recycled water nutrient levels, if 100% recycled water is used repeatedly over the same areas without being diluted by channel or bore water, the annual nutrient loads may exceed the long-term nutrient uptake rates for many pasture mixes.

Recycled water TDS levels are mid-range of Salinity Class 3 for irrigation waters (EPA Publication 464.2). Waters of this class are acceptable for soils with good drainage and moderately salt tolerant crops such as include ryegrass and lucerne, which are proposed to be grown for the recycled water scheme.

Recycled Water/Channel Water Shandy Irrigation Water Quality Targets

Ag-Challenge has specified target nutrient and salinity levels for the irrigation water shandy for pasture and lucerne production as follows:

- TN <65 mg/L
- TP <7 mg/L
- TDS < 750 mg/L.

Nutrient Loads and Plant Uptake Rates

Ag-Challenge based its target nutrient concentrations and loading rates on typical plant uptake rates as shown in Table 13. To be conservative, the nutrient load limits were based on maximum achievable yields of 12 and 15 tDM/ha for rye-grass and lucerne respectively as highlighted red in Table 13.

These annual farm-wide nutrient uptake rates are adopted as long-term average year nutrient load triggers for the recycled water scheme. Note that the pasture mix may also comprise other moderately salt tolerant species including barely, fescue, and/or mixtures of these and other fodder crops. The nutrient loads will vary from year to year depending on rainfall, irrigation demand, crop regimes, etc.

To ensure the above load triggers are not exceeded, the irrigation management strategy is to apply the recycled water using a paddock rotation schedule aiming to utilising the whole 118Ha of available irrigation areas over time so that recycled water application rates sustainably match plant water and nutrient demands in the long-term.

To meet plant water demand and match plant nutrient uptake rates, recycled water will be mixed at a ratio of about 1:1 with low nutrient and low salinity channel water. Bore water from the south bore might also be used from time to time to shandy the recycled water if channel water is not available.

Calculated annual average irrigation area nutrient loadings for recycled water use with channel and bore shandy are given in Table 14 for a ryegrass crop, and Table 15 for lucerne.
Table 13 Nutrient Uptake Rates by Pasture (Ag-Challenge 2019)

<table>
<thead>
<tr>
<th>Crop</th>
<th>% DM</th>
<th>Amount of nitrogen in crop at varying yields (kg/ha)</th>
<th>8 t/ha</th>
<th>10 t/ha</th>
<th>12 t/ha</th>
<th>14 t/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rye-grass yield (tDM/ha)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen (kg/ha)</td>
<td>3.70 %</td>
<td></td>
<td>296</td>
<td>370</td>
<td>444</td>
<td>518</td>
</tr>
<tr>
<td>Lucerne yield (tDM/ha)</td>
<td></td>
<td></td>
<td>438</td>
<td>548</td>
<td>657</td>
<td>767</td>
</tr>
<tr>
<td>Nitrogen (kg/ha)</td>
<td>4.38 %</td>
<td></td>
<td>10 t/ha</td>
<td>12.5 t/ha</td>
<td>15 t/ha</td>
<td>17.5 t/ha</td>
</tr>
</tbody>
</table>

Table 14 Recycled Water nutrient and salinity loads on irrigated ryegrass (average year)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Recycled Water Quality</th>
<th>Bore Water Quality</th>
<th>Channel Water Quality</th>
<th>RW/Bore Shandy Quality</th>
<th>RW/Ch. Shandy Quality</th>
<th>Irrigation area loads (RW/Bore shandy)</th>
<th>Irrigation area loads (RW/Ch. shandy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total N</td>
<td>80</td>
<td>3.1</td>
<td>&lt;1</td>
<td>41.6</td>
<td>40</td>
<td>274</td>
<td>264</td>
</tr>
<tr>
<td>Total P</td>
<td>5</td>
<td>&lt;0.01</td>
<td>&lt;0.05</td>
<td>2.5</td>
<td>2.5</td>
<td>16.5</td>
<td>16.5</td>
</tr>
<tr>
<td>TDS</td>
<td>900</td>
<td>820</td>
<td>130</td>
<td>860</td>
<td>476</td>
<td>5676</td>
<td>3142</td>
</tr>
</tbody>
</table>

Notes to above table:
1. Based on 1:1 recycled water channel or bore water shandy
2. Based on ryegrass irrigation demand of 6.6 ML/Ha/Yr in average year

Table 15 Recycled Water nutrient and salinity loads on irrigated lucerne (average year)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Recycled Water Quality</th>
<th>Bore Water Quality</th>
<th>Channel Water Quality</th>
<th>RW/Bore Shandy Quality</th>
<th>RW/Ch. Shandy Quality</th>
<th>Irrigation area loads (RW/Bore shandy)</th>
<th>Irrigation area loads (RW/Ch. shandy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total N</td>
<td>80</td>
<td>3.1</td>
<td>&lt;1</td>
<td>41.6</td>
<td>40</td>
<td>399</td>
<td>384</td>
</tr>
<tr>
<td>Total P</td>
<td>5</td>
<td>&lt;0.01</td>
<td>&lt;0.05</td>
<td>2.5</td>
<td>2.5</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>TDS</td>
<td>900</td>
<td>820</td>
<td>130</td>
<td>860</td>
<td>476</td>
<td>8256</td>
<td>4570</td>
</tr>
</tbody>
</table>

Notes to above table:
1. Based on 1:1 recycled water channel or bore water shandy
2. Based on lucerne irrigation demand of 9.6 ML/Ha/Yr in average year

The average nutrient loads in the above tables are within the range (and less than the maximum) of the indicative nutrient uptake rates for ryegrass and lucerne specified in EPA’s “Use of Reclaimed Water Guidelines” (i.e. in the table in Appendix F of publication 464.2). These expected loading rates are considered sustainable given the calculations are conservatively high.
The proposed nutrient loads in the shandied irrigation water are likely to be below the rates of nutrient removal in pasture to be cut and carried from the irrigation areas of the property. It is likely the nutrient contribution will be insufficient to achieve desirable pasture rates and to maintain a vigorous pasture sward. It is likely that additional inorganic N/P/K fertiliser will need to be applied to achieve adequate pasture production and nutrient export from the irrigation areas.

The LCA recommends a cut-and-carry fodder enterprise to ensure nutrient export from the farm and maintain soil nutrient levels at optimum productivity levels that do not pose a deep leaching risk to groundwater. Ongoing soil and crop monitoring will be undertaken to ensure nutrient application rates match pasture uptake rates, and to assess potential migration of nitrogen and salts to deeper subsoils.

Salinity Load Management

The LCA assessed the salinity issues associated with recycled water and concluded that salinity loads are readily managed by shandying the recycled water, good irrigation management practices, monitoring, selection of appropriately tolerant pasture species and cut-and-carry enterprise to ensure nutrient export from the irrigation areas.

Soil testing in September 2017 indicated generally low soil salinity across the property, with Paddock 3 in the south west corner of 630 Lancaster-Mooroopna Rd indicating slightly saline conditions increasing with depth. Salinity levels were considered manageable and of no concern.

Ag-Challenge has recommended target salinity levels for irrigation water less than TDS 750mg/L. The recycled water shandy up to 1:1 with channel water easily achieves this target level, with the channel water shandy providing the lower salinity levels. The irrigation water will be within the Class 3 salinity range, which requires good soil and drainage practices and selection of moderately salt tolerant pastures (e.g. ryegrass, fescue and lucerne). The irrigation shandy would have TDS <500mg/L and therefore be Salinity Class 2, such that more salt sensitive crops could be sustainably grown.

The predicted annual average irrigation area salt loads from the recycled water shandy were provided in Table 14 (ryegrass crop) and Table 15 (lucerne). The LCA report considers that excess winter rainfall combined with a leaching fraction of 10% above plant evaporation requirements would be sufficient to flush the estimated 3 – 5 t/ha of salts applied in the irrigation water shandy through the soil profile. The soils will be subject to soil monitoring to check if soil salinities are being maintained below levels of concern to pasture productivity and to check salt migration through the profile to deeper subsoil.

That the management of potentially higher salinity recycled water during contingency periods when bore water is supplied to the factory was discussed in section 5.3.

Sodicity

Soil testing by Ag-Challenge found that soils vary from non-sodic in the surface soil (0-10 cm) to strongly sodic in some of the subsoil depths. Highest soil sodicity was found in Paddock 3 where some intervention may be ultimately necessary to reverse the current highly sodic nature of the subsoil.

The expected sodium absorption ratio (SAR) is to be determined by recycled water sampling. However, undiluted recycled water from Pond 4 is expected to have SAR of about 3 to 5. The recycled water shandy is predicted to lower the SAR further to <3 due to the low SAR of channel water supply. SAR calculations as per EPA Guidelines Pub 168 are provided in Appendix M including for: channel water, bore water and key wastewater sources, combined recycled water and recycled water/channel shandy.

The LCA has assumed a shandy water SAR of 3 - 6. Long-term application of this SAR in irrigation water is expected to reduce the soil ESP of the subsoil in paddock 3. Therefore, despite the subsoils in this area of the property already being sodic, the expected irrigation water quality is such that there is a reduced risk of soil permeability loss through reduced soil structure. The LCA recommends monitoring of
recycled water (SAR) and soils (ESP) to enable timely identification and remediation (e.g. gypsum applications) of any soil sodicity problems.

**Blue-Green Algae (BGA)**

Blue-green algae toxins may remain on dry pasture for a time following irrigation, often until there is a rain event or further irrigation with uncontaminated water. If BGA contaminated irrigation water is applied, the farm manager would keep sheep off the pastures for at least 7 days after the irrigation event. This in accordance Agriculture Victoria guidance: “Blue-green algae and irrigation water” (Note Number: AG1408, March 2016).

### 6.3.5 Irrigation Area Stormwater Management

Stormwater management on the irrigation areas is managed through its whole farm plan design. The farm is served by an onsite drainage network to collect irrigation runoff which collects in the main reuse sump on the western boundary for irrigation reuse onsite. This system can also be operated to collect first flush irrigation area runoff (potentially containing nutrients and salt residues) after high rainfall events consistent with the runoff guidelines described in EPA Publication 168.

The local GMW Rodney drainage system will receive excess drainage from the farm – likely during non-irrigation season, and as a result of high rainfall events and extended rainfall periods. These drains also receive runoff from other irrigated farms in the area. The offsite drainage from the farm is expected to be no different to other farms in the area. GMW has regional monitoring programs for its channels and drains including for BGA.

### 6.3.6 Irrigation Management Plan (IMP)

An IMP for the onsite recycled water scheme will be prepared in accordance with the Environment Improvement Plan (EIP) Checklist for irrigation schemes >1 ML/D as described in EPA’s Guidelines for Reclaimed Water Use (Pub. No. 464.2). The IMP will outline the recycled water use operations and controls, key procedures, monitoring programs (for water use, soils, nutrients and salinity), emergency notification and response, and a self-assessment annual performance checklist.

As a key part of the IMP, implementation of best practice flood irrigation is supported by a targeted environmental and agricultural productivity monitoring system. The monitoring program, sampling and testing frequency and parameters are provided in the LCA report in Appendix L and will include:

- recycled water and channel water quality and usage,
- rainfall and evaporation and net evapotranspiration,
- water balance calculations for forecasting plant water demand and irrigation scheduling,
- soil pH, nutrients, salinity, sodicity, structure, organic matter, trace elements, etc,
- nutrient budget accounting for total loads from recycled water and supplementary fertilisers,
- crop yields, energy and nutrient content, and
- groundwater quality (from production bores).

The monitoring program will be best practice in accord with EPA best practice environmental management guidelines (EPA Publications 168 and 464.2). Refer to section 13.1 for further details of the proposed overall environmental monitoring program for the project.

The IMP including monitoring program will be developed prior to commencement of recycled water supply from the Gillieston meatworks. The complete IMP will be provided to EPA at time of licence application. An indicative table of contents of the proposed IMP with key headings and structure as per EPA’s EIP Checklist is provided in Appendix N.
6.3.7 Environmental Best Practice for Flood Irrigation

The existing flood irrigation system was chosen as the environmental best practice option for this project. Alternative irrigation methods were considered including pivot and travelling spray irrigation and big-gun sprays. Spray irrigation technologies can be more water efficient, but for this project had several disadvantages compared with the existing flood irrigation system including:

- very high capital costs for substantial new spray irrigation and pumping infrastructure,
- higher operating and maintenance costs (power demands),
- potential blockage of spray systems due to algae,
- potential for spray drift (odour, worker and public health exposure risks),
- minimal additional environmental or productivity benefit.

A business case for these technologies was rejected from a triple bottom line perspective. The upgrade and utilisation of the existing flood irrigation system was chosen as the best practice solution with the key justification based on lowest environmental risk, lowest public health risk and therefore best social outcome, and lowest capital and operating costs.

Flood irrigation systems are well suited to production of pastures and grazing on low sloping land. Flood irrigation is the predominant method successfully employed in the Goulburn-Murray Irrigation District (GMID) and other riverine irrigation districts elsewhere in Victoria and Australia.

Agriculture Victoria’s “Border-Check Irrigation Design” Note Number AG1262 (October 2006) states that “Border-check irrigation of perennial pasture can be quite efficient – on suitable soils, with an appropriate layout and good management. Efficient irrigation is applying the water needed by the pasture with a minimum of deep drainage or runoff”

Flood irrigation with runoff capture under a whole farm plan is widely recognised best practice by Catchment Management Authorities, GMW and local councils as part of endorsement of irrigation development proposals and whole farm plans. GBCMA’s publication “Whole Farm Planning in the Shepparton Irrigation Region October 2018” states: “Through Whole Farm Planning, landholders are encouraged to consider protection and enhancement of natural features, achieve improved water management and increased water use efficiency leading to better production.”

The existing laser graded flood irrigation areas and drainage reuse system are part of whole farm planning for the site, which can be endorsed if necessary by the relevant authorities (eg. GBCMA, GMW and council).

Flood irrigation with appropriate design and management is also clearly recognised as a best practice irrigation method by EPA best practice guidelines Publication 464.2 and 168. The flood irrigation design and layout, scheduling practices, water and nutrient balances, sustainable water and nutrient application rates, runoff controls as discussed in the sections 6.3.1 to 6.3.6 above are all best practice measures conforming to EPA guidelines.

In view of the above discussion, the existing flood irrigation system is demonstrated to apply environmental best practice thereby ensuring safe and sustainable recycled water irrigation onsite.

6.4 Groundwater Assessment

6.4.1 Groundwater Bore Search

A search for registered groundwater bores within a 2km radius from the centre of the Gillieston Abattoir site was undertaken using the “Visualising Victoria’s Groundwater” (VVG) internet data portal (via
The VVG indicates that there are about 100 registered groundwater bores within 2km of the site. The locations of the bores are shown in Appendix K (Figure K-1). According to VWG, these bores have the following registered uses:

- groundwater investigation (52);
- observation (13);
- domestic, stock and/or irrigation (20);
- undefined (14); and
- capped and no longer in use (1).

Construction details are available for fifty-two (52) of the one-hundred bores identified. The bores have a maximum depth of 60 m below ground level (bgl). However, the average depth of all bores is approximately 13 m.

The 20 identified irrigation and/or domestic and stock bores in the search area with possible current beneficial uses are as follows:

- 81209 and WRK013441 located off-site to the west and southwest corner of the property
- 81236, 123493, WRK006338, G8021668 located off-site and south of the central areas of the site
- WRK6197 to the north east offsite
- WRK7170 and 81204 to the east offsite
- WRK10980, 81235, WRK8947, WRK6505 and 81198 located to the south east offsite
- WRK612245, WRK006580 and WRK006581 located to the north west offsite
- WRK010338 (possibly also having ID 137773) and WRK007365, which are two active production bores located on-site, which are to be discussed in Section 6.4.2.

Based upon an inferred northerly regional groundwater flow direction, the offsite bores listed in the VVG dataset that could be hydrogeologically downgradient include:

- 81209 – ~150m west of MAPL property boundary, reuse sump and GMW drain 6 connection point (possible lowest point on property), ~250m downgradient of proposed winter storage Pond 4;
- WRK12245, WRK006580 and WRK006581 – ~520m north west between MAPL property and Rodney main drain.

### 6.4.2 Onsite Bores

VVG data identifies 17 onsite bores. Table 16 summarises bore construction details, where available, for all potential onsite bores. There are two onsite GMW licensed production bores as follows:

- **North Bore** (no. WRK010338) in the northwest corner of the site (Parcel 27)
  
  (Note: GMW label attached to the north bore pump shed identifies this bore as ID 132712.)
- **South Bore** (no. WRK007365) in the southwest corner of the site (Parcel 3).
  
  (Note: the GMW label on the south bore shed is not legible.)

The south bore has a licensed allocation of 576 ML/Yr, whilst the North Bore 75 ML/Yr. The licensed uses of these bores are: irrigation, domestic and stock, dairy uses, and general non-irrigation farm use.
Table 16 Onsite Bore Construction Details (VVG, FedUni, 2015)

<table>
<thead>
<tr>
<th>Borehole ID</th>
<th>Coordinates</th>
<th>Constructed Depth (mbgl)</th>
<th>Screen interval (mbgl)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Easting</td>
<td>Northing</td>
<td>From (m)</td>
</tr>
<tr>
<td>126019</td>
<td>337993.3</td>
<td>5978924.3</td>
<td>8.0</td>
</tr>
<tr>
<td>137773</td>
<td>338183.3</td>
<td>5979689.3</td>
<td>13.5</td>
</tr>
<tr>
<td>23327</td>
<td>338033.3</td>
<td>5978964.3</td>
<td>23.0</td>
</tr>
<tr>
<td>23354</td>
<td>338393.3</td>
<td>5978244.3</td>
<td>9.5</td>
</tr>
<tr>
<td>23355</td>
<td>338343.3</td>
<td>5978304.3</td>
<td>9.5</td>
</tr>
<tr>
<td>23363</td>
<td>338333.3</td>
<td>5978274.3</td>
<td>10.5</td>
</tr>
<tr>
<td>23364</td>
<td>338383.3</td>
<td>5978234.3</td>
<td>9.5</td>
</tr>
<tr>
<td>43033</td>
<td>338033.3</td>
<td>5978236.3</td>
<td>0</td>
</tr>
<tr>
<td>44802</td>
<td>339873.3</td>
<td>5979770.3</td>
<td>0</td>
</tr>
<tr>
<td>45494</td>
<td>338363.3</td>
<td>5978124.3</td>
<td>9.5</td>
</tr>
<tr>
<td>81191</td>
<td>339904.3</td>
<td>5979409.3</td>
<td>0</td>
</tr>
<tr>
<td>81204</td>
<td>339856.3</td>
<td>5978945.3</td>
<td>11.3</td>
</tr>
<tr>
<td>81231</td>
<td>339932.3</td>
<td>5979472.3</td>
<td>11.23</td>
</tr>
<tr>
<td>WRK010338</td>
<td>338137.3</td>
<td>5979715.3</td>
<td>14</td>
</tr>
<tr>
<td>WRK007150</td>
<td>339965.7</td>
<td>5979428.7</td>
<td>11.2</td>
</tr>
<tr>
<td>WRK007365</td>
<td>338415.5</td>
<td>5978294.3</td>
<td>9</td>
</tr>
</tbody>
</table>

Note to Table above: UNK = Unknown

The status of the 15 other onsite bores is not known. It is possible that, at some of these locations, bores were drilled for intended use but unsuitable groundwater conditions were encountered and/or no well materials were installed.

A search of the VWG portal failed to recognise any bores within the State of Victoria having an ID of 132712. However, the VWG portal did identify two bores located near the northwest corner of the property having IDs 137773 and WRK010338. Both bores are drilled to a depth of approximately 14 m bgl. A single water quality measurement conducted at bore 137773 in 2002 yielded an EC of 3,337 µS/cm. Likewise, the EC at bore WRK010338 in 2010 was 3,770 µS/cm.

A similar search of the VWG portal identified one bore within the same approximate location having the ID WRK007365. This bore was drilled to a depth approximately 9m bgl in 1992. A single water quality measurement conducted at this bore in 2010 yielded an EC of 2,620 µS/cm.

6.4.3 Onsite Groundwater Bore Testing

The two onsite production bores were testing in June 2016, and again in September 2018. Results of testing are provided in Appendix K. The most recent testing indicates that the south bore has the lower salinity (TDS 820 mg/L) compared to the north bore (TDS 2200 mg/L). Salinity is sodium dominated with SAR about 5.9 in the south bore and 15.2 in the north bore.
These bores have very low nitrogen (TN 3.1 mg/L in south bore and 1 mg/L in north bore) and phosphorus levels (TP ≤0.01 mg/L). There were no other chemical contaminants or toxicants detected as levels of concern – see Appendix K.

The previous dairy farmer utilised the lower salinity south bore for irrigation, domestic and stock and dairy farm uses. The higher salinity and sodicity north bore is considered unsuitable for irrigation.

6.4.4 Geology Hydrogeology of the Gillieston Region

A summary of regional and local geological and hydrogeological information is presented in Table 17.

Table 17 Geological / Hydrogeological Information – Gillieston Region

<table>
<thead>
<tr>
<th>Regional Geology</th>
<th>Upper and Lower Shepparton Formations, typically comprises unconsolidated to poorly consolidated mottled clay and silty clay, with lenses of fine to coarse sand, gravel and silts; predominantly fluvial, locally lacustrine.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Geology</td>
<td>Red to brown and grey clay, silty clay, sandy clay and sand.</td>
</tr>
<tr>
<td>Average Depth to Groundwater</td>
<td>&lt; 5 m below ground level</td>
</tr>
<tr>
<td>Local Groundwater Flow Direction</td>
<td>Presumed northerly, although local variations may exist across the site due to interaction with surface water bodies, including drains, dams, and ponds.</td>
</tr>
</tbody>
</table>
| Likely Aquifer Quality | State Environment Protection Policy (Waters):  
  • Segment A2 in the south  
  • Segment B in the north of the property                                                                                                                                                     |

Figures K-2, K-3, K-4 and K-5 in Appendix K provide mapping of groundwater salinity, beneficial uses, geology and depth to groundwater, respectively, for the site and surrounds.

Lithologies

Lithology details were examined for all seventeen (17) potential onsite bores (Table 16). The local geology was generally reported to be comprised of red, brown and grey clay, silty clay, sandy clay and sand, which is consistent with that of the regional geological profile (Shepparton Formation) (see Figure K-4, Appendix K).

Water table levels

VVG water level data were examined for all potential 17 onsite bores (Table 16), which covered the period from 1980 to 2001. Groundwater levels, where available, were generally between 1.6 and 4 m bgl, which is consistent with (FedUni, 2015) (Figure K-5, Appendix K). It is noted, however, that very few groundwater level measurements, if any, are available for most of the bores.

Minimum water table depths of >1.5m for irrigation areas is suggested in the relevant EPA guidelines Pub. 168). As discussed in Section 6.2 the Geotechnical investigations did not encounter shallow groundwater or infiltration to the 4m drill depth of the test bores drilled in the potential location of the proposed pondages (paddocks 1, 3 and 4).

The historic water tables between 1.6 - 4m suggests that the site is suitable for wastewater irrigation and also suitable for wastewater pondages where the water table is at least 4m bgl.

Salinity

VVG data for Electrical conductivity (EC) for the period from 1995 - 2015 was examined for the 17 potential onsite bores (Table 16). EC values ranged between 665 – 4,040 µS/cm. Based on typical correlation between Total Dissolved Solids (TDS) and EC (TDS = 0.65 x EC), these EC values suggest
that groundwater TDS values range 430 - 2,625 mg/L. This result is generally consistent with the expected range of regional salinities given by VVG (Figure K-2, Appendix K).

The groundwater sampling from the southern-most onsite bore in 2016 and 2018 TDS 820 - 918 mg/L, is at the lower end of the range of TDS values given in the VVG data. For the north bore the 2018 sampling results for TDS are at the upper end of the VVG range. Therefore, it appears that for these onsite bores the ~14m deep aquifer has lower salinity in the south of the property, becoming more saline to the north. This is consistent with the VVG groundwater salinity mapping shown in Figure K-2 (Appendix K).

However, both onsite licensed bores are likely drilled into a confined or semi-confined aquifer system and therefore the salinity of these bore may not fully represent shallow groundwater at the property. There are no shallow monitoring bores at or in close proximity to the property to verify this.

**SEPP Segment**

According to the VVG, Class B segment designation as per previous SEPP (Groundwaters of Victoria) generally applies within and around the property – as shown by VVG (see Figure K-3, Appendix K). However, based upon the range of salinities reported in the production bores, groundwater in the south of the site (in confined or semi-confined aquifers) might be designated as Class A-2.

Based on the new groundwater salinity segments described in SEPP (Waters) (gazetted October 2018) the new segments onsite are likely to be within segment A2 (TDS 601 – 2000 mg/L) in the south and segment B (1201 – 3100) in the north. Groundwater of A2 segment quality has a wider range of beneficial uses including irrigation for production of a wide range of crops and pastures include salt sensitive species. Water of segment B quality is not generally suitable for irrigation, but still has a wide range of beneficial uses including stock watering.

### 6.4.5 Groundwater protection at Factory and WWTP ponds

As discussed in section 6.1, the proposed meatworks operations pose an inherent low risk of harm to land due to the high standards of cleaning and hygiene required by AQIS, in conjunction with the organic nature of wastes and by-products generated, and the various paved areas, EPA compliant bunds and containment systems to be provided (see Table 12). Therefore, the factory operations will also pose low risk of any negative groundwater quality impacts.

The proposed wastewater ponds will be provided with clay liners (at least 0.5m thickness) and very low permeabilities (<1 x 10⁻⁹m/s) to be verified by geotechnical testing during construction. Seepage from the wastewater ponds is regarded as a low risk of negative groundwater impact.

To summarise, the key groundwater protection measures for the MAPL project that ensure low groundwater risk include:

- underlying clayey soil subsoils and geology with low inherent permeability
- enclosed factory processes, operational area paved areas, bunding and containment systems
- clay lined ponds meeting EPA minimum thickness and maximum permeability specifications
- wastewater only contains organics, nutrients and low salt levels, and no chemical contaminants
- current water tables more than 4m below ground surface, ensuring no capillary movement of groundwater and salts to the surface
- wastewater pond seepage and recycled water irrigation leaching is contained onsite and highly unlikely to adversely impact SEPP (Waters) groundwater segment A2 to B beneficial uses
• there are no natural waterways in close proximity to the site therefore groundwater dependant ecosystems as a beneficial use is not considered at risk

• adequate setbacks to private bores. Nearest downgradient bore 81209 (stock water uses) is ~150 from the western boundary and ~250m from the winter storage ponds

• the onsite production bores will be monitored as part of factory procedures for potable water quality assurance, and as part of the environmental monitoring programs for the site.

6.4.6 Groundwater impacts of irrigation with recycled water

The onsite recycled water irrigation scheme will require some leaching fraction to be applied in irrigation events (Ag-Challenge recommended 10% plus winter flushing) to address salt loads in treated effluent. The wastewater ponds will also be lined to EPA permeability specifications.

Watertable is at least 1.6m (mostly >4m) below natural ground level, so groundwater is not a site limiting factor for sustainable irrigation.

The property has been irrigated with channel water and dairy shed effluent for many decades, with around 400ML/Yr of channel water and 200 ML/Yr of bore water typically used. The previous dairy farming operation included pasture production to support about 600 head of dairy cattle. Significant quantities of fertiliser and dairy shed effluent and manures would have been applied to the land for many years.

The groundwater impacts from recycled water irrigation leaching and minor wastewater pond seepage are expected to be not discernibly different from the impacts of other dairy farm and irrigated agriculture operations in the area.

Recycled water irrigation will be managed in accordance with good agricultural and irrigation practice and EPA’s wastewater irrigation and reclaimed water use guidelines (Publications 168 and 464.2). Irrigation rates will match plant water and nutrient demands. It is good agricultural and irrigation practice to implement leaching fractions to maintain productive soils that result in high crop yields to maximum nutrient uptake.

An irrigation management plan (IMP) will be put in place for the recycled water scheme based on the EIP checklist given in EPA’s reclaimed water guidelines 464.2 - refer to section 6.3.6 and Appendix N.

Onsite production bores will be monitored as part of part of potable water quality assurance and environmental monitoring programs for the site.
7 Air Emissions

7.1 Air Quality Issues

The key air (odour) quality management issues for the MAPL and discussed in this chapter are potential odour from the following sources:

- livestock handling including livestock trucks and holding pens
- by-product handling and temporary storage including blood collection tank, waste skips and bins
- manure handling and storage
- skin salting processes
- wastewater treatment plant including screening plant, treatment ponds and sludge management.

The impact of industrial residual air emissions is assessed by the two approaches as follows:

1. evaluation of compliance with EPA's "Recommended separation distances for industrial residual air emissions" (Pub. No. 1518) for unintended, industry-generated odour and dust emissions; and
2. assessment of residual air emissions and impacts associated with typical operations using the current EPA approved AERMOD plume dispersion modelling approach.

Air dispersion modelling has been undertaken for odour emissions from the wastewater treatment plant and pondage system, and other potential odour sources mentioned above.

7.2 Separation Distance Assessment

Recommended separation distances for meat processing and wastewater treatment are provided in EPA's Guideline: “Recommended Separation Distances for Industrial Residual Air Emissions” (IRAE, Pub. No. 1518, March 2013).

Definition of a "sensitive land use" is subject to interpretation but is usually regarded as a residential zone, school, hospital, or similar. An isolated farmhouse or rural residence within a farming zone can also be regarded as a sensitive use.

Table 2 of the IRAE guidelines describe two different methods of how to measure the recommended separation distances, which depends on the zoning of the sensitive land. The MAPL property and surrounding lands are in the Farm Zone. Therefore “Method 2” applies where separation distance is measured from the factory building/hardstand (the source) to house building footprint (sensitive use).

The six nearest private houses are:
- 535 Lancaster-Mooroopna Rd: ~510m north-west of winter storage pond 4
- 525 Lancaster-Mooroopna Rd: ~645m north-west of winter storage pond 4
- 530 Lancaster-Mooroopna Rd: ~565m west of winter storage pond 4
- 1189 Mulcahy Rd: ~570m north-north east of administration offices and loadout
- 1195 Mulcahy Rd: ~650m north-north east of administration offices and loadout
- 1070 Mulcahy Rd: ~520m south-east of the proposed sheep overflow yards.

The next nearest houses are 1km or more away from the proposed meatworks.
The IRAE guideline separation distances are as follows:

<table>
<thead>
<tr>
<th>Separation Distance (m) from private residence to:</th>
<th>Factory Operational Area</th>
<th>WWTP and Ponds</th>
<th>Flood Irrigation Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>500m</td>
<td>See Section 7.2.1</td>
<td>275m</td>
<td>See Section 7.2.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50m</td>
<td>See Section 7.2.2</td>
</tr>
</tbody>
</table>

### 7.2.1 Factory/Operational Area Separation Distance Requirement

EPA’s IRAE guidelines recommend a separation distance of 500m from abattoir processing works (without onsite rendering) with throughput >200 tonnes/year. This distance applies to the factory operational area compound, which is taken to be at the edge of the hardstand (see Proposed Site Layout Factory and Operational Area Figure 2845 P12 in Volume 2).

All private residences are outside the recommended 500m separation distance to the operational area.

### 7.2.2 Wastewater Treatment Plant Separation Distance Requirement

EPA’s IRAE guidelines do not specify distances specifically for meat processing wastewater ponds. However, the guidelines do provide specific separation distance guidance for sewage treatment plants, which increases with the size of population that the treatment plant serves.

The method described in section 11 of the IRAE guidelines was used to estimate an indicative separation distance requirement for MAPL’s proposed wastewater treatment plant based on estimated equivalent population (EP) calculated from expected BOD loads discharged to the ponds.

Table 6 reproduced below from the IRAE guidelines provides the formula for calculating separation distances for treatment plants and wastewater irrigation areas.

#### Table 6: Separation distances for sewage treatment plants (in metres)

<table>
<thead>
<tr>
<th>Type of installation</th>
<th>Separation Distance (n = equivalent population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical/biological wastewater plants</td>
<td>=10n^{1/3}</td>
</tr>
<tr>
<td>Aerobic pondage systems</td>
<td>=5n^{1/2}</td>
</tr>
<tr>
<td>Facultative ponds</td>
<td>=10n^{1/2}</td>
</tr>
<tr>
<td>Disposal areas for secondary treated effluent by spray irrigation</td>
<td>200m</td>
</tr>
<tr>
<td>Disposal areas for secondary treated effluent by flood irrigation</td>
<td>50m</td>
</tr>
</tbody>
</table>

**Example of how to use this table:**

What is the recommended separation distance for an aerobic pondage system serving an equivalent population of 10,000 people?

Distance = 5n^{1/2} where n=10,000

Separation distance = 50m

BOD load factors for determination of Equivalent Population (EP) are given in the following EPA Guidelines:

- “Code of Practice for Small Wastewater Treatment Plants” (Pub. No. 500, 1997), which states a typical BOD load of 50g BOD/person/day
- “Code of Practice Onsite Wastewater Management” (Pub. 891.4. July 2016), Table 4 suggests an organic material loading rate of 60g BOD/person/day (0.06 kg/p/d).
The higher organic loading rate (60g BOD/person/day) has been assumed for this assessment.

From section 5.1.2 of this report (see also the ETS report in Appendix G), factory wastewater flows (containing the BOD load) are ~500 kL/d peak BOD value is anticipated to be of the order of 2500 mg/L post screens. Average BOD of 1200mg/L is forecast to Aeration Pond 1 (post screening and DAF plant).

Therefore, the BOD load would be 600 kg/d on average to the aeration pond, and 1250 kg/d for peak day loads post screens. The calculated Equivalent Population (EP) is as follows:

- Average load EP = 600 kg/d / 0.06 kg/p/d = 10,000 persons (post screens and DAF)
- Peak BOD load EP = 1250 kg/d/ 0.06 kg/p/d = 20,833 persons (post screens).

For MAPL’s proposed WWTP screens, DAF and aerated ponds (equivalent to a mechanical/biological wastewater plant) the separation distances (SD) are calculated as follows:

- Average day load (ex-screens and DAF): SD = 10n\(^{1/3}\) = 10 x (10,000) \(^{1/3}\) = ~215 m
- Peak day load (ex-screens): SD = 10n\(^{1/3}\) = 10 x (20,833) \(^{1/3}\) = ~275 m

I we were to use a more conservative separation distance calculation for aerobic pondage systems the SD would be 500m for average BOD load and 721m for peak load, which are also met for this project.

The expected peak BOD load on the proposed settling pond 2 (equivalent to an aerobic pondage system) would be about 40 kg/d (based on BO of 80mg/L after settling of treated wastewater received from aerated pond). The separation distance for settling pond 2, which would also apply to the Maturation/Winter storage Ponds 3 and 4, is calculated as follows:

- 5n\(^{1/3}\) = 5 x (40)\(^{1/3}\) = ~32m.

All private houses in the Farm Zone around the property are well outside these indicative estimates of required separation distances for the wastewater treatment plant and ponds.

EPA’s IRAE guidelines state that the recommended separation distances aim to minimise impacts on sensitive land uses arising from the unintended, industry-generated odour and dust emissions. The separation distances calculated from the IRAE Table 6 method for the WWTP are considered adequate to prevent offsite offensive odour based on the following factors:

1. The wastewater ponds will have best practice aerator control technology, monitoring and contingency plans (odour suppression and chemical dosing if required) to ensure aerobic conditions and positive dissolved oxygen levels are maintained in all ponds. Offsite offensive odour is not likely to occur from WWTP operations even under peak load conditions. Refer to Section 5.1 and ETS report in Appendix G for further details of WWTP and pondage process controls.

2. Assessment and AERMOD modelling of conservatively high odour flux rates from the ponds predict that odour levels at sensitive uses would not be at levels expected to be offensive or cause odour complaint. Refer to Section 7.4.1 and the Odour Assessment Report prepared by specialist odour consultants Air Noise Environment (ANE) provided in Appendix O.

3. Environmental risk assessment (ERA) (see Section 11.1) concludes there is low risk of offsite odour even for peak BOD loads and other non-routine operations.

### 7.2.3 Flood irrigation Separation Distance Requirement

A separation distance of at least 50m will be maintained to nearest private houses from all recycled water flood irrigation areas. The closest houses to irrigation areas are at 1070 Mulcahy Rd and 905 MacKenzie Rd.
A 50m buffer around the property of 1070 Mulcahy Rd is shown in green on the Farm Property Plan Irrigation Areas Figure 2845 P11 (Volume 2). To ensure 50m buffer to 905 Mackenzie Rd is maintained part of the southern-most check-bay in irrigation paddock 6 can be excluded for recycled water use.

7.2.4 Greater Shepparton Shire Council Threshold Distances
Clause 52.10 of the GSSC planning scheme indicates the following “threshold distances” for “Uses with Adverse Amenity Potential”, which are relevant to the MAPL development:

- Abattoirs: 500m
- Treatment of aqueous waste: 200m.

Under the planning scheme threshold distances are usually measured from source boundary to receptor boundary. There are no private houses within these threshold distances as shown in Figure 2845 P15.

7.3 AERMOD modelling
An Odour Assessment Report has been prepared by specialist odour consultants Air Noise Environment (ANE) and provided in Appendix O.

7.3.1 Model and met file used
To assess potential air quality impacts from the facility on nearby sensitive uses, the default AERMOD model (Version 18081) as recommended by EPA Victoria was utilised for odour modelling.

The meteorological data set was developed in accord with standard procedures described in EPA’s “Construction of input meteorological data files for EPA Victoria’s regulatory air pollution model (AERMOD)” (Publication 1550, 2013). The dataset was based on the nearest Bureau of Meteorology (BOM) station at Kyabram (12.8 km south west of the proposed development) with adaptions using TAPM to suit the Gillieston locality. The modelling was conducted for five calendar years 2013-2017.

The methodology for the development of the meteorological dataset for the AERMOD model is summarised in the ANE report in Appendix O.

7.4 Odour Emission Sources
The primary sources of odour from the project are expected to be as follows:

- Elevated sheep pens and truck unloading area
- Wastewater screening plant including red and green pits and screens, screenings bins, etc
- Wastewater treatment ponds comprising aerated pond 1, settling pond 2, maturation pond 3 and winter storage pond 4
- Wastewater sludge storage tank
- Storage areas for skips and bins for offal, paunch and other by-products removed daily
- manure shed and skin salting shed.

Lower intensity odours sources include:

- meat processing building - enclosed slaughter room, offal processing area, future boning room, etc
- chillers, cold store, product loadout area
- aerobic sewage treatment plant
- sheep overflow yard occasionally (used when elevated pens are full).
The highest proportion or mass load of odour emissions are expected to be generated from the wastewater treatment facilities and elevated sheep pens but will be effectively dispersed within the site.

The meat processing building is best practice AQIS design and is therefore only expected to produce a very low-level fresh meat smell given it is fully enclosed and ventilated, and maintained to high standards of housekeeping and hygiene required by AQIS export licensing and domestic market food safety certifications. Odour emissions from the cold room and loading area are also likely to be minimal given that carcasses are chilled within the cold room before loading into the delivery trucks.

Odour emissions from the small enclosed aerobic STP will also be minimal compared to other sources.

The odour source inventory adopted for the AERMOD model for Gillieston meatworks and ancillary works and wastewater ponds is provided in Table 4.3 of the ANE Odour Assessment Report in Appendix O. The odour assessment has considered all major and minor potential odour sources as above.

There is limited reliable published data for odour emissions from meat industry wastewater treatment systems that is directly applicable to the MAPL project design. Limited reference data can be found in the published sources such as:

- previous EPA works approval and council planning applications and VCAT hearing expert statements
- published literature from meat industry associations such as MLA and AMPC
- journals, papers and reports across Australian and New Zealand.

The basis of derivation of specific odour emission rates (SOERs) and references are also provided in the ANE Report. The adopted SOERs represent conservatively high estimates from the available literature indicated above as well as from extensive industry experience of ANE, ETS and OTE.

Potential fugitive and background farming type odour sources were considered but these were not regarded as significant, and therefore not included in the odour model, to be discussed below.

### 7.4.1 Odour Modelling Results

Results of odour dispersion modelling are provided in the ANE report in Appendix O. ANE’s report found that the 1 OU criteria is predicted to be slightly exceeded along the northern property boundary (up to 1.4 OU) and the western property boundary (up to 1.2 OU) for the year 2013. Odour modelling results for all other years (2014, 2015, 2016 and 2017) are noted to be similar with compliance predicted within the boundary of the property.

While exceedence is predicted along the boundary (2013 year basis), the risk of the potential for odour impacts is considered low for the following reasons:

- exceedence along the boundary is predicted only for small parts of the northern and western boundaries as shown in the Predicted Ground Level Odour Concentrations – Year 2013 (Close-up) Figure 4.7 of the ANE report;
- compliance at the nearest sensitive receptors is predicted (0.59 OU vs 1 OU criterion);
- comparison of the 2013 odour plot with the odour plots for other years shows that the year 2013 predictions are atypical. The results for 2014 to 2017 are consistently below the 1 OU criterion at the boundary and nearest sensitive receptors.

ANE concludes that the results of the modelling show that overall risk of potential offsite odour impacts are low for the proposed MAPL meatworks project.

Further to the above, in reality odour concentrations occurring at an odour threshold of 1 OU, 99.9\textsuperscript{th} percentile is highly unlikely to be detected in the field. Even at 2 OU, and depending on how offensive
the odour is, people may detect odour but are unlikely to find the odour objectionable until the concentration reaches at least the 5 OU level. Complaints are not likely unless odours exceed 10 OU, unless odours are particularly offensive. It is therefore considered that 5 OU, 99.9th percentile odour criteria is appropriate to apply for houses in the Farm Zone, consistent with numerous VCAT determinations and other published precedents.

The predicted odour concentrations at nearest residences are well below the recommended assessment criteria of 5 OU for houses in the farm zone.

7.5 Best practice air quality/odour management

The proposed meatworks, associated WWTP and associated by-product and waste management activities represent a low risk of offensive odour offsite given that predicted odour levels at nearest sensitive receptors is 0.59 OU (vs 1 OU SEPP criterion) from AERMOD modelling. Highest odour rates of 1 – 2 OU predicted on the northern and western boundaries are also not likely to generate public complaint. The odour emission rates assumed for the model are conservatively high, therefore these predicted boundary and offsite ground level odour concentrations are also conservatively high.

Even with this best practice level of compliance with SEPP (AQM) odour objectives, the proponent will implement best practice odour controls and surveillance to ensure lowest practicable levels onsite and offsite and protection of public environmental health. The key best practice odour management measures to be implemented include:

- Establishment of new state of the art plant and equipment with built-in high standards of housekeeping and hygiene required for AQIS export licensing and domestic market food safety certifications. Meat processing operations do not produce offensive odours due to inherent high standards of hygiene and cleaning to meet food quality and export licence quality standards.

- Covered and elevated sheep pens constructed to AQIS guidelines are considered best practice in the meat industry to ensure low stress for improved animal welfare, dry and well-ventilated conditions, efficient dry manure removal via subfloor. The result is effective onsite dispersion of pen odours due to good natural ventilation from the elevated pen position well-above natural ground level.

- Mixing, flushing and daily cleanout of all wastewater pits to ensure no build-up of pit odours.

- Separate screening of raw red and green wastewater streams to reduce BOD and organic solids loadings on the treatment ponds.

- Paunch waste diversion from the wastewater stream to reduce organic loading on WWTP.

- Best practice WWTP and STP, aeration and odour controls to ensure positive DO in all processes and treatment ponds, and regular washdown of all plant and equipment in WWTP compound.

- Daily removal of by-products (offal, screenings, paunch waste, sludges and solids) for offsite rendering, composting uses or disposal as relevant (no onsite treatment, reuse or disposal).

- Dry processing of manures and regular offsite transport for reuse (no onsite composting or reuse).

- Same day salting of green skins, and regular salted skin transport offsite to hides customers.

- Production of secondary treated Class C recycled water for irrigation onsite, which will be shandied with clean channel or bore water to reduce BOD further.

- Cut and carry fodder from irrigation areas, and sheep stocking rates (stubble grazing only) to be maintained at low levels.

- Adequate buffers are in place around the new meatworks, WWTP and flood irrigation operations.
- Environmental risk management plans will be implemented to ensure EPA licence compliance and no offsite offensive odour (see Section 11).
8 Energy Use and Greenhouse Gas Emissions

8.1 Overview
Expected energy requirements for the project are discussed in the Lean Projects Report in Appendix E. The meat processing facility will require significant quantities of electricity for factory cooling, refrigeration, water and wastewater treatment plant operations. LPG will also be required for hot water heating. A small amount of diesel and other liquid fuels will be used for onsite vehicles. This electricity and fuel usage will result in energy related greenhouse gas (GHG) emissions, which are estimated in accordance with NPI calculation methods and discussed later in this chapter.

Non-energy related GHG emissions will be negligible from the project given the aerobic nature of the WWTP and that there will be no onsite anaerobic processes or composting of by-products or manures.

8.2 LPG Use & Associated GHG emissions

8.2.1 LPG Usage
A 12,000-litre capacity LPG tank will be provided to supply gas for the hot water boiler.

As discussed in section 3.2.12, a 3.5 MW LPG fired boiler will provide hot water for factory uses. Typical energy demand is expected to be about 2.4 MW with a peak of 4.8 MW (see Lean Projects Report in Appendix E).

Average daily use of LPG is anticipated to be about 2 kL/day or ~50,000 MJ/Day (25.7 GJ/kL). For 275 days of operation per year, the annual LPG consumption is forecast to be about 13,750 GJ/Yr.

Note that liquid fuels (LPG, ULP, Diesel) used onsite by forklifts, backup generator, etc are very low compared to LPG usage and therefore not assessed further.

8.2.2 GHG emissions from LPG combustion
Based on boiler operation at full capacity 275 days per year, a conservative estimate of greenhouse emissions from the boiler would be about 961 tonnes of CO₂-e per year (NPI conversion factor 69.92 kg CO₂-e/GJ).

8.3 Electricity Use & Associated GHG emissions

8.3.1 Electrical Usage
MAPL will make application to Powercor for an upgraded 1000kVA capacity grid supply, to cater for an anticipated 800kVA max. demand. MAPL will operate a new HV transformer onsite located adjacent to the refrigeration engine room. A diesel generator unit will be provided for emergency backup power.

The power supply and electrical systems are subject to detailed design following receival of EPA and council approvals. The Lean Projects Report in Appendix E has undertaken a concept level assessment of electrical demands for the project. The expected electrical demands and main uses for the factory are provided in Table 18. The expected electrical demand for the WWTP and STP (60 kW of aerators plus screens, DAF, pumps, etc) is expected to be of the order 100 kW.

MAPL have future plans for supplementing grid power by installation of 500kW of solar panels on the factory roof to provide peak power saving and as an energy minimisation initiative. The future solar project aims to generate 15-20% electricity for the site.
Typical electricity usage is expected to be ~54,000 MJ/day, 15,000kW/day and 340,000 kWh per month. Based on meat processing about 275 days/year, the electrical energy use factory-wide is therefore estimated to be about 4080MWh/Yr.

### 8.3.2 GHG emissions from Electrical Usage

Based on the above forecast electricity usage, annual GHG emissions will be about 4,366 tCO$_2$-e/yr (NPI conversion factor 1.07 tCO$_2$-e/MWh).

### 8.4 Energy Use - Greenhouse Gas Inventory

A summary of the forecast total LPG and electrical energy usage, and associated GHG emissions is provided in Table 19.

#### Table 19 Energy use and GHG emissions of the proposed works

<table>
<thead>
<tr>
<th>Energy/fuel type</th>
<th>Used by</th>
<th>Amount used</th>
<th>Conversion Factor</th>
<th>GHG emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPG</td>
<td>Boiler</td>
<td>137,500 GJ/Yr</td>
<td>69.92 kgCO$_2$-e/GJ</td>
<td>961</td>
</tr>
<tr>
<td>Electricity</td>
<td>Factory-wide use</td>
<td>4,080 MWh/Yr</td>
<td>1.07 tCO$_2$-e/MWh</td>
<td>4,366</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>5327 tCO$_2$-e/Yr</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 8.5 Non-Energy Related Greenhouse Gas Emissions

Potential non-energy related emissions from aerobic wastewater treatment will be negligible.

### 8.6 Energy Use Efficiency Measures

The factory is a new state of the art facility incorporating best industry practice energy use elements. Key energy efficiency measures include:

- Dry type transformer (no oil) designed to reduce energy losses both standing (no-load) and when operating.
- Hot water boiler uses high performance reverse flame technology with high thermal efficiency (>91%) and focus on fuel savings, low flue gas temperature and reduction of polluting emissions (CO and NOx). LPG combustion air emissions are well below EPA Works Approval/licensing mass rate triggers.
- The major electrical loads are associated with refrigeration, which will be provided with energy efficient motors and fans with automated, optimized control.
• The majority of large electrical motors will have VSD control to optimise efficiency and ensure efficient use of power across the site. This includes VSD controlled fans for heating, ventilation, and air conditioning (HVAC) units for reduced electricity demand.

• Energy efficient evaporative coolers used for ventilation of slaughter floor and service areas

• All water and wastewater pumps and aerators will have VSD drives to minimise energy and optimise flow and process control.

• LED Lighting is proposed throughout, controlled in utility spaces (toilets, etc) with sensors. Local control for the process areas is proposed for compliance with AQIS and OH&S requirements.

• Electrical energy meters proposed to enable monitoring, process improvement and energy conservation to be managed.

• Future 500kW solar project to offset electrical energy use by 15-20%.

The energy efficiencies built into the MAPL project will enable it to make any necessary adaptations in a timely manner to respond to potential climate change issues – including those that might impact in the future on water, gas and electricity supply services to the site.

### 8.7 Energy use efficiency and GHG emission intensity

The AMPC and MLA regularly survey the meat processing industry and publishes Environmental Performance Reviews (EPR) for a number of sustainability indicators. The most recent AMPC report is the "Environmental Performance Review: Red Meat Processing Sector 2015 Final Report". This EPR represented about 14 sites across Australia (12 of these containing onsite rendering).

AMPC’s 2015 EPR reported an average site energy use efficiency of 1461 MJ/t HSCW, which excludes the energy intensive rendering process. For GHG emissions the average was 318 kg CO2-e/t HSCW also with the rendering process excluded. The HSCW in this unit is also related to “cattle equivalents”. The AMPC report does not provide a “small animal correction factor” (like it does for the water use benchmarks) for these energy use efficiencies and GHG emissions benchmarks.

The Leans Project Report provides a forecast energy use of about 104 GJ/day (50 GJ/d Heating 54GJ/d electricity) excluding the energy offsets from the future solar project. From section 8.4, the estimated GHG emissions from the MAPL project are forecast to be 5327 tCO2-e/Yr – also excluding solar offset.

For a throughput of 3000 sheep per day at 21 kg/HSCW, this gives 63 tonnes HSCW/d.

Based on the above, the MAPL project is expected to have the following energy and GHG eco-efficiencies initial and GHG emission intensity:

• energy use efficiency 1650 MJ/t HSCW

• GHG emission intensity 85 kg CO2-e/t HSCW.

The forecast energy use efficiency is slightly above the average benchmark value reported by AMPC for the 14 companies participating in the surveys, but well below the GHG emission intensity benchmark. The energy use efficiency would be within the range of the site usage values reported by AMPC.

Energy usage accounting for future solar offset (15-20%) could reduce the energy use efficiency to about 1320 – 1400 MJ/t HSCW, which would fall below the AMPC reported benchmark.

After commissioning and commencement of operation, MAPL expects greater energy use efficiency gains and reductions in GHG emissions over time as process improvements are made and staff fully trained. Even more energy offsets should be possibly should the business case for the solar project be favourable to enable it to proceed.
8.8 Climate Change Considerations

Climate change readiness will be integral into the MAPL project, through inherent eco-efficiency measures such as:

- Meat availability variations follow climate variations: – i.e. lower sheep availability during periods of drought, potentially higher during wetter conditions when there are better conditions for sheep production. During period of low sheep availability (usually with drought), there will be lower effluent loads, which would also be easier to manage onsite during corresponding dry conditions.

- During wet conditions, MAPL’s contingency strategy would be to reduce sheep processing to the plant if the wastewater system is at risk of becoming hydraulically overloaded and it is too wet to irrigate recycled water.

- Energy efficiency in process – there has been an organic change in the meat processing industry over the years to reduce production, water and energy use costs resulting in eco-efficiency improvements over the years such as those described in sections 4.3 and 8.6.

- MAPL’s new facility will be modern design for small stock processing incorporating energy efficiencies built-in (efficient boiler, LED lighting, VSD motors, pumps, fans and aerators, etc).

- Water use efficiency and drought proofing of factory water supply – the use of bore water during contingency periods reduces reliance on GMW channel water if it becomes subject to restrictions during extended dry periods.

- Collection of roof water from factory to supplement water supply for uses such as toilet flushing, garden watering and other non-potable uses.

- Recycling of treated recycled water from the CSP and Pond 3 for external non-potable uses external to the factory meat process such as yard washing, truckwash, paunch pumping, WWTP compound washdown, screen backwash, etc. Direct reuse of paunch filter press water for paunch pumping.

- Irrigation reuse onsite helps to drought proof the farm, again reduce reliance on GMW channel supply for irrigation, and also helps to maintain farm viability for sustainable production of fodder

- There is more than enough irrigation area onsite to cater for higher effluent volumes and/or lower plant water demand due to short term or longer term high rainfall (due to climatic change). An additional 6.6Ha of irrigation area can be developed as a climate change contingency measure.

- MAP is carrying out a business case for the installation of future solar panels on the roof of factory and office buildings to offset energy usage onsite and reduce reliance on the electricity grid.
9 Noise Emissions

9.1 Noise Assessment Guidance

Assessment of the potential noise emissions from the MAPL project including factory and WWTP operations has been undertaken by specialist noise consultants Watson Moss Growcott Acoustics (WMG). WMG’s report “Consideration of Noise Emissions Associated with Proposed Facility Operations” (20 October 2018) is provided in Appendix P.

State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 only applies to Melbourne’s metropolitan areas.

Guidance on industry noise levels and limits in Regional Victoria is described in EPA’s “Noise from Industry in Regional Victoria” (NIRV) guidelines, Publications 1411, 1412 and 1413. In particular Publication 1411 explains how recommended noise levels are set for sensitive receptors potentially impacted by an industrial operation. NIRV adopts SEPP N-1’s procedures for setting recommended noise levels and also for measurement of noise.

WMG’s report in Appendix P provides an acoustic assessment of the MAPL project in accordance with EPA NIRV guidance. The report provides details of noise emission assessment criteria, sensitive receptor locations, potential noise sources, derivation of recommended maximum noise levels (RMNLs), noise modelling results, predicted noise levels at sensitive receptors for comparison with RMNLs, and suggested noise mitigation measures for the development if required.

9.2 Noise Emission Sources

The primary noise sources from the MAPL project assessed by WMG for this WAA are:

- general office building
- truck collection (product loadout) area
- workshop building
- skin shed building
- truck unloading area for livestock
- covered/elevated sheep holding pen building.
- slaughter floor building
- cool room building
- external engine room including refrigeration plant
- transformer room
- future boning room
- water treatment (filtration) plant
- wastewater treatment plant including four treatment ponds.

Most of the significant noise sources are located inside the factory and services buildings, which are provided with acoustic wall panels. External noise sources can be provided with noise covers/shrouds as required, subject to a verification noise survey at time of commissioning.
The noise model assumed conservatively high noise emissions from MAPL, based on adopted operations during the EPA-defined day, evening and night periods as shown in Table 6 of the WMG report.

Low background noise expected in the Farming Zone has been reflected in the assessment, and potential vehicle noise from Lancaster-Moorpoona Rd (VicRoad asset) has also been considered.

9.3 Sensitive Receptors for Noise Assessment

Noise sensitive receptors around the proposed MAPL operations are shown in Figure 1 of the WMG report. These are the same as listed in section 7.2 and shown in Figure 2845 P15 (Volume 2). The WMG report focused on the 4 closest farmhouses within the Farm Zone at 530 and 535 Lancaster-Mooroopna Rd, 1070 and 1189 Mulcahy Rd.

9.4 Recommended Maximum Noise Levels

Recommended Maximum Noise Levels (RMNLs) were calculated in accordance with NIRV taking into account the Farm Zone for MAPL landholdings and surrounding lands where all closest sensitive noise receptors are located. The applicable RMNLs at the noise sensitive receivers are as follows:

- Day Period: 46 dB(A) L_{eq} (30-minute)
- Evening Period: 41 dB(A) L_{eq} (30-minute)
- Night Period: 36 dB(A) L_{eq} (30-minute)

The full derivation of these RMNLs is provided in the WMG report in Appendix P.

9.5 Noise Impact Assessment

WMG developed a 3-dimensional digital model of the subject site and surrounding lands. Results of noise modelling and assessment of compliance with the NIRV RMNL’s is provided in Table 20. WMG has concluded that the operation of the facility will comply with the relevant NIRV RMNLs for the day evening and night periods. Predicted night period noise levels are equal to the RMNL at 1189 Mulcahy Rd, and just below the RMNL for the evening period.

Table 20 Predicted noise levels and NIRV compliance status (WMG Noise Report)
The noise sources that are the highest contributors to the night-time and evening predicted levels at sensitive noise receivers are likely to be the livestock trucks and livestock unloading activities.

WMG has suggested some minor noise control measures for consideration to ensure compliance with these RMNLs particularly in the evening and night periods (refer to Section 8 of the WMG report).

### 9.6 Best practice noise control measures

WMG suggested identified a range of potential mitigation measures associated with the noise sources that are predicted to contribute most to offsite noise. These include:

- Truck operating limitations for livestock trucks and product loadout, including turning off engines when waiting onsite
- Fitting of new generation broadband reverse alarms to mobile vehicles instead of traditional reversing beepers
- Animal unloading activities – installation of rubber on metal gates, latches and frames to reduce metal impact noise
- General plant and equipment operating limitations such as tractors, workshop activities, etc
- Acoustic consultant review of noise ratings for selected mechanical, electrical and transformer equipment during detailed design phase.

As suggested by WMG, MAPL proposes to conduct commissioning noise measurements when the plant is operational to validate noise levels at sensitive receivers and take remedial action if required to meet RMNLs. The suggested noise control measures in Section 8 of the WMG report are likely target areas for noise mitigation.
### 10 Waste management

#### 10.1 Waste Inventory

The types and volumes of wastes generated from the new Gillieston meatworks are yet to be determined. Upon commencement of operation, MAPL will establish a tracking system to monitor generation of wastes and potential recyclable materials. Expected types of wastes generated from MAPL operations are listed in Table 21.

**Table 21 General, Industrial Waste & PIW generation**

<table>
<thead>
<tr>
<th>By-product or waste</th>
<th>Typical Quantity</th>
<th>Storage/Recycling/Disposal Route</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meat Processing Wastes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edible Offal</td>
<td></td>
<td>Offal rooms in subfloor drained to WWTP. Chilled, packaged and transported daily to specialist customers, butchers, food businesses</td>
</tr>
<tr>
<td>Inedible Offal</td>
<td>9 – 13% of HSCW</td>
<td>Offal rooms in subfloor drained to WWTP. Skip bins transport offsite daily to pet food businesses, EPA approved/licensed rendering plants</td>
</tr>
<tr>
<td>Suspect/reject meat products</td>
<td></td>
<td>As per inedible offal. Daily transport to EPA licensed rendering plants or landfills subject to type and quality</td>
</tr>
<tr>
<td>Blood</td>
<td>4 tonne/day</td>
<td>Bunded blood tank in subfloor under pens. Daily transport offsite to EPA approved rendering plants</td>
</tr>
<tr>
<td>Skins</td>
<td>3000/day</td>
<td>Subfloor green skin collection and transfer to onsite enclosed skin salting shed. Transport 1-2 times/week salted skins to hides/skin processing businesses</td>
</tr>
<tr>
<td>Salt/Brine</td>
<td>Very low quantities</td>
<td>Bunded skin shed with closed loop brine system. Excess brine/salts that cannot be used in salt process transported offsite to EPA licensed facilities (as PIW)</td>
</tr>
<tr>
<td>Paunch &amp; Casings Wastes</td>
<td>TBC</td>
<td>Wet paunch pumping to WWTP compound for dewatering by filter press. Skip bins transported offsite daily to EPA approved composters or landfills.</td>
</tr>
<tr>
<td>Manure from elevated sheep pens and overflow yard</td>
<td>400 – 500 kg/d</td>
<td>Daily removal from pens to onsite enclosed manure shed. Dry processed in manure shed for transport (1-2 per week) to offsite composters/offsite land spreading.</td>
</tr>
<tr>
<td>Suspect or Deceased animals</td>
<td>Very low numbers of animals</td>
<td>Isolation in suspect pen. Offsite transport as soon as practicable in accord with animal</td>
</tr>
<tr>
<td>By-product or waste</td>
<td>Typical Quantity</td>
<td>Storage/Recycling/Disposal Route</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Welfare/meat industry regulations and Agriculture Victoria stock disposal codes. To EPA licensed landfills, knackeries offsite.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wastewater Treatment System Wastes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green stream screenings and green pit sludges</td>
<td>TBC</td>
<td>Drained in WWTP compound and transferred daily to onsite manure shed for incorporation into manure, subject to contamination from other materials. Otherwise disposal offsite to EPA licensed landfills.</td>
</tr>
<tr>
<td>Red stream screenings and pit sludges</td>
<td>TBC</td>
<td>Added to daily transport to rendering plants subject to contamination from other materials. Otherwise disposal offsite to EPA licensed landfills.</td>
</tr>
<tr>
<td>STP screenings and sludges (primary, secondary sludge tanks)</td>
<td>TBC</td>
<td>Transported offsite by septic tank carter to EPA licensed facilities (local municipal wastewater treatment plant)</td>
</tr>
<tr>
<td>Wastewater ponds sludges and solids (6 months after commencement)</td>
<td>TBC</td>
<td>Pumped to enclosed sludge holding tank. Potential future sludge dewatering press onsite (subject to EPA future approval). Transport offsite to EPA licensed facilities or recyclers.</td>
</tr>
<tr>
<td>PWT plant UF backwash</td>
<td>78 kL/d</td>
<td>Discharged to winter storage pond 3.</td>
</tr>
<tr>
<td><strong>Other General and Industrial Wastes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spill cleanup solid and liquid wastes</td>
<td></td>
<td>Liquid spill wastes to WWTP (red or green pit) for treatment as relevant subject to water quality/toxicity to WWTP biomass. Other liquid spill wastes and solid spill wastes transported to EPA licensed disposal facilities as PIW.</td>
</tr>
<tr>
<td>Construction waste – wood, metal, packaging, plastics, concrete, bricks, soil, etc</td>
<td></td>
<td>EPA licensed facilities or construction material recyclers</td>
</tr>
<tr>
<td>General Office Waste - garbage, food wastes</td>
<td></td>
<td>Campaspe Shire kerb side collection or by contractor to EPA licensed landfill (likely to be Shepparton landfill).</td>
</tr>
<tr>
<td>Office recyclables – paper, cardboard, glass and plastic drink bottles, hard plastic containers, foil, etc</td>
<td></td>
<td>EPA approved recycling facilities – to be collected by contractor</td>
</tr>
<tr>
<td>Factory packaging and recyclables – meat cartons, cardboard, hard plastics, plastic film, etc</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### By-product or waste

<table>
<thead>
<tr>
<th>By-product or waste</th>
<th>Typical Quantity</th>
<th>Storage/Recycling/Disposal Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrap metal – old equipment, metal strapping, copper wiring</td>
<td></td>
<td>EPA approved metal recyclers</td>
</tr>
<tr>
<td>E-Waste – computers, screens, etc</td>
<td></td>
<td>EPA approved E-Waste recycling facilities</td>
</tr>
<tr>
<td>Wooden pallets</td>
<td></td>
<td>EPA Approved pallet recycling, woodchipping facilities</td>
</tr>
<tr>
<td>Prescribed industrial wastes</td>
<td></td>
<td>Dedicated waste bins within bunded area at workshop. Bins collected by EPA permitted transport contractor to EPA licensed facilities or recyclers. Used IBCs and other chemical containers to be returned to supplier or to EPA licensed container washing sites.</td>
</tr>
</tbody>
</table>

### 10.2 Waste Recycling and Resource Recovery

The AMPC 2015 EPR reports average 5.9 kg/t HSCW of solid waste sent to landfill from the surveyed sites. Note this value is for meatworks sites with integrated rendering operations and the report does not provide a benchmark value for small animal processing only. If this value were to apply to the MAPL project (63 tHSCW/d sheep processing, no rendering), then the landfill waste load (i.e. Table 21 materials) might be of the order 315 kg/d.

Upon commencement of operations, MAPL will identify waste recycling and resource recovery opportunities to minimise disposal to landfill and prescribed waste facilities, keeping any AMPC, MLA or other meat industry benchmarks in mind.

As part of an operational environmental management plan (OEMP), MAPL will establish waste management and tracking procedures to ensure proper disposal routes for non-recyclable materials to EPA approved and licensed facilities. See Section 11 for discussion on future OEMP development.
11 Environmental and Public Health Management

11.1 Environmental Public Health Management

The Chapters above have already described public health protection measures impacts given that potential human health impacts are a key beneficial use consideration. Drawing upon the previous chapters, this section provides a stand-alone assessment of best practice protection measures incorporated into the project design that ensures low risk of potential public health impacts.

The chosen meat processing and WWTP technology has incorporated environmental and meat industry best practice, such that any health risks to the neighbours and local community are anticipated to be negligible. Key public health and amenity issues and proposed mitigation measures demonstrating how human health will not be adversely impacted by the proposed works are described in the following subsections.

11.1.1 Odour

Detailed discussion of potential odour sources and environmental best practice management was provided in Chapter 7.

As discussed in sections 2.3.1 and 7.2, the site was purposefully chosen for the appropriate existing separation distances, which comply for all onsite activities (meatworks, WWTP and flood irrigation) with EPA’s “Recommended Separation Distances for Industrial Residual Air Emissions” (Pub. 1518).

Odour modelling by specialist air quality consultants, ANE (see report in Appendix O) has confirmed best practice compliance with SEPP AQM and concluded that the proposed works represents a low risk of offsite odour. Even with the conservatively high emission rates, less than 1OU is predicted at private residences, and between 1-2 OU at north and west property boundaries. These levels will not generate public complaints.

The meatworks is within a rural area with many other agricultural industries in operation including livestock, dairy shed operations, organic fertiliser application, etc. The low level agricultural type emissions (particularly from livestock pens, manure, etc) from the project are expected to be commensurate with other agricultural type odours in the local area.

Even with these best practice outcomes from odour modelling, MAPL will implement further best practice odour control measures including daily surveillance runs to monitor site levels. Full list of measures was provided in Section 7.5.

In conclusion, the proposed works represent a low odour risk, will not cause offensive odours or complaint offsite and provides adequate protection of public health.

11.1.2 Noise

Detailed discussion of potential noise sources and environmental best practice management was provided in Chapter 9.

As discussed in section 2.3.1, the site was purposefully chosen for the appropriate existing separation distances. Noise assessment and modelling by specialist acoustic consultants WMG (see report in Appendix P) has confirmed best practice compliance with recommended maximum noise limits at sensitive receptors in accord with EPA’s “Noise from Industry in Regional Victoria” (NIRV) guidelines (Publications 1411, 1412 and 1413). WMG have concluded that the proposed works represents a low risk of offsite nuisance noise.
Even with the conservatively high noise emission rates, the predicted noise levels will not generate public complaints.

Even with these best practice outcomes from noise assessment modelling, MAPL will implement further best practice noise control measures including daily surveillance runs to monitor site levels. There will be no livestock truck deliveries during sleep time night periods. MAPL is committed to conducting a full noise survey during commissioning phase for the project to verify compliance with NIRV and carry out mitigation works as necessary. A full list of noise mitigation measures was provided in Section 9.6.

In conclusion, the proposed works represent a low noise risk, will not cause nuisance noise or complaint offsite and provides adequate protection of public health and amenity.

11.1.3 Dust

A dust management plan will be implemented at the site as part of Operational EMP for the site. This will include daily inspections to monitor dust sources across the operational area and farm, to enable prompt remedial actions to take place.

Potential dust sources are mostly fugitive in nature and could include:

- livestock truck movements
- sheep holding pens and overflow sheep holding yard,
- dust build-up on paved operational areas,
- manure shed operations if roller doors left open,
- construction and earthmoving activities,
- vehicle movements on un-sealed roads and
- farm soil cultivation (ploughing, tilling) and crop harvesting activities.

Most of the above dust sources are well within the property boundaries, such that dispersion and deposition of dust will occur within property boundaries and before reaching neighbouring private residences.

Onsite dust controls will include:

- use of street sweepers within paved operational areas and water carts on unsealed roads
- closing roller door on manure shed to ensure it is enclosed when forklift access not required
- washing of trucks after livestock deliveries
- reducing driving speeds for company and contractor vehicles and trucks on onsite unsealed roads as well as Mulcahy Rd (unsealed road)
- planned soil cultivation and harvesting to be scheduled during non-windy conditions.

The onsite dust management plan will also be part of the Q-fever risk control strategy – refer to section 11.1.5 for further details.

All of the above dust controls will ensure compliance with SEPP (AQM) air-borne particulate objectives, and therefore ensure low human health risks.
11.1.4 Water

Surface Water

As discussed in section 5.4, a suite of best practice irrigation measures including irrigation runoff capture and recycling will be implemented to minimise offsite discharge of nutrients and salts. Potential surface water quality impacts were discussed in Section 5.4.5.

The proposed meatworks, WWTP and recycled water operations pose a low risk of negative water quality impact on GMW’s man-made Rodney Drainage System. The quality of stormwater ultimately discharging from the MAPL property is expected to be equivalent or better than that for the previous dairy operations. Stormwater discharge from the property is only expected to occur during high rainfall or extended wet periods and drainage water quality will be similar to that from other rural properties (upgradient and downgradient) that are served by GMW Drain 6 and the Rodney drainage scheme.

There is potential for human exposure to water within the GMW drainage system from primary and secondary contact including from potential drain diversion licenses downstream, and GMW employees accessing the drain for maintenance. However, the water quality impacts from MAPL operations is likely to be indistinguishable from agricultural background water quality in the catchment.

Nearest natural surface waters are a long way (~16km) downstream at Wells Ck and Goulburn River, so environmental and public health risks to these waterways associated with the Gillieston meatworks project will be negligible.

Groundwater

The risk to groundwater users from the site pondage system seepage and recycled water irrigation area leaching is also considered very low as discussed in Section 6.4. There are no nearby licensed bores for human drinking purposes.

The local aquifer used for irrigation and domestic and stock uses is confined/semi-confined at a depth of around 10-13m bgl and therefore has low risk of onsite contamination from pond of irrigation seepage.

There is an inferred northerly regional groundwater flow direction. The nearest down-aquifer private bores offsite as listed in VVG dataset are:

- ~150m west of MAPL property boundary, reuse sump and GMW drain 6 connection point (possible lowest point on property), and ~250m downgradient of proposed winter storage Pond 4;
- ~520m north west between the MAPL property and Rodney main drain.

At these separation distances, any potential seepage from the ponds or irrigation areas is likely to be undetectable in the context of other regional agricultural impacts between MAPL and the receptor bore and also within the wider catchment. Therefore, risk to human health associated with potential groundwater seepage from the MAPL project are negligible.

11.1.5 Pests and Vermin

Pest control contractors specialising in the food industry will be engaged to control pest and vermin including rodents, birds, feral cats, insects, etc. Pest control is in any case a mandatory AQIS requirement as well as that of local council environmental health and planning departments, Agriculture Victoria and Health Department for food production facilities.

Conventional pest controls include baited traps, insect traps and other best practice measures that are very effective in minimising pests onsite and preventing potential pest migration offsite. These best practice measures ensure human health impacts are negligible from pest and vermin.
11.1.6 Zoonotic Disease and Q-Fever

“Zoonotic diseases” (also called zoonoses) are infectious diseases that can pass from animals to humans but only if present at high levels at source and if uncontrolled transmission pathways exist.

A zoonotic diseases contingency risk assessment has been prepared by sheep disease expert Professor Colin Wilks and Associates (Appendix Q) to evaluate potential risk to human health from the Gillieston meatworks project. This zoonotic disease risk assessment includes a Q-fever risk assessment and infection control strategy to prevent adverse human health impacts.

This risk assessment and infection control management plan draws from available information as summarised in the Wilks background report and considers the potential risks in specific pathways and the actions that will be taken to mitigate them. The potential for certain zoonotic infections of humans including Q-fever from the Gillieston Meatworks project has been assessed in detail and best practice measures identified to protect human health including meatworks staff, visitors and members of the public.

The site will be designed and operated to comply with AQIS stringent licensing standards for an export meat processing plant, as well as Health Department and Victoria Worksafe OHS requirements that assures worker health protection and food safety. These standards are very effective in containing zoonotic disease and Q-fever risks and preventing transmission pathways beyond site operations.

The fundamental stating point to ensuring low risk of zoonotic diseases is that livestock (mostly lambs) will be sourced from Victorian farmers, livestock saleyards and other contracted suppliers that can ensure high quality and clinically healthy animals certified under livestock quality assurance schemes (e.g. MLA and Aus-Meat administered Flockcare programs). Lambs may also be obtained from other south-east Australian states including from South Australia, Tasmania and southern NSW under these industry accepted livestock quality assurance scheme. Note that lambs are not a Q-fever infection risk.

MAPL will implement a biosecurity plan and Q-Fever management procedure that will incorporate health protection measures such as (adapted from: Worksafe Victoria Guidance Note - Q fever prevention 2013):

- Pre-screening and vaccination program for workers including for Q-Fever
- Provide appropriate personal protective clothing (eg overalls/coat and rubber boots) including respiratory protection (P2 respirator) for high risk (dusty and aerosol areas)
- encourage appropriate personal hygiene procedures
- only allow certain high personal access to low risk Q fever work areas
- Install appropriate ventilation and dust suppression systems in high risk livestock handling and meat processing areas to help reduce dust and other airborne particles. Ventilation systems designed with separated intake and exhaust vents to prevent recirculation of contaminated air.
- Provision of appropriate washing and changing facilities in each of the above work areas to avoid cross-contamination
- Arrange for personal clothing to be stored away from any work clothing that may be contaminated (work clothing not taken out of the workplace to prevent Q fever exposure to others outside the workplace).
- Prohibit eating, drinking, smoking, and nail-biting in animal holding or processing areas. Require employees to thoroughly
- Washing of hands before eating, drinking, smoking in designated areas, before going to the toilet and at the end of each shift (to prevent Q fever exposure to others outside the workplace).
- Clean and disinfect work areas regularly and ensure drainage is adequate.
- Collect, contain and remove suspect animals, by-products and other wastes that are not suitable for processing.
- Securely collect, contain and promptly dispose offsite WWTP wastes including screenings, DAF sludges, etc.
- Implement an appropriate first aid program to ensure employees with open wounds are treated quickly.
- Implement an ongoing maintenance program (eg routine inspection of ventilation and drainage systems and wash facilities, etc)
- Training and awareness in safe work practices about Q fever and other zoonotic diseases and supervision to enable workers to perform work in a safe manner and without risks to health.
- Training staff with appropriate knife skills to minimise damage to the udder and the rectum to reduce potentially contaminated airborne particles from the release of milk and faeces respectively, and maintain the integrity of the animal organs such as the bladder, intestines and uterus when they are removed and lowered to the eviscerating table.
- Washing stock on the race entering the kill floor with low pressure hoses to reduce the release of potentially contaminated airborne particles.
- Muzzle dogs that are used to move livestock into pens to prevent cross contamination.

In conclusion, the overall risk of zoonotic disease (including Q-Fever) transmission to humans is regarded as low and manageable by routine AQIS, food safety, hygiene, OHS, biosecurity management systems including Q-fever policy and control procedures.

### 11.2 Risk Assessment of Non-Routine Operations

The key risk aspects for non-routine operations considered to have potential for offsite impact are summarised in Table 22. Residual risk ratings have been determined by qualitative methods consistent with EPA’s “Licence Assessment Guidelines for Using a Risk Management Approach to Assess Compliance with Licence Conditions” (Pub. No. 1321.2, June 2011).

**Table 22 Risk Management of Non-Routine Operations**

<table>
<thead>
<tr>
<th>Risk Aspect</th>
<th>Description of Mitigation Measures</th>
<th>Residual Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power failure and potential for odour, inadequate recycled water treatment</td>
<td>Backup diesel generator kicks in to maintain meat processing, refrigeration, essential services including WWTP processes (screening, pumps, aerator operation, etc).</td>
<td>Low</td>
</tr>
<tr>
<td>High BOD loading to WWTP, potential for odour or exceedance of Class C recycled</td>
<td>Aerated Pond 1 (45kW total duty from the 3 aerators) provides ~1.5 times the minimum required HRT and ~140% of the minimum aeration required to functionally treat expected organic and nutrient loads. The settling pond provides almost 3 times the minimum capacity recommended to ensure</td>
<td>Moderate</td>
</tr>
<tr>
<td>Risk Aspect</td>
<td>Description of Mitigation Measures</td>
<td>Residual Risk</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>water quality</td>
<td>effective solids settling. Odour suppression chemical dosing can be implemented as a contingency. Refer to sections 3.2.7 and 5.1.3 and ETS report in Appendix G.</td>
<td></td>
</tr>
<tr>
<td>WWTP Aerator or other failure</td>
<td>Pond 1 can operate without odour on two aerators if one were to fail to enable aerator repairs. If 2 or all 3 aerators stop operating (eg. due to power failure) there is adequate capacity in Pond 1 (~6.5ML) to maintain aerobic conditions until the power supply is restored and/or aerator repairs are completed. Odour suppression chemical dosing can be implemented as a contingency. Refer to sections 3.2.7 and 5.1.3 and ETS report in Appendix G.</td>
<td>Low</td>
</tr>
<tr>
<td>Spills to stormwater system (eg. blood, brine, wastewater, chemicals, fuels, etc)</td>
<td>Contained within the onsite stormwater system pits and CSP and/or clean stormwater pond/SWB. Spills cleaned out and pumped to WWTP or sent offsite subject to quality and risk assessment for WWTP biomass protection. Refer to section 5.4.4.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Wastewater pond spills/ overflows</td>
<td>The wastewater will cascade from Pond 1 to 4 by gravity or auto-pump assist if required. All ponds have at least 500mm freeboard, which is adequate for extreme rainfall events. As a contingency emergency overflow can occur from Pond 4 to reuse sump (~5ML capacity) or pumping to irrigation areas, which drain back to reuse sumps (closed loop drainage system) on the property.</td>
<td>Low</td>
</tr>
</tbody>
</table>
| Recycled water quality – failure to meet Class C Recycled Water Quality | The WWTP design has additional aerator capacity and detention time to ensure BOD/SS 20/30 standards are routinely met. However algal blooms may cause increase in BOD, SS and pH levels (refer to next row in this risk table). The soil suitability and land capability of the irrigation areas has been assessed, and short-term exceedance of Class C standards and potential higher BOD, N and P loads can be readily managed by good farm practice including:  
  • additional shandying with channel/bore water to reduce BOD and flood irrigation area odour risk  
  • implementation of cut-and carry fodder enterprise to ensure nutrient export  
  • grazing subject to temporary sheep access restrictions.                                                                                                                                                                                                                                                                                                                                                                                                                  | Moderate      |
<p>| Algal blooms in WWTP ponds               | Elevated N and P levels in the lagoons may result in growth of algae particularly during warmer months of the year. Management of algal blooms are an operational element rather than a non-routine event. Recycled water can be recirculated through the ponds to break up the algae if required. Algae in recycled water is not a limitation for flood irrigation systems,                                                                                                                                                                                                                                                                                                                                                       | Low           |</p>
<table>
<thead>
<tr>
<th>Risk Aspect</th>
<th>Description of Mitigation Measures</th>
<th>Residual Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>fodder production or grazing subject to temporary sheep access restrictions.</td>
<td>In the event of an algal bloom, recycled water from the WWTP ponds can be shandied with channel of bore water to help dilute the algae prior to irrigation onsite. The receiving channel systems can also be flushed with fresh channel or bore water to restore quality. The irrigation areas have runoff collection and reuse systems as part of a whole farm plan, which will ensure onsite containment of any algal laden runoff. These risks will be managed through the IMP – refer to section 6.3.6.</td>
<td></td>
</tr>
<tr>
<td>Recycled water irrigation spills/runoff to drains, storage dam/reuse sump overflow to GMW drain</td>
<td>Any potential spill, loss or runoff of recycled water (low BOD, moderate turbidity, nutrients, algae) would only reach GMW drain 6 after a “tortuous pathway” and exceedance of the capacity of all onsite drains and reuse sumps. Any residual water discharge offsite would have low environmental consequences given GMW’s manmade rural drain is a highly modified ecosystem with low biodiversity values. There are no nearby natural waterways at risk (over 15km to the north). Spill and runoff risks will be managed through the IMP.</td>
<td>Low</td>
</tr>
</tbody>
</table>
| Irrigation area soil exceedance of agronomic triggers for nutrients, salinity, sodicity, pH | The baseline nutrients, salinity, sodicity and pH of onsite soils and land capability of the irrigation areas has been assessed by Ag-Challenge (Appendix L). Short-term exceedance of agronomic triggers and higher nutrient and salt loads can be readily managed by good farm practice that could include the following:  
  · additional shandying with channel/bore water to reduce N, P and salt loads  
  · preferred use of lower salinity channel water for shandying if available  
  · cut-and carry fodder enterprise to ensure nutrient export  
  · soil monitoring to track trends in soil nutrients, salinity, sodicity and pH and determine suitable soil treatments to ensure productivity  
  · implementation of additional leaching fraction (minimum 10% plus winter rainfall flushing recommended by Ag-Challenge) to maintain low salinity levels in root zone soils  
  · maintenance of good soil structure and drainage by low tillage methods and low sheep stocking rates to minimise soil compaction, aeration of soils, application organic matter, application of gypsum if suggested by soil tests  
  · selection of moderately salt tolerant fodder crops. | Low |
<p>| Noise | The assessment of noise at sensitive receptors has been assessed in section 9 using conservatively high (worst case) | Low |</p>
<table>
<thead>
<tr>
<th>Risk Aspect</th>
<th>Description of Mitigation Measures</th>
<th>Residual Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>noise emissions for day, evening and night-time periods. Even at these high noise source emissions the WMG report predicts compliance with RMNL’s of EPA’s NIRV guidelines. Any unwanted noise events will be promptly responded to and mitigation measure implemented as required.</td>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Zoonotic disease/Q-Fever infection of humans (workers, contractors, neighbours, other public persons)</td>
<td>The zoonotic diseases contingency risk assessment prepared by Colin Wilks &amp; Associates (Appendix Q) concludes that there is a low risk to human health from the Gillieston meatworks project. The Q-fever risk assessment and infection control strategy outlined in the Wilks report will be developed further as part of OHS and food safety standard operating procedures to prevent adverse human health impacts.</td>
<td>Low</td>
</tr>
</tbody>
</table>

### 11.3 Site Management Plans and Systems

An integrated management system (IMS) will be developed addressing: AQIS and Meat industry certification, food safety, hygiene, OHS, Zoonoses/Q-Fever management, Environmental and EPA licence compliance. The IMS will be in accord with meat industry best practice standards for an AQIS licensed export facility.

A comprehensive site Risk Aspects and Impacts register for routine and non-routine operations will be developed as part of a site OEMP and environmental monitoring program. The risk management framework will be consistent with EPA’s Licence Assessment Guidelines (Pub. No. 1321.2, June 2011).

The OEMP incorporating the Environmental Monitoring Program (see section 13.1) and Irrigation Management Plan (section 12.3) will be developed prior to commencement of EPA licensing. The environmental management framework is shown conceptually in Figure 11.
Figure 11 MAPL Gillieston OEMP Framework

- Works Approval Application
- EPA Works Approval
  - EPA Licence
  - MAPL Site operations and Maintenance Systems and Procedures: AQIS compliance, Food Safety, Hygiene, QMS, OHS, Zoonoses/Q-Fever RMP
  - Operations Environmental Management Plan (OEMP)
    - Aspects & Impacts Register & Environmental Monitoring Program
    - Irrigation Management Plan (IMP) and LCA for Onsite Recycled Water Use
      - Annual Soil Testing & IMP Compliance Review
        - Internal Audit Program & MAPL Management Review
          - Annual Performance Statement to EPA
11.4 Construction Environmental Management Plan (CEMP)

Prior to commencement of construction activities, a Construction Site Environmental Management Plan (CEMP) will be prepared in accordance with EPA's BPEM guidance: “Environmental guidelines for major construction sites” (Pub. 480, 1996) and “Construction techniques for sediment pollution control” (Pub. 275, 1991). The CEMP will address:

- Construction activity times, traffic and noise controls
- Stormwater and flooding management including diversion around construction areas,
- Erosion and sediment pollution, dust controls
- Vehicle washing requirements prior to site entry and exit
- Public road sweeping/cleaning procedures around access points
- Construction waste, litter and contaminated materials management
- Chemical and fuel storage
- Remnant vegetation protection and weed management
- Environment incident response and notification
- Inspection, monitoring and reporting.

Existing onsite farm dams or new basins built near the construction site will be provided to serve as construction sediment basins during construction phase. Any construction site runoff would have no significant consequence or sensitivity (low risk rating) given the discharge would be to GMW drains and there are no natural waterways in close proximity to MAPL.

After construction these dams will be desilted and then become detention basins for the operational stormwater management phase as discussed in Section 5.4.
12  Other Approvals

12.1  Commissioning Plan

MAPL will undertake a commissioning phase for the meatworks and WWTP. This is expected to occur over a period of up to 120 days. During this time the factory meat processing plant and equipment will be performance tested and staff appropriately trained to ensure operations in accordance with design parameters and production efficiencies.

The treated effluent discharge from Settling Pond 2 to the Maturation/Winter Storage Pond 3 is not expected to fully meet Table 8 quality levels for several months. The BOD, SS and nutrient levels will start at raw levels (Table 7) improve with time as the activated sludge biomass builds up within the pondage system. The wastewater treatment system (aerators, pumps etc) is subject to a start-up period of 3-6 months as discussed in the ETS report in Appendix G.

Table 8 standards are expected to be met within 3-6 months. During this period the onsite recycled water scheme will be managed by a number of commissioning measures to ensure no odour or land capability issues at the farm. These measures include:

- additional shandying with channel water and/or bore water
- use of laser graded paddocks with most uniform slopes and drainage to minimise ponding
- use of centralised flood irrigation paddocks with high internal buffers to boundaries/residences
- flushing residual effluent out of ponded paddocks, farm channels and drains.

12.2  New Licence subsequent to Works Approval

12.2.1 Recycled Water Quality Limits

After the commissioning period, the final recycled water available from the winter storage pond 4 is expected to meet the following Class C recycled water quality objectives (12-month medians) as follows:

- BOD  20 mg/L
- SS   30 mg/L
- TN   80 mg/L
- TP   5 mg/L
- pH   6 – 9 (90th percentile range).

The above recycled water targets may be exceeded due to algal growth, which can temporarily increase BOD, SS and pH.

12.3  Recycled Water Scheme EIP

EPA endorsement of the onsite IMP will be sought prior to commencement of irrigation:

The IMP (draft table of contents in Appendix N), will be prepared prior to commencement of the commissioning phase, when recycled water is expected to become available for reuse onsite. Both a commissioning IMP and operational IMP (post commissioning) will be prepared for EPA endorsement.

MAPL seeks exemption from licensing for the onsite recycled water scheme, subject to endorsement of the IMP.
## 13 Post Decision Operational Requirements

### 13.1 Environmental Monitoring Programs

MAPL will develop a risk-based environmental monitoring program derived from its Risk Aspects and Impacts register, developed in accordance with EPA Publication 1321.2. The monitoring program is expected to include the key elements as summarised in Table 23.

**Table 23 Environmental Monitoring Program – Key Elements**

<table>
<thead>
<tr>
<th>Monitoring Element</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory throughputs – sheep processed, meat products and by-products generated</td>
<td>Weighbridge records, sheep processing numbers and product loadout sales, by-product transport records</td>
</tr>
<tr>
<td>Water use – GMW channel and bore supplies</td>
<td>GMW meters. WFP meter and factory submetering.</td>
</tr>
<tr>
<td>Factory Wastewater Flows</td>
<td>Meters on Green and Red pits</td>
</tr>
<tr>
<td>Sewage treatment and disposal</td>
<td>Meter on outlet of STP to Winter Storage 4</td>
</tr>
<tr>
<td>Raw Wastewater quality (Table 7 parameters)</td>
<td>Routine Monitoring – frequency to be determined upon commissioning</td>
</tr>
<tr>
<td>Wastewater treatment process controls</td>
<td>DO, pH and temperature monitoring in aeration and settling ponds – to be confirmed upon commissioning</td>
</tr>
<tr>
<td>Sludge build-up/depth in settling pond</td>
<td>Sludge levels checked by inspection, or by sampling</td>
</tr>
<tr>
<td>Algal monitoring in ponds</td>
<td>Regular visual observations (weekly) in WWTP, stormwater ponds, reuse sump. Algal testing if required by GMW due to B-G algal blooms in stormwater ponds or reuse sump.</td>
</tr>
<tr>
<td>Treatment and Winter storage pond levels and condition (erosion, stability)</td>
<td>Regular inspection for condition of pond embankments and depth – to verify 500m freeboard maintained</td>
</tr>
<tr>
<td>Recycled Water Quality – from winter storage to irrigation area (Table 8 parameters)</td>
<td>3 times per year during irrigation season, 2 times during non-irrigation season – to be confirmed upon commissioning</td>
</tr>
<tr>
<td>Recycled water volumes used for irrigation</td>
<td>Reuse pump station meter and/or run-time recording.</td>
</tr>
<tr>
<td>Stormwater quality</td>
<td>Routine inspection (weekly) of stormwater ponds</td>
</tr>
<tr>
<td></td>
<td>Sampling of indicator pollutants in the event of spill to stormwater</td>
</tr>
<tr>
<td>Monitoring Element</td>
<td>Method</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Odour, dust and noise emissions</td>
<td>Daily site inspection/ surveillance runs to verify no offensive odour or unwanted dust or noise offsite.</td>
</tr>
<tr>
<td>Boiler LPG usage</td>
<td>LPG tank filling records. Visual inspection of boiler stack emission to verify no visible smoke or particulate emissions</td>
</tr>
<tr>
<td>Electricity Use</td>
<td>Powercor meters/bills. MAPL submeters in factory.</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Monitoring of onsite production bores to be undertaken prior to commencement of MAPL operations and annually thereafter – in autumn each year.</td>
</tr>
<tr>
<td>Onsite recycled water use, soil monitoring, and performance</td>
<td>MAPL to engage farm operator to implement monitoring programs and procedures described in the IMP including water use recording by paddock number, date and volume. Annual soil sampling (in autumn each year) of selected paddocks for agronomic parameters (soil pH, salinity, sodicity, nutrients and trace elements)</td>
</tr>
<tr>
<td>Solid wastes</td>
<td>Tracking system (via transport records, EPA PIW certificates and invoices) to be implemented to record volumes/tonnages of garbage, recyclables solid and other wastes generated at MAPL, and verification of appropriate disposal/recycling routes. Prescribed industrial wastes (PIW) to be tracked by EPA’s waste transport system (EPA permitted drivers and certificates).</td>
</tr>
</tbody>
</table>

The above monitoring program including testing parameters, frequencies and locations will be developed further during the commissioning phase of the project. A final monitoring program and the risk register that underpins it will be provided to EPA prior to completion of commissioning.

Monitoring results, data and records from the above programs will be maintained by MAPL in secure environmental files and database repositories for subsequent use in assessing compliance with licence conditions and preparing the Annual Performance Statements to EPA due in September each year.

The environmental monitoring program will incorporate response triggers to enable interpretation of results and assessment of compliance with licence limits and conditions. A trigger action response plan (TARP) will be developed to enable appropriate responses in the event of exceedance of triggers.
13.2 Incident Response and Reporting

MAPL will develop incident response and EPA reporting procedures for the following:

- **Factory site**  
  Identification of spills, odour, noise, dust, visual emissions, litter, algal blooms (in stormwater ponds), etc from routine site inspections and internal audits. Investigation, risk assessment and resolution of incident.

- **WWTP**  
  Power failure, screening system failure, green/red pit blockage, aerator fault, pump failure, anaerobic conditions (zero DO levels), breach of Class C water quality, risk of pond overflow (safe freeboard levels not maintained <500mm), high odours, etc.

- **Irrigation Area**  
  Identification of recycled water pipeline spills/leaks, non-compliance with IMP – eg. use of recycled water on land not permitted by the IMP, soil risks identified by testing, complaints about recycled water scheme. Investigation, risk assessment and resolution of incident.

- **Environmental Complaints**  
  Recording and investigation of complaints received by public (could be either directly or from EPA). Possible complaint categories: spills, odour, noise, dust, visual emissions, litter, water pollution, etc. Complaints investigated as soon as practicable, complainants to be contacted on same day. Complaint resolved/reported within 24hrs.

13.3 Annual Performance Statement

MAPL will prepare an EPA annual performance statement in accord with the EPA licence conditions and EPA’s Annual performance statement guidelines (Publication 1320.3, June 2011). APS information and data to be reported is expected to include:

- Wastewater quantity and quality generated from the factory
- Recycled water volumes and quality discharged to onsite irrigation areas
- Reporting of any non-compliance with licence conditions and the IMP including the incident report, complaint records as relevant.

The APS will be submitted to EPA in September each year.

An annual self-assessment and IMP compliance statement will be undertaken by the operator of onsite recycled water scheme and submitted to MAPL management by the end of each financial year. The report will include compliance statement for the following:

- Recycled water use, paddock number that received effluent
- Channel or bore water used onsite to shandy recycled water to provide estimated average annual shandy/dilution rate
- Soil test results and any problem areas in terms of productivity (salinity, sodicity, pH, nutrients, soil structure, plant growth limitations, etc)
- Incident reporting internally to MAPL management – runoff to GMW drain from main reuse sump, soil/pasture productivity/damage issues, etc.
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A.1  EPA Works Approval Application Company Legal Entity Form
A.2 Relevant Offence Declaration Form
A.3 ASIC Certificates of Registration

ASIC company search documents, not more than 14 days old:

- Meatworks Australia Pty Ltd, ABN 13 619 105 083
B   EPA Supporting Information Form & Checklist

B.1   EPA Supporting Information Form
B.2   EPA Works Approval Checklist
B.1   EPA Supporting Information Form
B.2 Works Approval Checklist
### Property Title Documents

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<td>Crown Allotment 27 Parish of Mooroopna West</td>
<td>630 Lancaster-Mooroopna Rd, Gillieston</td>
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<td>C.2 Certificate of Title, Vol. 09619, Folio 532</td>
<td>Lot 2 Lodged Plan LP149981S</td>
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<td>C.3 Certificate of Title, Vol. 11642, Folio 090</td>
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D  Planning Property Reports

D.1  Planning Property Report - 630 Lancaster Mooroopna Road Gillieston
D.2  Planning Property Report - 1100 Mulcahy Road Gillieston
E  Process Planning Report (Lean Projects)
F Potable Water Treatment Report (ETS)
G  Wastewater Treatment Report (ETS)
H Screening and DAF system technical information

H.1 Red and Green Screening Systems
H.2 DAF Unit
H.3 Fan Press (Paunch dewatering)
H.1 Red and Green Screening Systems
H.2 DAF Unit
H.3  Fan Press (Paunch Dewatering)
I  Sewage Treatment Plant

I.1  STP Process and Concept Design Information

I.2  Commerce-in-confidence material - provided separately
J Geotechnical Report for Wastewater Ponds (B.M.)
K  Groundwater Information and Data

K.1  Groundwater Bore Search Bore Info
K.2  GW and Bore Maps: Figures K-1 to K-5
K.3  Onsite Groundwater Bore Testing Results 2016 and 2018
K.1 Groundwater Database Search Data

Groundwater Bore search data
K.2  Groundwater Database Search Maps

OTE Figures K-1 to K-5
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L  Land Capability Assessment (Ag-Challenge)
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M-3  Combined WWTP and STP flows and Quality
M-4  Irrigation Areas - Paddock Breakdown
M-5  20Yr Water balance 135 ML/Yr, Irrigation Area Specified 118Ha, Lucerne/Pasture
M-6  1 Year statistical water balance, 135 ML/Yr, Lucerne/Pasture, average, 90th percentile and maximum rainfall years
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# Recycled Water IMP – Draft Table of Contents

**IMP indicative Table of Contents**

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**APPENDICES**

APPENDIX A Locality & Site Plans
APPENDIX B Water Balance Calculations
APPENDIX C Nutrient Loading Calculations
APPENDIX D Inspection & Maintenance Checklist
APPENDIX E Emergency Procedures
APPENDIX F Monitoring Planner/Schedule
APPENDIX G Annual Performance Statement Checklist
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Q Zoonotic Disease Risk Assessment & Management
MEATWORKS AUSTRALIA PROPOSED SMALL STOCK MEATWORKS – GILLIESTON VICTORIA ZOONOTIC DISEASES CONTINGENCY

Report Prepared By: Professor Colin R Wilks, March 2019

1. Purpose and Scope

This report provides a review of potential environmental public health impacts associated with the potential for zoonoses from the proposed meatworks operations at Gillieston. This specialist report supports the EPA Works Approval Application prepared by the Meatworks Australia consulting team.

2. Background

Most infectious diseases of humans are contracted by direct or indirect contact with another infected human. However, throughout the world there are a number of disease agents (viruses, bacteria, parasites, fungi and protozoa) that have been recognised to infect animals and be transmitted from those animals to cause disease in humans. Such diseases of humans are called zoonoses.

The occurrence of different zoonoses varies throughout the world and even in different geographic areas within the same country. Some zoonoses are only present in restricted areas of the world and most are restricted to a limited number of animal species.

In Australia, only a small number of all of the known zoonotic diseases occur and there are about 500 total notifications of human zoonotic infections each year, about 64% of which occur in Queensland. Two important zoonoses, bovine brucellosis and bovine tuberculosis, have been eradicated from the whole of Australia and others, such as Q fever, are well-known in the meat industry and are routinely controlled at source by veterinary inspection programs and vaccination of farmers, meat industry workers and other at-risk people.

Therefore, by taking well-recognised risk mitigation measures for the limited number of zoonoses that have been recorded to occur in Victoria, the overall risk level can be justifiably reduced to low for those working closely with small stock animals (e.g. sheep) and for those in the areas surrounding sites such as meatworks where large numbers of sheep are handled.

It is therefore important to note, when considering zoonotic risks potentially associated with Meatworks Australia’s lamb processing facility, that it is sourcing its lambs from a restricted low risk region of south east Australia and therefore we only need to identify and consider the potential for zoonoses in that region. Once the potential zoonoses have been identified, the likelihood that they are present in the class of stock entering the meatworks and the pathways by which they could potentially be transmitted to humans, either in the facility or in the surrounding area, need to be considered to identify the likelihood and consequences of the risks, and the mitigation measures that may be necessary to reduce any identified risk to a target low level.

There is only a small number of potential zoonotic agents present in sheep in Australia, and an even smaller number that warrant consideration given that the proposed meatworks is processing only clinically healthy lambs that are sourced predominantly from Victoria, southern NSW and South Australia. The key agents warranting consideration are Coxiella burnetii (Q fever), ovine parpoxvirus (contagious ecthyma, ‘scabby mouth’), leptospira, and gastrointestinal agents such as salmonella and cryptosporidia.
The likelihood of zoonotic risk from sourced livestock with any of these agents is already low. However, where it is considered that contingency risk mitigation measures are still necessary for a particular agent, there are a suite of best practice measures already embedded in the meat production industry (i.e. as part of OHS, Food Safety management systems and AQIS export licensing certifications) that effectively reduce the overall risk level. The range of best practice measures include:

- Sourcing of low risk stock from known disease-free farms and regions through QA systems such as Sheepcare, Flockcare and other Livestock Production Quality Assurance (QA) programs
- Selection of clinically healthy stock of the required age group e.g. lambs
- AQIS appointed veterinary inspection programs for all stock received at the meatworks
- Isolation of stock received at the meatworks not meeting veterinary standards (e.g. over age, pregnant or suspected unhealthy sheep) in suspect pen areas for safe and humane removal from site
- Facility design and construction in accord with AQIS Construction and Equipment Guidelines for Export Meat to ensure that the design and structures are compatible with disease eradication principles including ease of cleaning, weather sealing, separation of edible and inedible processing areas (eg. separation of livestock handling from bleed areas from slaughter floor processes, etc), clean and filtered conditioned air controls, etc.
- Facility operations to very stringent standards of hygiene commensurate with meat industry best practice including regular aggressive, hot washdowns and sanitising carried out to ensure thorough cleaning and disinfection of disease causing bacteria, viruses, fungi and protozoa, as well as of commensal microbial agents.
- Vaccination of workers and contractors working with livestock, meat processing and wastes
- Use of personal protective equipment, including gloves, aprons, overalls, boots, face shield
- Good personal hygiene practices including washing hands prior to eating, drinking, smoking, and no eating, drinking or smoking in work areas
- Regular cleaning and disinfection of work spaces and equipment
- Measures to minimise creation and dispersal of dust and aerosols
- Safe handling and disposal of potentially contaminated waste
- Control of rodents and other pests with standard vermin management systems.

The above best practice measures have been routinely and successfully implemented by farmers, transporters, livestock saleyards and meat processors for several decades to protect worker and public health. They are minimum standards that must be achieved to obtain relevant food safety and quality assurance certifications as well as AQIS export licences.

3. Methodology

The zoonoses assessed for the Meatworks Australia Gillieston Facility and risk mitigation measures were identified on the basis of prior personal knowledge and extensive relevant experience in Victoria and internationally, review of the published scientific literature and government reports, and consultation with colleagues in Health Victoria, Agriculture Victoria and The University of Melbourne. Particular note was taken of whether or not the zoonosis had been reported previously in Victoria, how frequently and in what context, and the impact on workers and the broader community.

The qualitative method of assessing risk including terms and definitions used are consistent with that described in the following EPA Victoria guidelines:

- “Assessing and Controlling Risk: A Guide for Business” (Publication 1695); and
- “Licence Assessment Guidelines – Guidelines for Using A Risk Management Approach to Assess Compliance with Licence Conditions” (Publication 1321.2).
The risk assessment approach is also consistent with qualitative methods described in the "Environmental Health Risk Assessment - Guidelines for assessing human health risks from environmental hazards" (enHeath 2012).

A precautionary approach was taken when allocating a rating to likelihood and consequences.

4. Consideration of risk of specific potential zoonotic agents

a. Ovine parapoxvirus

Infection of sheep with ovine parapoxvirus causes painful and clinically obvious scabby lesions around the mouth of lambs, usually just after weaning, particularly if the lambs are weaned onto harsh stubble or if prickly plants are present in the pasture. The virus is transmissible to humans by direct contact with clinically infected sheep, or their immediate contaminated environment, and causes similar painful lesions, mainly on the hands, which resolve spontaneously over the course of a week or two.

The clinical lesions are obvious in sheep and buyers will be trained to recognise and be alert to the condition. Affected sheep will not be purchased. A second line of defence will be ante-mortem inspection by the on-site independent government veterinarians, who will only allow clinically healthy lambs to be presented for processing. In the rare event of affected sheep being identified in the holding yards, they will be separated and removed off-site.

The likelihood of the risk at the meatworks is considered to be 'rare' and the consequence, in terms of health impact on workers, is considered to be at worst 'moderate', so the overall risk level is [low].

b. Leptospirosis

Infection of sheep with leptospire bacteria may result in long-term kidney infection with the infectious bacteria being shed in urine. Infection of humans can occur by contact with infected urine or animal tissues, mainly through breaks in the skin or through the conjunctiva. Leptospires do survive in water and there is also a possibility of infection by contact with contaminated water.

However, leptospirosis is rare in sheep (Agriculture Victoria fact sheet), and the only animal hosts associated with human infection reported in Victoria are rats, cows and pigs (Health Victoria fact sheet).

Given the historical absence of human cases associated with sheep, attention to safe hygienic working practices and the rodent pest control program in place at the proposed meatworks, it is considered that the likelihood of risk to workers or the surrounding community is 'rare' and the consequences at worst are 'moderate', so the overall risk level is [low].

c. Gastrointestinal agents

Gastrointestinal bacteria, such as salmonella, or protozoa, such as cryptosporidia, may cause severe diarrhoea in sheep or be present at a low level as a sub-clinical infection. Transmission to humans is by ingestion of faecally contaminated food or water. In humans, infection with salmonellae can lead to "acute gastroenteritis with fever, vomiting, nausea, abdominal pain, headache and diarrhoea. Dehydration may occur, especially among infants and the elderly. Infection may also present as septicemia, and occasionally may be localised in other body tissues, resulting in endocarditis,
pneumonia, septic arthritis, cholecystitis and abscesses. Symptoms usually last 3–5 days.” (Health Victoria fact sheet). Cryptosporidial infection of humans may lead to gastroenteritis with watery diarrhoea and vomiting.

In Victoria about 2000 human cases of salmonellosis occur each year and are most frequently associated with uncooked eggs and egg products, raw milk and milk products, poultry and poultry products and, much less commonly, raw red meats.

Since only healthy lambs will be processed at the proposed meatworks, even if some of them are subclinically carrying an enteric agent capable of causing human infection, the likelihood of infection is considered ‘unlikely’ and the consequence is ‘moderate’. The risk level of infection will be low for abattoir workers given basic good hygiene practices. Proper collection, treatment and distribution to land of waste water and proper disposal of manure means that the risk level will also be low for the surrounding community, which will already be subject to exposure from animals on the surrounding farms.

d. *Coxiella burnetii* infection (Q fever of humans)

Q fever is a zoonotic disease of humans caused by the bacterium *Coxiella burnetii*, which is carried by certain livestock species (cattle, sheep and goats), some domestic pet animals (cats and dogs) and wildlife (kangaroos and bandicoots). Most cases of Q fever in Australia occur in people in occupations involving close contact with livestock (abattoir workers, farmers, shearers, veterinarians), who are exposed to the organism which is mainly present in uterine discharges from the infected animal around the time of parturition. Infected livestock may also shed lower amounts of the organism for a few weeks after giving birth in their faeces, urine and milk. By far the greatest number of infectious organisms are present in the placenta, placental fluids and fetus of infected animals and this, or inanimate material contaminated with this material, is the main source of infection for humans.

The organism only replicates in the body of live animals, but it is very resistant in the environment and survives for months, for example in contaminated soil or on other contaminated objects. Human infection can occur by inhalation of infectious aerosols or of dust blown from contaminated soil and this may occur over long distances, up to several kilometres.

*Coxiella burnetii* is inactivated at temperatures over 65°C (pasteurisation is effective) and by disinfectants such as hypochlorite solutions (for example, as used in disinfection of work areas in a meat processing plant).

When considering the size of the risk of exposure to *C. burnetii* it is necessary to consider geographic location, the species and class of animal potentially infected as well as the circumstances of potential exposure to the infected animal. This is reflected in the occurrence of Q fever in persons in Australia. By far most cases of Q fever occur in Queensland and north western New South Wales, which account for over 90% of all cases of Q fever in humans in Australia each year, occurring at about 150 cases per year (a rate of 50 cases per 100,000 population in those areas). Only about 15 cases or 7% of the total occur in Victoria (0.5 cases per 100,000 population). This mirrors the prevalence of exposure found in domestic animals, which dramatically falls as you progress south from Queensland to Victoria.

For many years it was considered that infection was not endemic in livestock in Victoria and that any human cases occurring here were the result of exposure to livestock that had been transported from northern areas of the country. It now appears that infection is present in some localised areas of the state in dairy cattle and on some dairy goat farms, which have experienced outbreaks of Q fever in farm
workers. A recent (2016-17) survey of sheep in Victoria, conducted by The University of Melbourne, found serological evidence of past infection in between 0 and 3.7% of the nearly 600 sheep sampled (24 positive samples from 9 of the 51 flocks sampled i.e. 42 of the 51 flocks had no evidence of infection at all). When the results were classified by age of the sheep sampled only 2% of sheep in the infected flocks that were classed as primiparous or younger had evidence of infection compared to 10% of those that were older i.e. evidence of exposure is very low in young sheep compared to those that have lambed several times.

It is concluded that, with lambs sourced from Victoria, southern NSW or South Australia, the risk of infection of abattoir workers with *C. burnetii* is classified at worst as ‘possible’ (exposure only to young, non-pregnant animals that are unlikely to be infected). However, the consequences of infection are considered to be ‘moderate’, so risk mitigation measures for the meat processing facility workers are required. Fortunately, there is a vaccine that confers a high level of protection (>90%) on those vaccinated. All workers in direct contact with animals will be required to be tested and vaccinated as appropriate. Vaccination will also be required for others that regularly enter the meat processing premises if they have direct or indirect contact with livestock (e.g. tradespeople). Vaccination will reduce the overall risk level for these workers to low.

In the rare event that a sheep in late pregnancy arrives at the facility, it will be identified in the yards and held separately in the suspect pen and subsequent safe and humane off-site removal. Workers, using the regular Personal Protective Equipment will take special care with the handling and disposal of any reproductive tracts and thorough cleaning with disinfectant of the work area. The meatworks will develop and implement robust OHS and food safety QA management systems and zoonotic disease (including Q fever) risk assessment and infection control management plans in accordance with meat industry best practice and AQIS export licensing provisions. As a result this will reduce the risk level to low.

Given the capacity for *C. burnetii* to survive in the environment and on contaminated inanimate objects and potentially be dispersed (albeit highly diluted) over distance on wind-blown dust or possibly in site runoff, it is also necessary to consider the potential risk of infection being transferred off-site. Again, considering the class of animal (predominantly lambs from south east Australia) being processed, and the stringent meat processing area cleaning and disinfection standards, the likelihood of the property being contaminated via manure, blood products and/or waste water, at least at a low level, is considered to be, at worst estimate, ‘possible’. The likelihood of infectious dust or water leaving the property and exposing persons in the surrounding area, under the normal operating procedures of the abattoir, is considered to be ‘unlikely’. However, since the consequences are considered to be moderate, risk mitigation measures are required. Suitable disinfection will be used in the meatworks process areas to reduce the low potential for contamination to an even lower level; manure will be collected regularly and stored safely until safe daily removal from the site; areas soiled by manure and urine will be regularly cleaned and drained to the Waste Water Treatment Plant (WWTP); waste water will be treated in the on-site WWTP before being stored for natural disinfection in maturation pond and winter storage prior to beneficial use by controlled flood irrigation; strategic windbreaks can be planted for areas identified as potential aerosol generators (e.g. aeration ponds); pasture or crop will be maintained over the property surrounding the facility’s buildings; dust from irrigation paddocks will be insignificant given maintenance of moist soil conditions from irrigation. Implementation of these risk mitigation measures are considered to reduce the overall risk level to low.

There is also the possibility of infection, if present, being transferred off-site on the person and clothing of meat workers. Those workers and contractors having any direct or indirect contact with livestock will leave work clothes for laundering by off-site contractors, and are expected to wash (staff showers provided) after leaving the AQIS controlled process areas and prior to leaving the site. The contract with the off-site laundry providers will include measures to mitigate the risk of exposure to potentially...
contaminated clothing including offering vaccination and instruction in safe handling provided through staff induction. Contractors, visitors and office staff, having no contact with livestock will wash hands before leaving the site. Q-Fever vaccination will be offered to the immediate family members of all meat workers and office staff. All transfer of data from the livestock handling and meat processing areas to the office area will be electronic to avoid the possibility of transfer of infection on soiled documents. The risk level of transfer off-site by workers is low.

Q-fever risk assessment and infection control management plan

This risk assessment and infection control management plan draws from the information above and considers the potential risks in specific pathways and the actions that will be taken to mitigate them. The whole site will be operated to AQIS stringent standards for an export meat processing plant, standards that are considerably more stringent than required for the domestic market (http://www.agriculture.gov.au/export/controlled-goods/meat/elmer-3)

1. Risk of livestock entering the site carrying zoonotic infection, including C. burnetii
   - Only clinically healthy animals purchased and, where possible, sourced from farms operating under quality assurance schemes such as Flockcare and Sheepcare.
   - Lambs entering the site for processing derived from Victoria, southern NSW and South Australia (lowest risk of being infected because of age group and geographic source).
   - Ante-mortem inspection by AQIS appointed veterinarian to ensure lambs are healthy and fit for processing to export standards.
   - Non-compliant animals (such as pregnant sheep or those showing signs of disease) humanely disposed of appropriately off-site.
   - Q fever vaccination required (as indicated after testing) of all workers coming into contact with livestock, including regular contractors entering the site for plant maintenance and repair.
   - Workers will use personal protective equipment as appropriate to each stage in the meat processing sequence.
   - All areas in the meat processing works will be vigorously cleaned and sanitised, taking good advantage of the materials used in construction of the plant to enable vigorous and frequent washdown.
   - Whole of meat processing area operated under AQIS veterinary supervision to ensure maintenance of hygiene standards including segregation of specific processing areas.

Selection of specific class of livestock, QA measures on and off the site, ongoing independent inspection of hygiene standards including rigorous cleaning and disinfection, and vaccination for Q fever result in a risk level of low.

2. Risk of spread of potential zoonotic agents from livestock handling and processing areas to other areas of the site.
   - Office and administrative area is segregated physically and operationally from the livestock handling and processing areas of the site, including from truck unloading areas and holding pens.
   - Daily cleansing of unloading areas and under the holding pens, including manure collected and stored in enclosed bunkers prior to safe removal and processing off site at approved sites and daily washing of the sites.
   - Workers leaving the livestock handling areas wash and change clothing.
   - All records are transmitted digitally between livestock handling and other areas of the site to completely avoid use of potentially contaminated physical documents.
   - Vaccination for Q fever offered to those workers on the site not coming into contact with livestock or processing.
The above measures will further reduce the already low risk of infection being present in the livestock handling and processing areas from spreading to other areas of the site to low.

3. Risk of spread of zoonotic agents off-site
   a. Offals, blood and skins
      • Offals and blood will be handled in accordance with the stringent and audited AQIS standards (ELMER 3 – electronic legislation manuals and essential references), including inspection and disposition in the designated separate offals room.
      • Skins will be subjected to initial washing, salting and secure storage on-site before safe packing and transport from the site to an approved further processor.
   b. Manure
      • Manure is stored in three sided bunkers on-site within enclosed building before removal by approved operators for further composting according to Australian Standards AS 4454-2012.
   c. Contaminated clothing of workers
      • All work clothes will be left on site and workers wash (showers provided) before leaving areas where livestock are handled and processed.
      • Personal Protective Equipment will be washed and disinfected and remain on-site.
      • Work clothes will be laundered off site under contract to a commercial laundry, whose staff during induction will be trained in the safe transport and handling of the clothing and will be offered Q fever vaccination.
      • Q fever vaccination will be offered to family members of meat processing and livestock handling workers.
   d. Potentially contaminated water run off
      • All waste water from the meat processing area, and wash water from such areas as yard cleansing after manure removal and truck washdown is directed into the WWTP where settling, aeration and further time for natural degradation of pathogens to low levels will occur in maturation and winter storage ponds.
      • The grading of the site ensures no water run off the site. Class C water from the WWTP, free of solids, is used for flood irrigation to facilitate growth of pasture and crops over the site. Sludge from settling ponds is returned to the initial ponds to enable sustainable processing.
   e. Airborne spread
      • Controlled flood irrigation is used to promote coverage of paddock areas surrounding the meat processing buildings with pasture or crops and maintain moist soil to minimise dust.
      • Aeration ponds will be designed to minimise aerosol production and wind breaks may be planted in strategic areas as required.

The above measures will further reduce the already low risk of Q fever on-site to spread off the site to low.

Concluding comment

The potential risk from the identified zoonotic infections has been identified and best practice measures are implemented to ensure that, in each case, the overall risk level to the meatworks staff and contractors as well as to persons in the surrounding areas is low.

A synopsis of the risks, consequences, mitigation measures and final overall risk levels are contained in the following table.
## Table P-1  Synopsis of risk assessment and management for potential zoonoses

<table>
<thead>
<tr>
<th>Disease and risk category</th>
<th>Risk description</th>
<th>Consequence</th>
<th>Likelihood</th>
<th>Raw Risk level</th>
<th>Risk Mitigation Measures, Reduction treatment</th>
<th>Mitigated Consequence</th>
<th>Mitigated Likelihood</th>
<th>Residual Risk level</th>
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</thead>
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<tr>
<td>Contagious Ecthyma</td>
<td>Lambs with clinical signs of contagious ecthyma</td>
<td>Moderate</td>
<td>Rare</td>
<td>Low</td>
<td>Ongoing Tracking of low-risk livestock source areas through livestock QA programs (eg. flockcare, sheep care, ear tag tracking and records systems)</td>
<td>Minor</td>
<td>Rare</td>
<td>Low</td>
</tr>
<tr>
<td>High risk livestock</td>
<td>Lambs with clinical signs of contagious ecthyma</td>
<td>Moderate</td>
<td>Rare</td>
<td>Low</td>
<td>Ongoing Tracking of low-risk livestock source areas through livestock QA programs (eg. flockcare, sheep care, ear tag tracking and records systems)</td>
<td>Minor</td>
<td>Rare</td>
<td>Low</td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>Lambs or rodent pests subclinically infected with leptospirosis</td>
<td>Moderate</td>
<td>Rare</td>
<td>Low</td>
<td>As above</td>
<td>Minor</td>
<td>Rare</td>
<td>Low</td>
</tr>
<tr>
<td>High risk livestock</td>
<td>Lambs or rodent pests subclinically infected with leptospirosis</td>
<td>Moderate</td>
<td>Rare</td>
<td>Low</td>
<td>As above</td>
<td>Minor</td>
<td>Rare</td>
<td>Low</td>
</tr>
<tr>
<td>Gastrointestinal pathogens</td>
<td>Lambs subclinically carrying gastrointestinal bacterial or protozoan pathogens</td>
<td>Moderate</td>
<td>Rare</td>
<td>Low</td>
<td>As above</td>
<td>Minor</td>
<td>Rare</td>
<td>Low</td>
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<tr>
<td>High risk livestock</td>
<td>Lambs subclinically carrying gastrointestinal bacterial or protozoan pathogens</td>
<td>Moderate</td>
<td>Rare</td>
<td>Low</td>
<td>As above</td>
<td>Minor</td>
<td>Rare</td>
<td>Low</td>
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Coxielliosis (Q
<table>
<thead>
<tr>
<th>Disease and risk category</th>
<th>Risk description</th>
<th>Primary controls (best practice measures)</th>
<th>Consequence</th>
<th>Likelihood</th>
<th>Raw Risk level</th>
<th>Risk Mitigation Measures, Reducion treatment</th>
<th>Mitigated Consequence</th>
<th>Mitigated Likelihood</th>
<th>Residual Risk level 2</th>
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<tr>
<td>Fever)</td>
<td>Clinically healthy lambs</td>
<td>All site workers, including those not having direct contact with lambs, inducted to required work practices, tested and vaccinated, as indicated by test results, for Q fever. PPE used by all workers in contact with animals.</td>
<td>Moderate</td>
<td>Rare</td>
<td>Low</td>
<td>As above</td>
<td>Minor</td>
<td>Rare</td>
<td>Low</td>
</tr>
<tr>
<td>Low risk livestock</td>
<td>Older ewes in late pregnancy presented at abattoir instead of or in addition to lambs.</td>
<td>All site workers, including those not having direct contact with lambs, inducted to required work practices, tested and vaccinated, as indicated by test results, for Q fever. PPE used by all workers in contact with animals.</td>
<td>Moderate</td>
<td>Unlikely</td>
<td>Medium</td>
<td>Abattoir staff alerted to potentially higher risk. High risk ewes held back in suspect pen for further veterinary diagnosis and subsequent safe and human removal from site.</td>
<td>Minor</td>
<td>Rare</td>
<td>Low</td>
</tr>
<tr>
<td>Livestock (general)</td>
<td>Direct and indirect livestock contact by visitors to site such as contractors, tradespeople, maintenance workers.</td>
<td>Occasional visitors having no contact with livestock accompanied on site and restricted to visiting office and other non-livestock areas. Regular visitors having direct or indirect contact with livestock inducted in safe site practices, where face masks and PPE and vaccination ensured if required.</td>
<td>Moderate</td>
<td>Rare</td>
<td>Low</td>
<td>No further mitigation measures are needed. Potential mandatory vaccination requirement for regular visitors.</td>
<td>Minor</td>
<td>Rare</td>
<td>Low</td>
</tr>
<tr>
<td>Disease and risk category</td>
<td>Risk description</td>
<td>Primary controls (best practice measures)</td>
<td>Consequence</td>
<td>Likelihood</td>
<td>Raw Risk level</td>
<td>Risk Mitigation Measures, Reduction treatment</td>
<td>Mitigated Consequence</td>
<td>Mitigated Likelihood</td>
<td>Residual Risk level</td>
</tr>
<tr>
<td>---------------------------</td>
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</tr>
<tr>
<td>People</td>
<td>Infection carried off site on contaminated work-clothes or person.</td>
<td>For those in contact with livestock, work-clothes remain on site and are laundered off-site under contract. Workers wash after leaving AQIS controlled area and before leaving site. Those not in contact with livestock wash hands before leaving site. Moderate</td>
<td>Rare</td>
<td>Low</td>
<td>Potential to offer of vaccination programs for immediate family members for meat workers, office staff and permanent/long-term contractors. Laundry workers employed by contractor trained in safe handling of clothing and offered vaccination during induction process.</td>
<td>Minor</td>
<td>Rare</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Manure and urine</td>
<td>Infection present in manure and or urine of recently lambed ewes.</td>
<td>Predominantly (&gt;95%) of livestock are lambs (highly unlikely to be shedding Coxiella). Manure removed from under raised mesh holding yards, truck unload areas and races daily by bobcat and stored in 3-sided bunkers within enclosed shed until removed from site. Areas washed down daily to WWTP where pathogen reduction occurs via biological treatment processes and disinfection by natural sunlight on maturation pond and winter storage. Moderate</td>
<td>Rare</td>
<td>Low</td>
<td>Composting of manure off-site in accordance with Australian Standards AS 4454-2012 will further reduce pathogens to safe levels prior to unrestricted beneficial use by end-users</td>
<td>Minor</td>
<td>Rare</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Waste water</td>
<td>Infection present in waste water derived from yard and race washing</td>
<td>Composition of livestock (lambs) means likelihood of infection being</td>
<td>Moderate</td>
<td>Rare</td>
<td>Significant pathogens die-off will occur on irrigation areas</td>
<td>Minor</td>
<td>Rare</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Disease and risk category</td>
<td>Risk description</td>
<td>Consequence</td>
<td>Likelihood</td>
<td>Risk level</td>
<td>Risk Mitigation Measures, Reduction treatment</td>
<td>Mitigated Consequence</td>
<td>Mitigated Likelihood</td>
<td>Residual Risk level 2</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
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<tr>
<td>and from meatworks operations.</td>
<td>present is low. Water is processed through settling ponds to remove solids and allow decay of infectious agents over time before use for controlled flood irrigation, which confines water to site. Water quality monitoring of recycled water from WWTP will include full suite of indicator pathogens for NATA analyses against trigger levels (Class C Reclaimed Water objectives).</td>
<td>under natural biological processes and disinfection from sunlight and drying cycles. No public access to WWTP and irrigation areas – access only by authorised staff and farm workers who have been inducted and vaccinated.</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Rare</td>
<td>Dust from irrigation areas will be insignificant given maintenance of soil moisture due to irrigated conditions. Pasture harvesting and soil cultivation to occur during low wind conditions. BOM forecasts to be considered prior. Onsite weather station including direction and wind speed can be provided.</td>
<td>Minor</td>
<td>Rare</td>
</tr>
</tbody>
</table>

| Aerosols and dust | Infection present in aerosols or dust is blown off site from WWTP, livestock pens, manure, irrigation areas to expose people in the surrounding area. | Likelihood of infection being present is low. Aerosol generation will be minimised e.g. in aeration ponds due to low atomising aerators, manure shed and elevated pens enclosed, strategic shelter belts will be established, controlled flood irrigation used to maintain pasture or crop cover on land areas (minimal exposed soil). No spray irrigation proposed. | Moderate | Rare | Low | Dust from irrigation areas will be insignificant given maintenance of soil moisture due to irrigated conditions. Pasture harvesting and soil cultivation to occur during low wind conditions. BOM forecasts to be considered prior. Onsite weather station including direction and wind speed can be provided. | Minor | Rare | Low |
Table P-2  Environmental and Public Health Risk Framework

Definitions of the terms Consequence, Likelihood and Risk Level are in accordance with Figure 2 Risk Matrix Example in EPA Victoria’s: “Assessing and Controlling Risks: A Guide for Business” (Publication 1695) are shown below:

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Severe</th>
<th>Medium</th>
<th>High</th>
<th>High</th>
<th>Extreme</th>
<th>Extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent or long-term serious environmental harm / life threatening or</td>
<td></td>
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<tr>
<td>long-term harm to health and wellbeing.</td>
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<tr>
<td>Serious environment harm / high-level</td>
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<tr>
<td>harm to health and wellbeing.</td>
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<tr>
<td>Medium level of harm to health and</td>
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<tr>
<td>wellbeing or the environment over an extended period of time.</td>
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<tr>
<td>Low environmental impact / low potential for health and wellbeing</td>
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<td>impacts.</td>
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<tr>
<td>No or minimal environmental impact, or no health and wellbeing impacts.</td>
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</tr>
</tbody>
</table>

**Description of risk ratings**

<table>
<thead>
<tr>
<th>Risk level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme</td>
<td>Totally unacceptable level of risk. Stop work and/or take action immediately.</td>
</tr>
<tr>
<td>High</td>
<td>Unacceptable level of risk. Controls must be put in place to reduce to lower levels.</td>
</tr>
<tr>
<td>Medium</td>
<td>Can be acceptable if controls are in place. Attempt to reduce to low.</td>
</tr>
<tr>
<td>Low</td>
<td>Acceptable level of risk. Attempt to eliminate risk but higher risk levels take priority.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Could happen but probably never will</td>
</tr>
<tr>
<td>Not likely to happen in normal circumstances</td>
</tr>
<tr>
<td>May happen at some time</td>
</tr>
<tr>
<td>Expected to happen at some time</td>
</tr>
<tr>
<td>Expected to happen regularly under normal circumstances</td>
</tr>
</tbody>
</table>