C.3.3 ERA 53(a) Composting Environmental Assessment Report

ENVIRONMENTAL ASSESSMENT REPORT

ERA 53(a) Composting

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Environmental Assessment Report
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Prepared by:

RPS

Megan Davis
NQ Environment Leader

135 Abbott St
Cairns QLD 4870

T +61 7 4031 1336

Prepared for:

Kalfresh Pty Ltd

David Krause

6206 Cunningham Highway
Kalbar QLD 4309

T +61 7 5410 7700

Contents

Tables

Figures

Appendices

1 INTRODUCTION

RPS AAP Consulting Pty Ltd have been engaged to prepare an Environmental Assessment Report for the proposed Environmentally Relevant Activity (ERA) 53(a) Composting for the Scenic Rim Agricultural Industrial Precinct (SRAIP) project located at 6200 – 6206 Cunningham Highway, Kalbar Queensland, properly described as Lot 3 and Lot 4 on SP192221.

The proposed ERA is defined as ERA 53 (a) – Organic Material Processing of more than 200 tonnes per annum by composting.

1.1 Purpose of Environmental Assessment Report

The purpose of this Environmental Assessment Report (EAR) is to provide an overview of the proposed Environmental Authority application incorporating information to address the minimum application requirements prescribed under Section 125 of the EP Act, which are:

- An assessment of the likely impact of the proposed activity on the environmental values, including:
  - a description of the environmental values likely to be affected by the proposed amendment; and
  - details of any emissions or releases likely to be generated by the proposed amendment; and
  - a description of the risk and likely magnitude of impacts on the environmental values; and
  - details of the management practices proposed to be implemented to prevent or minimise adverse impacts; and
- A description of the proposed measures for minimising and managing waste generated by the relevant activity.

1.2 Background

Kalfresh propose to develop land surrounding its current vegetable processing facility located in Kalbar to create a rural enterprise precinct. The SRAIP will create a place where primary rural activities and secondary rural industry activities are located within proximity to each other and transport links to form a hub for the local food production industry. The current concept plan for the precinct is provided in **Appendix A,** including the location of the proposed composting activity.

The SRAIP will occupy a total of 40 hectares of land with the proposed composting activity utilising 15.4 ha (separate to the 40 hectare SRAIP) located in the northwest portions of Lot 3 and Lot 4 SP192221 (refer to **Appendix A** and **B**). The proposed composting facility lots are comprised as follows:

- Lot for windrow pad (A) – 3.92 hectares
- Lot for windrow pad (B) lot – 2.57 hectares
- Lot for feedstock holding bay – 2.08 hectares
- Lot for plant and equipment storage, parking, office amenities, waste storage and dam – 2.72 hectares
- Lot for finished product storage – 1.5 hectares
- Lot for unspecified activities – 1.66 hectares

It is noted the above areas total 14.45 hectares.

Kalfresh currently undertakes a small-scale composting operation over part of the subject area.

The balance of the area is currently used for grazing which shall be developed to accommodate multiple compost pads, feedstock holding bays and other associated infrastructure across an area. Surrounding land to the north and east (i.e. topographically downgradient of the subject area) is owned and operated by Kalfresh for cropping and grazing. Land to the south and west is also used for grazing by Kalfresh (Lot 2 RP44024) and private landholders. A hard rock quarry is located ~ 100 m northwest of the subject area.

1.3 Compositing Activity Details

Production of up to 50,000 tonnes per annum (tpa) of total (finished) compost product is proposed as part of the overall SRAIP concept to provide high quality organic fertiliser for existing crop production within the precinct and other cropping by Kalfresh and independent local producers.

The activity will utilise typical open windrow composting methods from feedstocks including green waste, wood chip, vegetable waste, anaerobic digestion liquid and solid fraction, ~~chicken litter~~ and used mushroom substrate. All material that requires shredding or sorting to be suitable for composting shall be imported in pre-processed forms negating the need for onsite shredding or sorting.

Chicken Manure was previously proposed as a feedstock to this Composting Activity. Since lodgement of the RDAIR, Kalfresh confirm this feedstock is not longer proposed to be utilised as solid digestate from the AD facility will be used instead. This report has been updated to reflect this change. Chicken Manure has been removed from Table 2 and Table 3 of this report. All other volumes of feedstocks remain unchanged.

The activity will not be utilising a GORE cover system which was a preliminary design option. Whilst a GORE cover can increase the rate of compost production, the organic composting methods described above will better suit Kalfresh's operational requirements.

1.4 Infrastructure, Plant and Equipment

Descriptions of the infrastructure, plant and equipment directly associated with the activity are summarised in **Table 1.** An indicative site layout showing fixed infrastructure is provided in **Appendix B.**

Table 1 Summary of Infrastructure, Plant and Equipment

Infrastructure, plant and equipment	Details
Compost pads	Windrow Pad (A) 3.92 ha and Pad (B) 2.57 ha constructed by expansions of existing southwest pad by cut-fill within the subject area. Pads shall be constructed with ~~a low permeability~~ impervious base and wearing layer (gravel / rock) with leachate collection system.
Feedstock holding bays	Open bays of 2.08 ha constructed as part of the windrow pads.
Finished product storage	Open storage area of 1.51 ha constructed by expansion of existing northeast windrow pad by cut-fill within the subject area.
Plant and equipment storage & maintenance	Onsite storage on constructed hardstand area. Existing maintenance facilities located at Kalfresh processing complex on Cunningham Highway.
Leachate containment system (LCS)	LCS incorporating: – Impervious leachate barrier system – 100 % separation of leachate and stormwater – minimum design capacity for one-in-ten ARI (24 hour) storm events plus additional desired storage for leachate reuse and/or evaporation.
Stormwater management system	Stormwater drainage and basin incorporating: – 100 % separation leachate and stormwater – minimum design capacity for one-in-ten ARI (24 hour) storm events – spillway design for 50 year ARI critical event.

Windrow turner	Task specific windrow turner as per below examples. Output capacity of each machine shall vary to produce windrow height and width based on pad area target productivity rates. Start-up phase shall utilise trailer turner (~ 1 x 1.8 m H/W) driven by standard tractor (e.g. 70 – 150 hp). Expansion phase shall utilise self-propelled turner (~ 2.0 m x 5.5 m H/W) to achieve higher productivity rates.   Tractor-assisted trailer windrow turner (left), self propelled windrow turner (right).
Front end loader	Standard front-end loader (e.g. small-wheel loader – 3 – 5 m^3 bucket)
Tanker truck(s)	Standard water tanker style truck(s) with two-way pumping system.
Body (tip) trucks	Standard body trucks (e.g. 13 – 25 t dual axle, truck & dog or semi tippers)
Ancillary equipment	Portable pumps and hoses (e.g. 2inch flex-drive)

1.5 Feedstock quantities and compost productivity rates

The maximum productivity rate for the activity shall be up to 50,000 tpa of total compost product based on approximately 65% conversion of the feedstocks to be utilised, as detailed in **Table 2**. Digestate liquid fertiliser shall be added as required for compost wetting to maintain optimum windrow moisture. At peak capacity the activity will produce 4 – 5 batches of 10,000 t – 12,500 t per annum based on a typical 12 week composting period per batch.

Table 2 Feedstock Summary

Feedstock	Approx. quantity (tpa)	Primary source	Category – potential environmental impact
Green waste	Up to 46,000	Municipal green waste – tub ground Wood chip – local tree loppers	Low
Digestate solid fraction	Up to 25,000	SRAIP anaerobic digestor	Low ~~– medium~~
Vegetable ~~food~~ waste	Up to 9,000	SRAIP processing facilities	~~Low –~~ Medium
~~Chicken litter~~	~~Up to 5,500~~	~~Local producers~~	~~Low - medium~~
Mushroom substrate	Up to 5,500	Local producers	Low

Table notes

Feedstock category (potential environmental impact) derived from Guideline: Open windrow composting under environmentally relevant activity 53(a) - organic material processing by composting (DES 2018)

1.6 Feedstock and product handling

All feedstock and finished product shall be placed directly into open holding bays with leachate collection located in the southwest portion of the subject area (**Appendix C**). Basic construction details of the holding bays are provided below.

Under Schedule 1 of the *Model operating conditions ERA 53(a)—Organic material processing by composting* (ESR/2015/1665 Version 4.00) all proposed feedstock types have a Low or Medium Odour Rating, and do not require to be received and stored in an enclosed system.

Weltec has assessed the odour risk of the solid digestate feedstock, and has determined that it has an Odour Risk Category of 'Low'. This assessment has been provided in Appendix C.3.5 Odour Potential of Solid Digestate for composting activity – odour risk rating assessment.

Following further queries form the regulator, additional investigations were undertaken to confirm the odour potential of Liquid Digestate (proposed to supplement compos wetting) would similarly have an Odour Risk Category of 'Low'. Refer to appendix D for an overview of the justification in this instance.

Vegetable waste will predominantly be comprised of waste organic matter from the factories operating within the precinct. For example, poor quality or incorrectly shaped carrots that are rejected from the processing facility, would be routinely utilised by in this feedstock stream.

Feedstock materials shall be imported to the site by supplier operated trucks (i.e. green waste, ~~chicken litter~~, and mushroom substrate), or relocated internally by Kalfresh operated trucks from SRAIP processors and AD facility (i.e. digestate solid fraction, and vegetable waste). All feedstocks shall be subject to strict acceptance criteria including pre-processing (shredding and sorting) prior to receipt at the composting site.

Onsite storage of raw materials shall be necessary to acquire enough feedstock to supply the next batch of compost. Proposed storage quantities and timeframes for each feedstock at any given time are provided in **Table 3**, which take into consideration quantities required, availability, and leachate and odour risks associated with specific materials.

Table 3 Feedstock storage – maximum quantities and holding times

Feedstock	Approx. quantity (t)	Holding time (weeks)
Green waste	Up to 7,500	Cumulatively up to 14 weeks
Digestate solid fraction	Up to 2,500	1 - 2 days – imported from AD storage building as required
Vegetable ~~food~~ waste	Up to 1,500	Cumulatively up to 4 weeks
~~Chicken litter~~	~~Up to 1,000~~	~~Cumulatively up to 4 weeks~~
Mushroom substrate	Up to 1,000	Cumulatively up to 14 weeks

On commencing a new compost batch, a loader, or similar plant, shall be used to transfer feedstock from the holding bays to the composting pads for mixing and windrow formation by a windrow turner. Finished product shall be transferred from the compost pad(s) into stockpile as soon as practicable following completion of the composting cycle. A loader, or similar plant, shall be used to load Kalfresh or customer operated trucks with the finished product for on-site or external use.

1.7 Windrow preparation and blending

All feedstocks will be tested for C:N ratio and the feedstock ratios will be calculated to ensure that the C:N ratio of the aggregate mixture is within the 25-30:1 target ration.

Green waste will be laid out in lines with front end loader (FEL) first. Feedstocks will be blended as per calculations by 'patting down' wood chips with the FEL and laying calculated quantities of additional feedstocks along the length of the windrow to achieve the target C:N ratio. The windrow turner will then pass over the feedstocks to blend and lay out windrow. Further blending will occur during subsequent windrow turns.

Blending ratios will be subject to change depending on feedstock availability however will abide by the following rules:

- C:N ratio between 25-30:1
- Digestate solid fraction to green waste/wood chips ratio between 1:3 and 1:4

Documented standard operating procedures (SOP) will be prepared for the operator which aligns with the methodologies specified above, and the conditions set within the environmental authority.

1.8 Windrow turning and pasteurisation

Windrow turning and pasteurisation shall follow the process detailed in AS 4454-2012: Composts, soil conditioners and mulches, as summarised below:

- Windrows will be turned at least four times to ensure all material is exposed to at least 55ºC for three consecutive days and for at least 15 days during the composting period.
- Windrows will be wetted while turning to reduce dust and bioaerosols (Figure 1)
- Temperature will be monitored using a temperature gauge and data logged.
- When the internal windrow temperature has been maintained for three consecutive days above 55ºC the windrow will be turned.
- Water or liquid digestate is added, from both the facility runoff (onsite leachate and/or stormwater) and bulk water supply (if required), to ensure moisture content of between 40% and 60% is maintained.
- The compost is windrowed at the above temperature requirements and turned for a minimum of 12 weeks.
- Once the pasteurisation process is complete the material will be stockpiled for internal use, or sale.

Figure 1. Compost is wetted during turning to reduce dust

1.9 Compost area design and construction

Operational areas for the compost pads, holding bays and finished product storage shall be constructed with ~~low permeability~~ impervious bases and walls as part of the overall leachate barrier and collection system (LCS). The concept layout of the site (**Appendix B**) has been designed to maintain separate leachate collection and stormwater management systems to the extent practicable.

Design and construction standards and principles of these and other key environmental aspects of the activity's establishment and operation such as site access, waste storages are discussed in Section 6.

2 RELEVANT ENVIRONMENTAL LEGISLATION

Key legislation relevant to the activity is detailed below:

- *Biosecurity Act 2015*
- *Environmental Protection Act 1994*
- *Environmental Protection Regulation 2019*
- *Environmental Protection (Water and Wetland Biodiversity) Policy 2019*
- *Bremer River environmental values and water quality objectives Basin No 143 (part) including all tributaries of the Bremer River 2010*
- *Environmental Protection (Air) Policy 2019*
- *Environmental Protection (Noise) Policy 2019*
- *Environmental Protection (Regulated Waste) Amendment Regulation 2018*
- *Land Protection (Pest and Stock Route Management) Act 2002*
- *Nature Conservation Act 1992*
- *Vegetation Management Act 1999*
- *Water Act 2000*
- *Waste Reduction and Recycling Act 2011.*

2.1 Relevant standards and guidelines

The following documents describe standard and guidelines applicable to the activity:

Erosion & Sediment Control

- Best Practice Erosion and Sediment Control (IECA 2008)
- Environmental Management Systems
- AS ISO 14001: 2016 – Environmental Management Systems
- AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines

Feedstock and end-product quality

- AS 4454-2012: Composts, soil conditioners and mulches
- Determination of Acceptable Levels of Preservative Treated Timber in Timber Reuse Applications (J. Hann et.al. 2010)

Hazardous materials

- AS 1940: 2004 – The storage and handling of flammable and combustible liquids
- Managing risks of hazardous chemicals in the workplace – Code of Practice (SWA 2018)

Noise

- Noise Measurement Manual (ESR/2016/2195, DEHP 2013a)

Water quality

- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018)*
- *AS/NZS 5667-1998: Water quality – Sampling*
- *Monitoring and Sampling Manual (DES 2018a)*
- *Queensland Water Quality Guidelines (DEHP 2013b)*
- *Guideline: Environmental Protection (Water and Wetland Biodiversity) Policy ~~2009~~ 2019 - Deciding aquatic ecosystem indicators and local water quality guidelines (DES ~~2018b~~2022)*

Technical guidelines – application / activity requirements

- *Guideline: Open windrow composting under environmentally relevant activity 53(a) - organic material processing by composting (DES 2018c)*
- *Guideline: Application requirements for activities with waste impacts (DES 2019)*
- *Guideline: Application requirements for activities with impacts to water (DES 2017a)*
- *Guideline: Application requirements for activities with noise impacts (DES 2017b)*
- *Guideline: Application requirements for activities with impacts to land (DES 2017c)*
- *Guideline: Application requirements for activities with impacts to air (DES 2017d)*
- *Guideline: Noise Control - Planning for Noise Control (DEHP 2015)*
- *Guideline: Odour Impact Assessment from Developments (DEHP 2013c)*
- *Compost guideline (EPA 2013)*

3 EXISTING ENVIRONMENTAL VALUES

The desktop assessment involved a review of relevant environmental documents, databases, scientific journals, books, technical reports, maps and legislation (Commonwealth, State and Local) to identify the environmental values that potentially occur within and surrounding the project area. This review included an assessment of the following information:

- Aerial Photograph Interpretation (API) to determine the broad categorisation of vegetation within and surrounding the site and to review the extent of historical clearing and land use, and any other significant environmental features such as watercourses and wetlands.
- Regional Ecosystem and Essential Habitat mapping.
- Protected Matters database of Matters of State and National Environmental Significance (MSES and MNES).
- Queensland Globe online mapping tool.
- Review of relevant legislation and associated plans and policies, including but not limited to the EP Act, NC Act, VM Act, EPBC Act and Water Act.
- Other existing reports and databases.

3.1 Site Description

Site and allotment details are provided in **Table 4** below and a Locality Plan is provided in **Figure 2.** The proposed Site Layout Plan is provided in **Appendix A.**

Table 4 Site and allotment detail

Aspect	Detail	
Local Government	Scenic Rim Regional Council (SRRC)	
Zoning	Rural	
Address	6200 – 6206 Cunningham Highway, Kalbar, Queensland	
Real property description	Lot 3 SP192221	Lot 4 SP192221
Area in hectares (ha)	48.93	61.16
Current land use and site structures	The primary use of the subject area is cattle grazing. A portion of the land (~ 1.7 ha) is used for small-scale composting of organic material.	
New land use	Organic material processing by composting	
Surrounding land uses	The primary use of the surrounding area is farmland for growing and processing vegetables and cattle grazing. The main structures located along Cunningham Highway operate as a distribution centre to wash, sort and process vegetables for bulk sale. A quarry is located ~ 100 m to the northwest at the nearest point.	

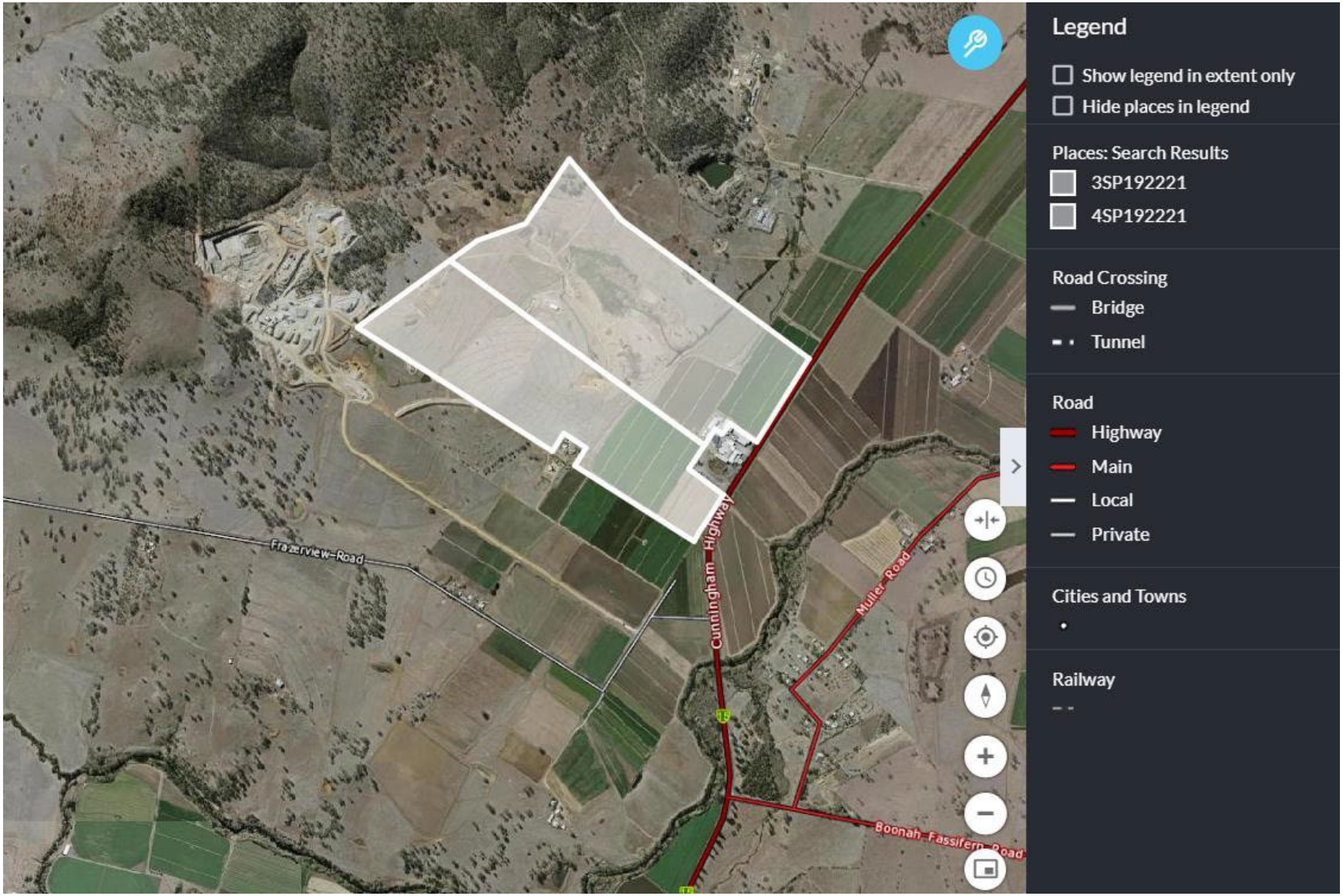


Figure 2. Locality Plan

3.2 Site characteristics

A summary of the physical characteristics is provided in **Table 5** below.

Table 5 Physical characteristics of the subject area

Aspect	Detail
Subject area	15.4 ha
Site elevation	Qld Globe contour layer indicates site elevations of 90 – 120 m AHD
Slope (%)	Gently – moderate inclined (~10 %)
Slope aspect	Downward to the northeast
Q10 and Q100 flood levels	80 – 83 m AHD (Q10 and Q100)*
Vegetation	Short grass
Exposure	High sun and wind exposure

* Developed flood level (6/12 hr critical duration) nearest to subject area (Sourced Cardno 2019).

3.3 Soil characteristics

A site inspection was conducted by Precise Environmental on 21 October 2019 which included the sampling and analysis of soils at onsite locations outside, yet representative, of the subject area.

3.3.1 Soil type

Four boreholes were constructed by Precise Environmental using a hand auger to a maximum depth of 0.9 m in the area proposed for effluent irrigation (BH1 and BH2), and 0.6 m in the proposed digestate liquid fertiliser (DLF) irrigation area (BH3 and BH4) adjacent to the subject area. The soil profiles observed were consistent with other onsite observations at open cut borrow pits at the site.

The encountered soil profiles were as follows:

BH1

- 0.0 – 0.1 m (Natural) Silty Sand, fine to medium grained sand, grey brown, moist.
- 0.1 – 0.6 m Clayey Gravelly Sand, fine to medium sized angular gravel, fine to medium grained sand, yellow brown, moist.
- 0.6 m – Borehole terminated in extremely weathered granite.

BH2

- 0.0 – 0.6 m (Natural) Light to Medium Clay, grey with orange mottles, moist.
- 0.6 – 0.9 m Clayey Sand, fine to medium grained sand, yellow brown, moist.
- 0.9 m – Borehole terminated extremely weathered rock.

BH3

- 0.0 – 0.6 m (Natural) Light to Medium Clay, with trace of fine to medium grained sand, orange, moist.
- 0.6 m Extremely weathered bedrock (granite).

BH4

- 0.0 – 0.4 m (Natural) Light to Medium Clay, with trace of fine to medium grained sand, orange, moist.
- 0.4 – 0.8 m Medium Clay, with trace of fine to medium grained sand, occasional gravel and weather granite fragments, brown, moist.
- 0.8 m Extremely weathered bedrock (granite).

3.4 Geology and hydrology

Geology details for the site and surrounds are provided in **Table 6**. Hydrology characteristics are detailed in **Table 7.** Mapped water courses and groundwater bores are shown in **Figure 2** below.

Table 6 Regional geology

Aspect	Detail
Acid sulfate soil	There is no acid sulfate soil mapping associated with this site.
Geology	The geology across the site is mapped as 1:500,000 as Quaternary: Flood plains, river terraces (Geological Survey of Queensland, Moreton Geology 1978). Local soil mapping 1:25,000 shows the site classified as Bromelton (eroded phase) with soils comprising dark clay loam or light clay with neutral or alkaline structured clay subsoil (Qld Department of Primary Industries 1979).

Table 7 Hydrology Details of the Site and Surrounds

Aspect	Detail
Direction of stormwater drainage	Stormwater is expected to follow the natural contour of the gullies flowing northeast from the subject area to low-lying land towards the centre of the SRAIP development area (Figure 2). Water draining from the soak shall flow to the overland (stormwater) flow path to be constructed around western perimeter of the proposed SRAIP subdivision. This drainage line will flow north through SRAIP land and adjacent properties before flowing east under Cunningham Highway to Warrill Creek.
Flooding	The site is mapped as low to high flood hazard. The composing area is not mapped as a flood hazard.
Onsite surface waters	Numerous ephemeral gullies are located on the site which are expected to flow seasonally or in a heavy rain event – which flows to Warrill Creek ~2.6 m northeast. These gullies converge at the low-lying land towards the centre of the SRAIP development area which is permanently inundated from process water from the existing vegetable processing facility which is circulated (recycled) in various areas of the site areas for agriculture irrigation purposes. There are also several dams located in the northern portion of the site. The closest dam to the composting area is 535 m east.
Onsite groundwater bores	There are five onsite operational bores located within Lot 2 SP192221 which are associated with the existing Kalfresh processing facility; the nearest of these is located 830 m from the composting area. A non-operational bore exists in Lot 2 and another in Lot 3 SP192221.

Onsite records indicate a standing water level (SWL) of ~ 10 m below ground level (BGL) in one of the shallow bores (total depth - 16.3 m) which would draw from the alluvial aquifer based on local registered bore reports.

3.5 Regional Climate

The site is located in the Kalbar region and experiences above average daytime temperatures, overnight temperatures, wind speed, rainfall and numbers of clear days. Humidity levels and numbers of cloudy days are average.

Summer in Kalbar is between December and February and maximum daily temperatures average between 30.3 and 31.1°C with overnight minimums averaging between 18.4 and 19.6°C. Summer days are very warm, averaging around 31.1 °C in the hottest months. Sunscreen, hat and plenty of water recommended.

Winter is between June and August and maximum daily temperatures average between 21.1 and 22.5°C with overnight minimums averaging between 5.4 and 7°C. Winter days in Kalbar are moderate but can be moderately cool if windy, dropping to around 21.1 °C.

A summary of the regional climatic statistics is shown in **Table 8** below.

Table 8 Summary of Regional Climate Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	115.4	119.9	85.7	54.2	52.4	46.8	37.2	28.3	33.1	73.4	80.9	119.3
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean min	31.2	30.5	29.4	27.2	24.1	21.6	21.3	22.9	25.7	27.8	29.6	30.8
Mean max	19.6	19.5	17.8	14.0	10.0	7.1	5.3	6.2	9.5	13.3	16.3	18.4

Source: Bureau of Meteorology for Amberley (AMO) (Station 04004)

3.6 Sensitive Receptors

Sensitive receptors are located a minimum 600 m from the site, refer to **Figure 3** below and summarised in **Table 9.**

Table 9 Sensitive receptor locations

Sensitive Receptor	Location
Nearest residential dwellings	14 dwellings ≥ 600 m from subject area
Nearest commercial activities	Surrounding cropping and grazing Adjoining quarry (southwest) Fertiliser supply activity (~ 600 m east) Proposed SRAIP industrial precinct allotments (≥ 400 m southeast)

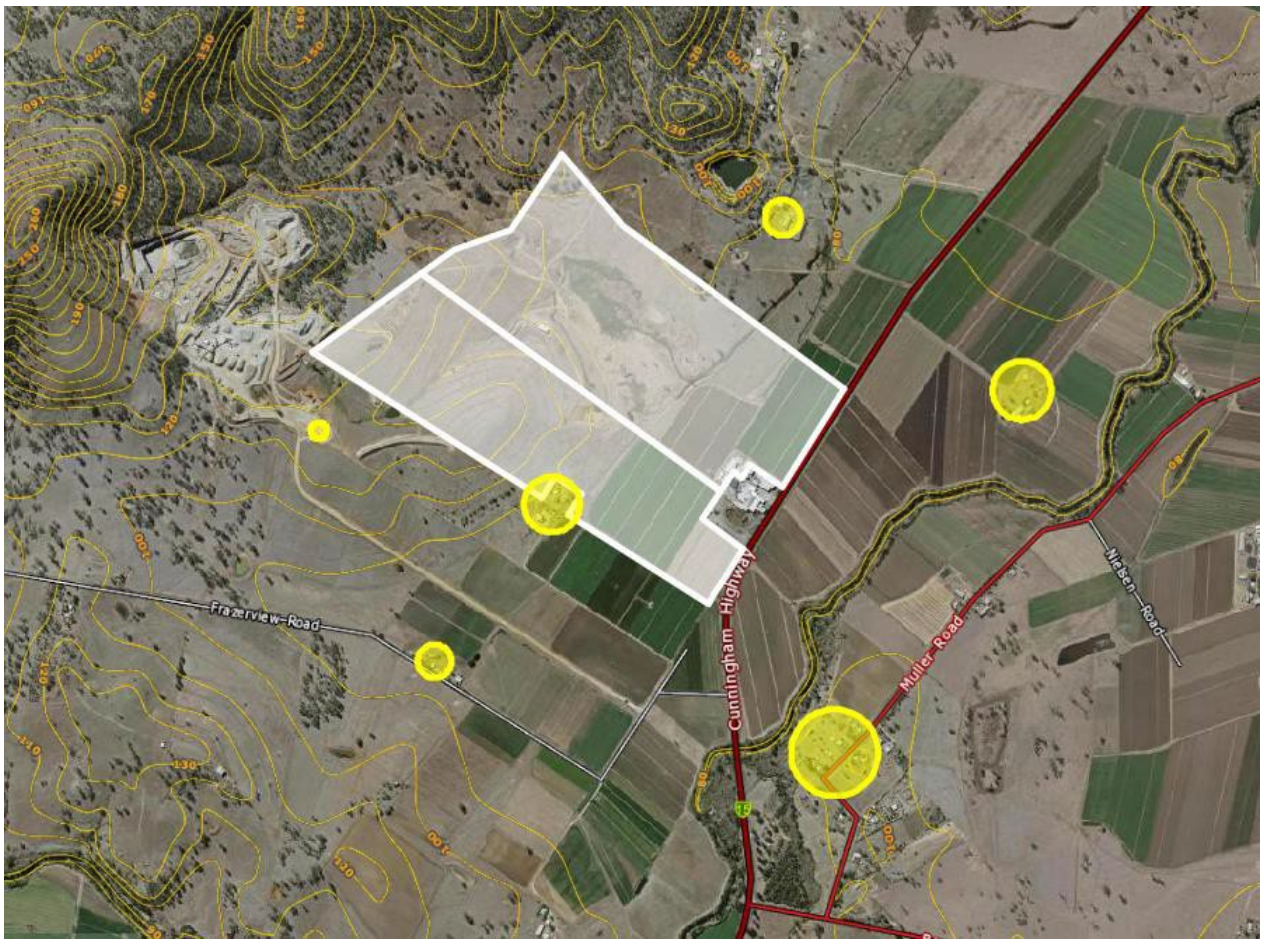


Figure 3. Sensitive Receptors (Yellow areas are sensitive receptors)

3.7 Air Quality

The land surrounding the site comprises extractive industry uses, agriculture/rural uses, and rural residential/lifestyle uses.

Sensitive receptors are presented in **Figure 3** above.

Wind speed and direction data collected at Amberley Aero weather station (BOM reference 04004) is the closest wind direction data available for the site. Average 9am and 3pm wind roses indicate that the prevailing wind direction is southerly, up to 10km/h, refer to **Figure 4** and **Figure 5** below.

The ambient air quality for the area is influenced primarily by agricultural activities and existing extraction activities.

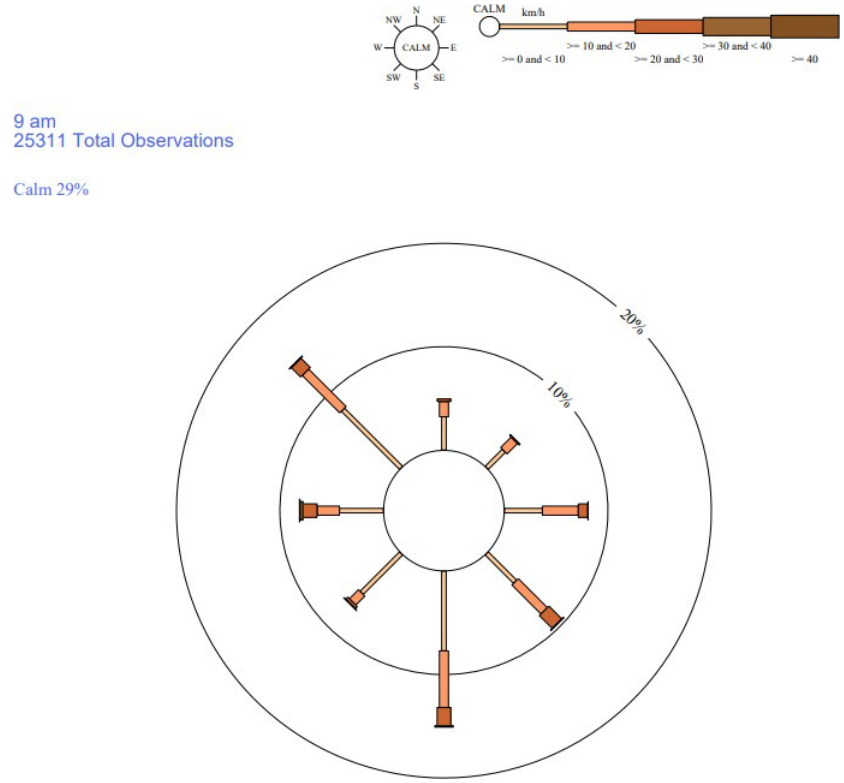


Figure 4. 9am Rose of Wind Direction versus speed in km/hr (Amberley AMO – BOM 2022)

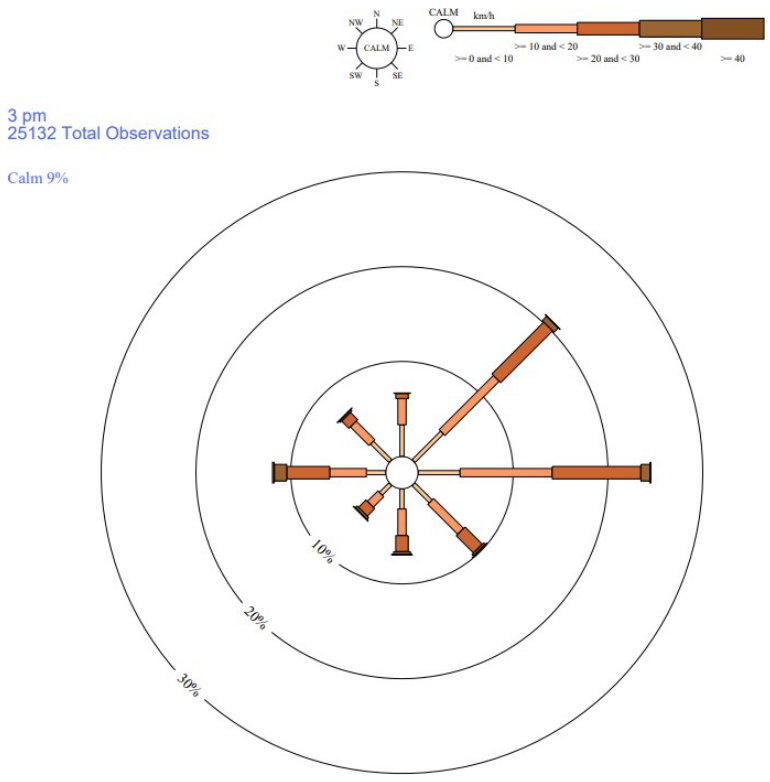


Figure 5. 3pm Rose of Wind Direction versus speed in km/hr (Amberley AMO – BOM 2022

3.8 Surface water quality

Baseline water quality data for downstream waters is not currently available, however, **Table 10** below summarises the ~~water quality objective of~~ types of receiving surface waters within the vicinity of the site.

Table 10 ~~Water Quality Objectives of Surface Waters~~ Receiving Surface Waters

Wetland protection area	None mapped within a 5 km radius.
Downstream Water Act defined watercourses	Warrill Creek is a defined watercourse for the purposes of the Water Act.
Downstream dams and other waterbodies	Two dams exist along the watercourse draining from the SRAIP sites northeast corner, approximately 1.3 km downstream. The dam proposed for onsite use as part of the SRAIP development is located 65 southeast.
Groundwater dependant ecosystem	The ephemeral gully and Warrill Creek are mapped as 'surface GDE areas' (81-100% derived GDE – moderate confidence) - alluvial aquifers with permanent / near permanent connection between surface water and groundwater. Surface expression GDEs (e.g. wetlands, regional ecosystems) are dependent on the discharge of groundwater to maintain their ecological processes / communities.
Fish habitat and marine parks	None mapped within a 5 km radius.

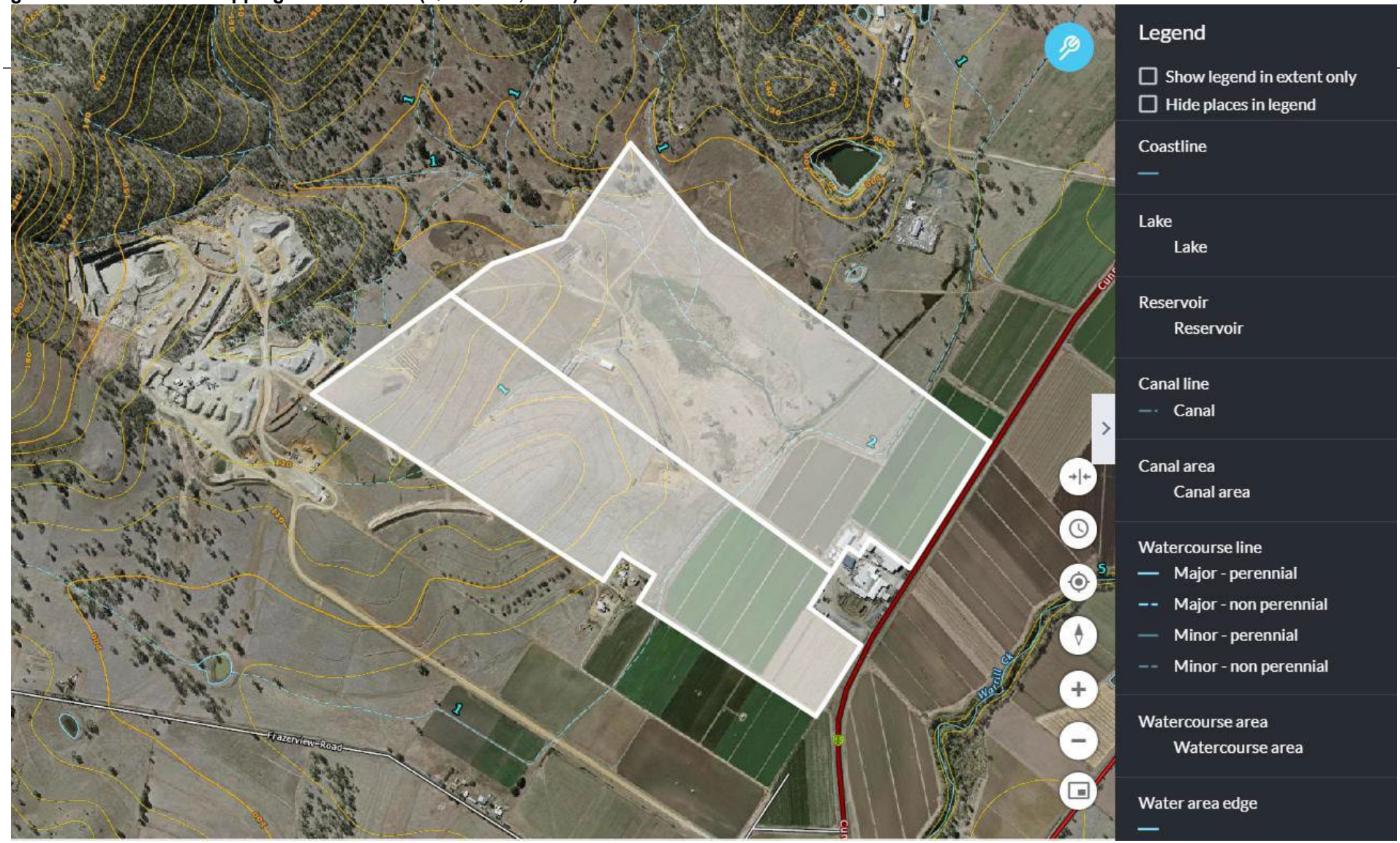
The watercourses onsite and immediately downstream are tributaries of Warrill Creek mapped as lowland freshwaters of middle Warrill Creek, refer to **Figure 6** below. The Bremer River environmental values and water quality objectives Basin No 143 (part) including all tributaries of the Bremer River (EHP 2010) applies to these watercourses. The environmental values (EVs) for groundwater in the Bremer River catchment include

- Aquatic ecosystem,
- irrigation,
- farm supply/use,
- stock and drinking water.

The Environmental Values for middle Warrill Creek – lowland freshwater include:

- Aquatic ecosystem,
- irrigation,
- farm supply/use,
- stock water,
- human consumer,
- primary/secondary/visual recreation,
- drinking water and
- cultural/spiritual values.

Figure 6. Watercourse mapping and contours (Qld Globe, 2022)



3.9 Groundwater quality

Baseline water quality data for the region is summarised in **Table 11** below and shown in **Figure 7**.

Table 11 Registered Groundwater bores

Registered groundwater bores in the locale (Queensland Globe)			
Nearest bores to feature with relevant information	RN138334 – within Lot 2 1.1 km southeast	RN14310270 1.3 km east	RN124727 1.4 km southeast
Status	Existing	Existing	Existing
Use / past use	Water supply	Sub-artesian monitoring	Water supply
Borehole depth (m)	141.7 m	17.3 m	518.0 m
Screen depth (m)	129.5 – 141.7 m	14.9 – 15.9 m	No data
Soil profiles	Varying clay gravel profiles from 0.0 – 15.8 m. Underlying material comprises granite, basalt, shale to the total depth.	0.0 – 12.1 m clay; underlain by gravel to 15.8 m. Basal from 15.8 – 17.3 m.	0.0 – 15.0 m clay; 15.0 – 36.0 sandstone and tuff. 36.0 – 518.0 m mixture of basalt, coal, sandstone and shale.
Water bearing zone / upper aquifer depth	134.7 m	12.1 m	36.0 m
SWL (m)	17.7 m	2.05 - 6.24 m	10.0 m
Upper aquifer status	Confined in basalt	The pressure head indicates this is a confined / semi-confined aquifer.	Semi-confined to confined.
Quality detail - bore card	EC 1800 µS/cm (saline)	No data.	Described as ‘Potable’ in aquifer section.

SWL = standing water level
EC = electrical conductivity

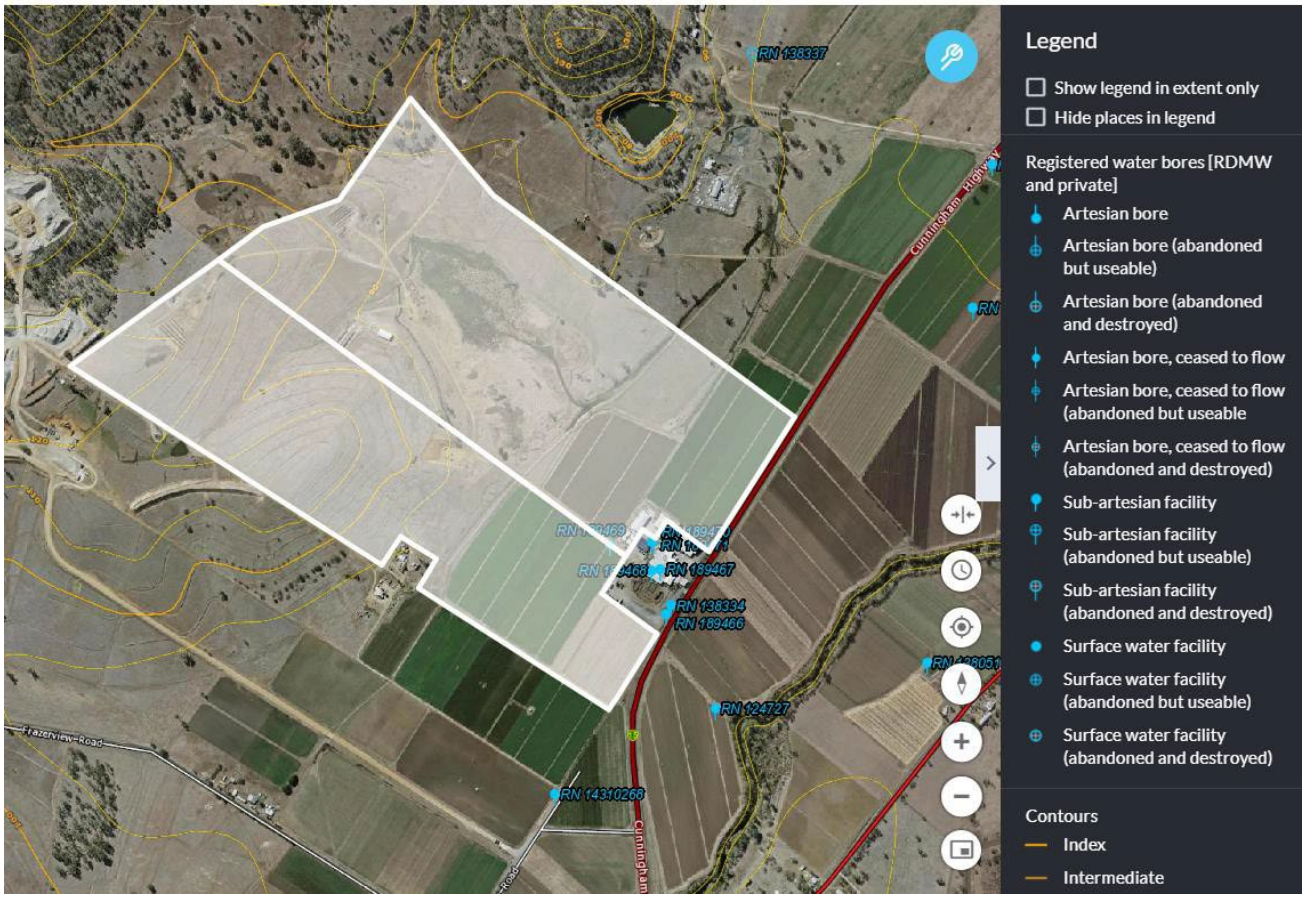


Figure 7. Groundwater Monitoring Bore Locations (Qld Globe, 20220)

3.10 Flora and Fauna

3.10.1 Regulated Vegetation – Regional Ecosystems

Remnant vegetation communities (Category A and Category B) and high value regrowth (Category C) in Queensland are classified by Regional Ecosystem (RE) for the administration of the VM Act. Sattler and Williams (1999) describe regional ecosystems as:

"Communities of vegetation that are consistently associated with a particular combination of geology, landform and soil in a bioregion".

Regional ecosystem mapping of the subject land is presented in **Figure 8** which shows that the site is mapped as non-remnant vegetation.

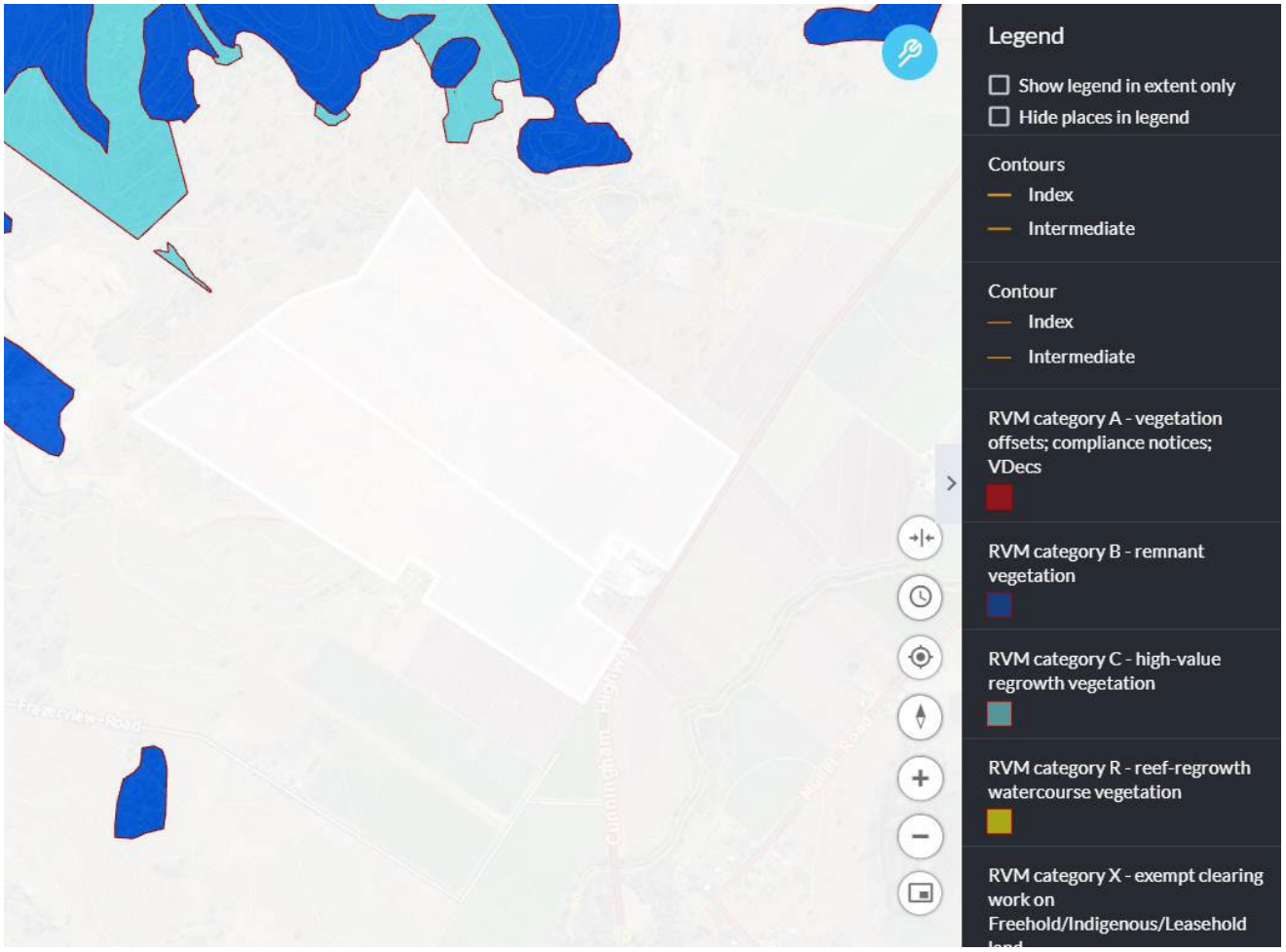


Figure 8. Regional Ecosystems Mapping

3.10.2 Matters of State Environmental Significance

The Matters of State Environmental Significance mapped on the site is limited to MSES Regulated Vegetation due to a defined Watercourse, refer to **Figure 9**.

These areas were historically cleared and no vegetation is present on the watercourses.

As a result, there is no potential for habitat for fauna species.

Figure 9. MSES Mapping

4 ENVIRONMENTAL VALUES RISK ASSESSMENT

The following section describes risks to environmental values and likely magnitude of the impacts generated by the proposed development.

4.1 Risk Assessment Synopsis

The risk assessment adopted is a qualitative risk-based approach designed to assess risk based on the likelihood of an environmental impact or event occurring (refer to **Table 12** – Definitions of Likelihood), and the consequences of the occurrence on the surrounding environmental values (**Table 13**– Definitions of Consequence). The likelihood and consequences are scored between 1 and 5 for each potential impact or event. The risk assessment has been formulated considering potential for impact without control measures put in place to manage potential risk.

Table 12 Definitions of Likelihood

Rating	Descriptor	Score
Rare	May occur only in exceptional circumstances	1
Unlikely	Could occur but doubtful	2
Possible	Might occur at some point in the future	3
Likely	Will probably occur	4
Almost Certain	Is expected to occur in most circumstances	5

Table 13 Definitions of Consequences

Rating	Descriptor	Score
Negligible	Impacts not requiring any treatment or management action	1
Minor	Nuisance or insignificant environmental harm requiring minor management actions	2
Moderate	Serious environmental impacts, readily manageable at low cost	3
Major	Substantial environmental impacts, manageable but at considerable cost and some disruption	4
Catastrophic	Severe environmental impacts with major consequent disruption and heavy cost	5

Table 14 Risk Assessment Matrix

		Consequence of Said Impact				
Likelihood of an Environmental Impact		Negligible	Minor	Moderate	Major	Catastrophic
		1	2	3	4	5
Almost Certain	5	5 Medium	10 High	15 High	20 Extreme	25 Extreme
Likely	4	4 Low	8 Medium	12 High	16 High	20 Extreme
Possible	3	3 Low	6 Medium	9 Medium	12 High	15 High
Unlikely	2	2 Low	4 Low	6 Medium	8 Medium	10 High
Rare	1	1 Low	2 Low	3 Low	4 Low	5 Medium

The consequence and likelihood scores are then plotted on the risk assessment matrix, refer to **Table 14** above. The final risk level assigned is thus a product of the likelihood and consequence scores. The higher the risk score, the higher the priority is for management.

Table 15 describes the possible actions required for each risk assessment rating.

Table 15 Indicative Management Option for Risk Assessment Ratings

Risk Rating	Risk Rating Scores	Indicative Management Option
Extreme	16 - 25	Manage by implementing site management and emergency procedures, plant design controls and regular monitoring.
High	10 - 15	Manage by implementing site management procedures, specific monitoring, and may require some operation/plant design controls.
Medium	5 – 9	Manage by implementing specific monitoring or response procedures.
Low	1 - 4	Manage by routine procedures, unlikely to need specific application of resources.

4.2 Potential Environmental Impacts

Activities associated with the proposed development which have the potential to cause environmental harm and/or nuisance have been outlined in **Table 16.**

This risk assessment is limited to the potential for the activity to impact upon the existing environmental values and does not consider any pre-existing approved impacts taking place on the site.

The identification of potential environmental impacts and associated risk matrix above has informed the control measures set out in Section 6.0 below. Where impacts are identified on an environmental value, mitigation measures have been implemented to reduce the potential impacts.

Table 16 Identification of Potential Impacts on Environmental Values

Element	PCCoC	Potential exposure pathways	PSR potentially exposed to adverse impacts	Risk ratings	
				Unmitigated	Mitigated
Feedstock	Chemical contaminants from green waste - timber preservatives, other heavy metals and residual (modern) pesticides, and tannins Chemical contaminants from digestate Chemical contaminants from mushroom substrate - heavy metals Pathogens – all feedstocks Nutrients (leachable)	Onsite leaching to: – soil – surface water – groundwater	*Refer 'Leachate'*		
	Air emissions (particulates / dust)	Airborne release	Refer MWA 2020a	Medium	Low
	Offensive odour emissions	Airborne release	Refer MWA 2020a	High	Medium
	Weed seed / propagules	Wind	Viability of adjacent agricultural land	High	Medium
			Surrounding ecological EVs (MSES essential habitat)	High	Medium
		Leachate releases to land / waters	*Refer 'Leachate'*		
		Compost use	*Refer 'Compost'*		
	Fire ants	Spreading (onsite)	Surrounding land / crop (value / viability)	High	Low
			Surrounding ecological EVs (MSES essential habitat)	High	Low
		Compost use	*Refer 'Compost'*		
	Foreign matter (e.g. metal, plastics)	Compost use	*Refer 'Compost'*		
	Fire (spontaneous combustion)	Spreading	Neighbouring properties	High	Low
			Surrounding ecological EVs (MSES essential habitat)	High	Low

Element	PCCoC	Potential exposure pathways	PSR potentially exposed to adverse impacts	Risk ratings	
				Unmitigated	Mitigated
Compost	Feedstock chemical contaminants and pathogens	Land application of end-product (Compost use)	Land / crop (value / viability)	High	Low
			Food consumer (health)	Medium	Medium
			Downstream surface water users (water quality)	High	Low
			Downgradient groundwater users (water quality)	Medium	Low
			Downstream ecological EVs	High	Low
	Feedstock chemical contaminants and pathogens, and leachable nutrients	Leaching (onsite stored product)	*Refer 'Leachate'*		
	Air emissions (particulates / dust)	Airborne release	Refer MWA 2020a	Medium	Low
	Offensive odour emissions	Airborne release	Refer MWA 2020a	Medium	Low
	Weed seed / propagules	Wind	Viability of adjacent agricultural land	High	Low
			Surrounding ecological EVs (MSES essential habitat)	High	Low
		Leachate releases to land / waters	*Refer 'Leachate'*		
		Compost use	Applied land / crop (value / viability)	High	Low
			Potential ecological EVs surrounding applied land	High	Low
	Fire ants	Spreading (onsite)	Surrounding land / crop (value / viability)	High	Low
			Surrounding ecological EVs (MSES essential habitat)	High	Low
		Compost use	Land / crop (value / viability / amenity)	High	Low

Element	PCCoC	Potential exposure pathways	PSR potentially exposed to adverse impacts	Risk ratings	
				Unmitigated	Mitigated
			Surrounding ecological EVs (MSES essential habitat)	High	Low
	Foreign matter (e.g. metal, plastics)	Compost use	Land / crop (value / viability)	Medium	Low
			Food consumer (health)	Low	Low
Compost	Fire (spontaneous combustion)	Spreading	Neighbouring properties	High	Low
			Surrounding ecological EVs (MSES essential habitat)	High	Low
Leachate	Feedstock chemical contaminants and pathogens Nutrients Biological oxygen demand (BOD) Chemical oxygen demand (COD)	Leachate releases to land / waters	Surrounding land / crop (value / viability)	Medium	Low
			Downstream surface water users (water quality)	High	Low
			Downgradient groundwater users (water quality)	Medium	Low
			Downstream ecological surface water EVs	High	Low
			Downgradient ecological groundwater EVs	Medium	Low
	Offensive odour emissions	Airborne release	Refer MWA 2020a	High	Medium
Stormwater	Suspended sediment, sheens / films, litter	Runoff	Downstream ecological surface water EVs	High	Low
Compost mixing / turning	Air emissions (particulates / dust)	Airborne release	Refer MWA 2020a	Low	Low
	Offensive odour emissions	Airborne release	Refer MWA 2020a	Medium	Medium
Plant & Equipment	Air emissions (particulates / dust)	Airborne release	Refer MWA 2020a	Low	Low
	Offensive noise emissions	Airborne release	Refer MWA 2020a	Low	Low
	Nuisance noise	Air vibration	Refer MWA 2020b	Low	Low
	Leaks and spills (fuels and oils)	Releases to land / waters	Adjacent land and downstream waters	Medium	Low

5 ENVIRONMENTAL OBJECTIVE ASSESSMENT

The following section assesses the proposed activity against the environmental objectives and performance outcomes for Air, Water, Wetlands, Groundwater, Noise, Waste and Land environmental values as per Schedule 8, Part 3 of the *Environmental Protection Regulation 2019* (EP Reg).

5.1 Air

The Environmental Objective for Air detailed within Schedule 8, Part 3, Division 1 of the EP Reg states:

> *"The activity will be operated in a way that protects the environmental values of air."*

Performance outcomes for Air as detailed in the EP Reg include:

1. There is no discharge to air of contaminants that may cause an adverse effect on the environment from the operation of the activity.

2. All of the following:

    a. Fugitive emissions of contaminants from storage, handling and processing of materials and transporting materials within the site are prevented or minimised;

    b. Contingency measures will prevent or minimise adverse effects on the environment from unplanned emissions and shut down and start up emissions of contaminants to air;

    c. Releases of contaminants to the atmosphere for dispersion will be managed to prevent or minimise adverse effects on environmental values.

The *Environmental Protection (Air) Policy 2019* (EPP (Air)) prescribes the environmental values that are to be protected or enhanced, which are:

a. The qualities of the air environment that are conducive to protecting the health and biodiversity of ecosystems;

b. The qualities of the air environment that are conducive to human health and wellbeing;

c. The qualities of the air environment that are conducive to protecting the aesthetics of the environment, including the appearance of buildings, structures and other property; and

d. The qualities of the air environment that are conducive to protecting agricultural use of the environment.

No measurement or monitoring of the background air quality has been carried out at sensitive receptors for the purpose of this application as no complaints have been received at the existing site to date. However, it is expected that air quality would be typical of the pre-existing agricultural activities and adjacent land uses (e.g. rural, residential, and agricultural).

Sources of air emissions from the proposed composting activity will be managed to reduce odour nuisance to sensitive receptors through strict feedstock acceptance criteria and compliance with the Australian Standard AS4454-2012.

5.2 Water

The Environmental Objective for Water detailed within Schedule 8, Part 3, Division 1 of the EP Reg states:

> "*The activity will be operated in a way that protects environmental values of waters*".

Performance Outcomes for Water as detailed in the EP Reg include:

1. There is no actual or potential discharge to waters of contaminants that may cause an adverse effect on an environmental value from the operation of the activity.

2. All of the following:

    a. The storage and handling of contaminants will include effective means of secondary containment to prevent or minimise releases to the environment from spillage or leaks;

    b. Contingency measures will prevent or minimise adverse effects on the environment due to unplanned releases or discharges of contaminants to water;

    c. The activity will be managed so that stormwater contaminated by the activity that may cause an adverse effect on an environmental value will not leave the site without prior treatment;

    d. The disturbance of any acid sulfate soil, or potential acid sulfate soil, will be managed to prevent or minimise adverse effects on environmental values;

    e. Acid producing rock will be managed to ensure that the production and release of acidic waste is prevented or minimised, including impacts during operation and after the environmental authority has been surrendered;

    f. Any discharge to water or a watercourse or wetland will be managed so that there will be no adverse effects due to the altering of existing flow regimes for water or a watercourse or wetland;

    g. For a petroleum activity, the activity will be managed in a way that is consistent with the coal seam gas water management policy, including the prioritisation hierarchy for managing and using coal seam gas water and the prioritisation hierarchy for managing saline waste;

    h. The activity will be managed so that adverse effects on environmental values are prevented or minimised.

The environmental objective for water is proposed to be met via Performance Outcome 2.

The leachate containment system shall be designed by a suitably qualified engineer; the preliminary design for the leachate collection ponds (DAM 1, DAM 2, DAM 4) and stormwater management system is provided in **Appendix C**.

Construction and maintenance of all material handling pads shall incorporate an impervious leachate barrier and collection system designed by a suitably qualified engineer. Basic design principles shall include:

- separation of drainage from material handling pads (leachate) and other operational areas (stormwater) to the extent practicable

- bunding and/or catch drains, ~~low permeability~~ impervious base and walls. An impervious barrier means a barrier with a thickness of at least 600 mm with an *in-situ* permeability (K) of less than 10^{-9} ms^{-1}

- clay- or synthetically-lined leachate ponds with a minimum design capacity for at least one-in-ten ARI (24 hour) storm events plus additional desired storage for leachate reuse and/or evaporation.

Integrity of the LCS shall be routinely inspected by the Composting Supervisor, and maintained as required.

A nil release approach under typical weather conditions shall be adopted under the SBMP. This shall involve the following management hierarchy (in order of preference) for collected leachate:

- onsite reuse for compost wetting
- evaporation
- collection and reuse at the AD facility if possible
- collection by a licensed contractor for lawful disposal offsite.

The mitigated risk of adverse impacts to surface water and groundwater has been assessed as low based on the following:

- Impervious leachate barriers to be incorporated in construction of the compost pads and leachate collection system.
- Clayey soil profile and relatively shallow bedrock expected across the subject area based on information for the adjacent land.
- Depth to the upper water bearing zone (WBZ) and depth of overlying confining strata based on records for registered bores located on the low-lying adjacent land, which indicate the depth to local WBZ is at least 10 m BGL and confined below bedrock and/or > 10 m of clay soil (Refer Table 5) – additional bores the aquifer is much deeper
- Local GDE are mapped as surface expression GDE – i.e. Potential contaminant pathways are groundwater to surface water (not vice versa) which is mitigated by the leachate barrier and containment system
- The potential contaminants from the composting system are limited to nutrients, and the likelihood of these leaching into adjacent surface water and groundwater is very low if the proposed mitigation measures are implemented.

Accordingly, a routine surface water and groundwater monitoring program is unlikely to be required. If required, the program would comprise a reactive program for monitoring of PCCoC (Section 4) for inclusion in the SBMP. The program shall only be implemented as a reactive measure following receipt of complaints or where releases of leachate to the environment occur.

~~A program for visual and quantitative surface waters monitoring of PCCoC (Section 4) shall be prepared as part of the SBMP. The program shall include both routine monitoring, and event based monitoring for exceptional circumstances where releases of leachate to the environment occur.~~

The reactive water quality monitoring program (if required) shall be overseen by a suitably qualified person who shall review and report on monitoring results which respect to potential adverse environmental impacts and requirements for preventive and corrective actions.

As there is no acid sulphate soil or potential acid sulphate soil present on site and no acid producing rock, no mitigation measures have been proposed to manage the potential for adverse effects on environmental values from these.

The stormwater management system shall be designed by a suitably qualified engineer; the preliminary design for the stormwater basin (DAM 3) and drainage system is provided in **Appendix C.** The stormwater system shall incorporate the following design principles:

- separation of leachate and stormwater to the extent practicable
- basins and drainage shall be designed with a minimum capacity for one-in-ten ARI (24 hour)

storm events

- sediment storage capacity in accordance with industry best practice standards
- basin spillways designed for 50 year ARI critical event.

Where leachate and stormwater catchments are connected, or in the event stormwater becomes impacted by leachate the resultant water shall be managed as leachate.

Reuse of collected stormwater within the SRAIP shall be prioritised for compost wetting, dust suppression and crop irrigation.

~~A program for routine and event based visual and quantitative surface waters monitoring shall be prepared as part of the SBMP. The monitoring program shall be overseen by a suitably qualified person who shall review and report on monitoring results which respect to potential adverse environmental impacts and requirements for preventive and corrective actions.~~

5.3 Wetlands

The Environmental Objective for Wetlands detailed within Schedule 8, Part 3, Division 1 of the EP Reg states:

"*The activity will be operated in a way that protects the environmental values of wetlands*".

Performance Outcomes for Wetlands as detailed in the EP Reg include:

1. There will be no potential or actual adverse effect on a wetland as part of carrying out the activity.

2. The activity will be managed in a way that prevents or minimises adverse effects on wetlands.

The *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP (Water)) defines wetland as an area shown as a wetland on the 'Map of Queensland wetland environmental values', published on the department's website. The 'Map of Queensland wetland environmental values' is a statewide statutory map under the EPP (Water) which identifies wetlands of high ecological significance (HES) and general ecological significance (GES) across the state. HES wetlands are identified as MSES under the Planning and Environmental Offsets legislation.

There are no HES wetlands within the receiving environment, therefore the application will achieve the environmental objective for water through Performance Outcome 1.

5.4 Groundwater

The Environmental Objective for Groundwater detailed within Schedule 8, Part 3, Division 1 of the EP Reg states:

"*The activity will be operated in a way that protects the environmental values of groundwater and any associated surface ecological systems.*"

Performance Outcomes for Groundwater as detailed in the EP Reg include:

1. Both of the following apply:

   a. There will be no direct or indirect release of contaminants to groundwater from the operation of the activity;

   b. There will be no actual or potential adverse effect on groundwater from the operation of the activity.

2. The activity will be managed to prevent or minimise adverse effects on groundwater or any associated surface ecological systems [1]

[1] Note: Some activities involving direct releases to groundwater are prohibited under section 41 of the EP Regs.

The potential for interaction with groundwater is considered low. The leachate containment system shall be designed by a suitably qualified engineer; the preliminary design for the leachate collection ponds (DAM 1, DAM 2, DAM 4) and stormwater management system is provided in **Appendix C**.

Construction and maintenance of all material handling pads shall incorporate an impervious leachate barrier and collection system designed by a suitably qualified engineer. Basic design principles shall include:

- separation of drainage from material handling pads (leachate) and other operational areas (stormwater) to the extent practicable
- bunding and/or catch drains, ~~low permeability~~ impervious base and walls. An impervious barrier means a barrier with a thickness of at least 600 mm with an *in-situ* permeability (K) of less than 10^{-9} ms^{-1}
- clay- or synthetically-lined leachate ponds with a minimum design capacity for at least one-in-ten ARI (24 hour) storm events plus additional desired storage for leachate reuse and/or evaporation.

Integrity of the LCS shall be routinely inspected by the Composting Supervisor, and maintained as required.

A nil release approach under typical weather conditions shall be adopted under the SBMP. This shall involve the following management hierarchy (in order of preference) for collected leachate:

- onsite reuse for compost wetting
- evaporation
- collection and reuse at the AD facility if possible
- collection by a licensed contractor for lawful disposal offsite.

The application will achieve the environmental objective for groundwater through Performance Outcome 2 as the activity will be managed to prevent or minimise adverse effects on groundwater or any associated surface ecological systems.

5.5 Noise

The Environmental Objective for Noise detailed within Schedule 8, Part 3, Division 1 of the EP Reg states:

"*The activity will be operated in a way that protects the environmental values of the acoustic environment*".

Performance Outcomes for Noise as detailed in the EP Reg include:

1. Sound from the activity is not audible at a sensitive receptor.
2. The release of sound to the environment from the activity is managed so that adverse effects on environmental values, including health and wellbeing and sensitive ecosystems, are prevented or minimised.

The *Environmental Protection (Noise) Policy 2019* (EPP (Noise)) prescribes the environmental values that are to be protected or enhanced, which are:

a. The qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems;

b. The qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following:

   i. Sleep;

   ii. Study or learn; or

   iii. Be involved in recreation, including relaxation and conversation; and

c. The qualities of the acoustic environment that are conducive to protecting the amenity of the community.

Modelling of noise emissions has predicted the activity can comply with the acoustic quality objectives of the *Environmental Protection (Noise) Policy 2019* (MWA 2020b). The assessment was based on measured sound power levels for comparable plant with standard emission controls.

The operator shall therefore adopt typical best practice noise controls including, yet not limited to, the following:

- Operations shall be restricted to approved hours, if required.
- Selection of plant and equipment which offer value for money noise reduction technology, where possible.
- Avoiding use of oversized plant and equipment.
- Implementing, where feasible, alternative work practices which generate less air and/or noise emissions, for such as use of electric equipment instead of fuel powered equipment.
- Scheduling noisy activities around times of high background noise (local road traffic or when other local noise sources are active), to the extent practicable.
- Repair and maintain plant and equipment in good working order, including fitting of noise suppression mufflers (if required).
- Where possible throttling down or shut down equipment used intermittently.
- Keeping panels and covers of silenced plant shut.
- ~~Day-to-day~~ Daily monitoring of activities for potential nuisance noise.

5.6 Waste

The Environmental Objective for Waste detailed within Schedule 8, Part 3, Division 1 of the EP Reg states:

"*Any waste generated, transported, or received as part of carrying out the activity is managed in a way that protects all environmental values*".

Performance Outcomes for Waste as detailed in the EP Reg include:

1. Both of the following apply:

   a. Waste generated, transported or received is managed in accordance with the waste and resource management hierarchy in the *Waste Reduction and Recycling Act 2011* (WRRA); and

   b. If waste is disposed of, it is disposed of in a way that prevents or minimises adverse effects on environmental values.

Waste and recoverable resources associated with the activity are limited to non-conforming product,

reject feedstock (where not returnable to the supplier), leachate, general solid waste associated with plant and equipment and personnel, and liquid waste from the site amenities.

The SBMP shall incorporate procedures for waste management and resource recovery based on the avoid, reduce, reuse, recycle, recover, dispose hierarchy. Previous sections outline control measures for avoiding management of reject feedstock, and managing potential bulk waste including non-conforming product and leachate.

The following outlines key control measures on which the procedures shall be based:

- Waste storage and management shall be limited to designated areas.
- All solid waste material will be transported from the site via a waste contractor on a regular basis as part of the Kalfresh processing facility contract.
- All materials shall be collected and disposed of by a DES licensed operator.
- Reusable or recyclable materials will be separated onsite into dedicated bins/areas, where practicable, for either reuse onsite or collection by a contractor and transport to off-site facilities.
- Where practicable, and where materials cannot be separated on-site, they will be sorted off-site by a contractor.
- Materials packaging waste will be returned to suppliers where possible.
- All waste and recyclables will be stored in appropriate covered receptacles secure from wildlife or vermin. Receptacles shall be of sufficient capacity for site activities and visitor numbers, and situated at appropriate locations onsite.
- All wastewater from the site shall be transferred to the proposed SRAIP STP and managed in accordance with the associated SBMP.

5.7 Land

The Environmental Objective for Land detailed within Schedule 8, Part 3, Division 1 of the EP Reg states:

"*The activity is operated in a way that protects the environmental values of land, including soils, subsoils, landforms and associated flora and fauna*".

Performance Outcomes for Land as detailed in the EP Reg include:

1. There is no actual or potential disturbance or adverse effect to the environmental values of land as part of carrying out the activity.
2. All of the following apply:
    a. Activities that disturb land, soils, subsoils, landforms and associated flora and fauna will be managed in a way that prevents or minimises adverse effects on the environmental values of land;
    b. Areas disturbed will be rehabilitated or restored to achieve sites:
        i. That are safe and stable;
        ii. Where no environmental harm is being caused by anything on or in the land; and
        iii. That are able to sustain an appropriate land use after rehabilitation or restoration;
    c. The activity will be managed to prevent or minimise adverse effects on the environmental values of land due to unplanned releases or discharges, including spills and leaks of contaminants; and

d. The application of water or waste to the land is sustainable and is managed to prevent or minimise adverse effects on the composition or structure of soils and subsoils.

The Environmental Objective for land is proposed to be met via Performance Outcome 1.

Storage of hazardous materials (HAZMAT) within the subject area is not intended. Should HAZMAT storage be required appropriate control measures based on applicable standards and codes of practice (Section 1.7) shall be incorporated into relevant SOP(s) and/or ECP(s).

6 RISK MITIGATION AND CONTROL MEASURES

Kalfresh have prepared a preliminary environmental management plan for composting that includes the following:

- Environmental Commitments
- Roles and Responsibilities of all involved
- Management of Environmental Values including air, water, noise, waste and land etc
- Inductions and training
- Emergency Response
- Complaints
- Incident Management.

6.1.1 Environmental Commitments

Kalfresh Vegetables is a business that has good farming techniques at its core. It's a business run by farmers, with a constant focus on the needs of our customers. The owners control all decisions, from seed selection, through to harvest, packing and distribution.

They are passionate about creating the freshest, tastiest, nutrient-rich produce possible. Their farming philosophy is driven by the belief that a happy plant is a healthy plant. Over the years they've honed our farming system to ensure it is environmentally sustainable and that our soil health is excellent.

Their sustainable farming system ensures the health and viability of our soil and of our crops.

6.1.2 Roles and Responsibilities

Key roles and responsibilities for implementation are detailed in **Table 17**.

Table 17 Responsibilities of key personnel

Position	Responsibilities and authorities
Chief Executive Officer (CEO)	Primary person responsible for preparation and implementation of the SBMP. Compliance with environmental requirements of the operation, including all applicable legislation, and consent conditions. Development and maintenance of standard operating procedures (SOP) and environmental control procedures (ECP). Training, awareness and competency of activity personnel. Communicating and directing the above to operation staff including activity management, site workers, sub-contractors and suppliers as applicable. Allocation of resources. Corrective and preventative action including emergency preparedness and response. Reporting and investigating any environmental non-conformances, complaints, incidents/emergencies or breach of approval conditions to the appropriate authorities.

	Environmental record management and reporting. Monitoring and review of environmental performance, and improvement opportunities.
Composting Supervisor (CS)	On-the-ground implementation of the SBMP. Assisting the CEO and HR Manager in training, awareness and competency of operation personnel. Assisting the CEO in monitoring and review of environmental performance, and improvement opportunities. Supervision of feedstock acceptance – criteria and management. Waste and resource recovery management. Servicing and maintenance of plant and equipment. Inspection and monitoring. Site maintenance.
Human Resources (HR) Manager	Assisting the CEO and CS in training, awareness and competency of operation personnel.
Purchasing Manager	Communication and implementation of feedstock acceptance criteria for imported material.

6.1.3 Training and Inductions

All operation personnel, including sub-contractors, shall receive awareness training (induction) in the environmental risks, and specific environmental requirements, of the composting activity relevant to the persons activities and responsibilities. Records of induction shall be maintained.

Information about the environmental aspects of the activity is to be communicated by:

- discussing the SBMP during induction and at refresher sessions
- initiating monthly toolbox discussions on environmental performance.

After the induction the person shall be aware of the following with respect to their involvement in the project:

- understanding the requirements of the SBMP and the individual's role
- site operating and environmental procedures
- environmental incident emergency response procedures
- an outline of the potential consequences of not meeting their environmental responsibilities.

The selection of persons for specific roles shall ensure competency levels are well matched to the employee responsibilities. Supplementary training shall be provided as required to ensure competency levels are established and maintained at appropriate levels for a person's designated responsibilities.

Where technical expertise beyond that of existing operation personnel is required the operator shall engage persons suitably qualified and experience in the relevant field.

6.1.4 Standard operating and environmental control procedures

The SBMP to be prepared for the activity shall include SOPs and/or ECPs addressing, yet not limited to, the following aspects of the activity:

- Pad inspection and maintenance
- Plant and equipment inspection and maintenance
- Compost blending and production (windrow management)
- Feedstock management (including acceptance criteria)
- Leachate management
- Stormwater management.

The documented procedures shall detail control measures, monitoring program/s and performance objectives for environmental and public health elements including, yet not limited to:

- Air emissions
- Noise emissions
- Odour emissions
- Spontaneous combustion
- Surface water quality
- Weed and pest management
- Waste and resource recovery
- Finished product – quality / contaminant levels.

6.1.5 Incidents and corrective action

Corrective action shall be undertaken where a site or operational condition that does not comply with the performance indicators stated in the SBMP (i.e. an incident) is identified.

A Corrective Action Request (CAR) shall be logged in a CAR register to ensure the matter is properly addressed in a timely manner. The status of CARs shall be routinely reviewed by the CEO and updated on a weekly basis, or shorter timeframe where required by the CAR.

Where necessary, investigation of the root cause and subsequent impacts of significant incidents shall be initiated by the CEO. This shall involve a review of operational procedures and control measures, and environmental monitoring (if required). Environmental monitoring shall be undertaken where necessary to assess potential impacts, address complaints which cannot be amicably resolved in an efficient manner, or where requested by regulatory authorities.

Where requested, any CAR registered in accordance with this SBMP shall be provided to a regulatory authority or other person, consensually or as lawfully required.

6.1.5.1 Complaints

Complaints received in relation to operational activities shall be logged in the CAR register and managed in general accordance with the corrective action requirements described above, as appropriate to the nature of the complaint.

All public complaints shall be validated and appropriately responded to in a timely manner. The complainant shall be notified of completed corrective actions.

All records of complaints and associated investigations shall be available for inspection by relevant authorities upon request.

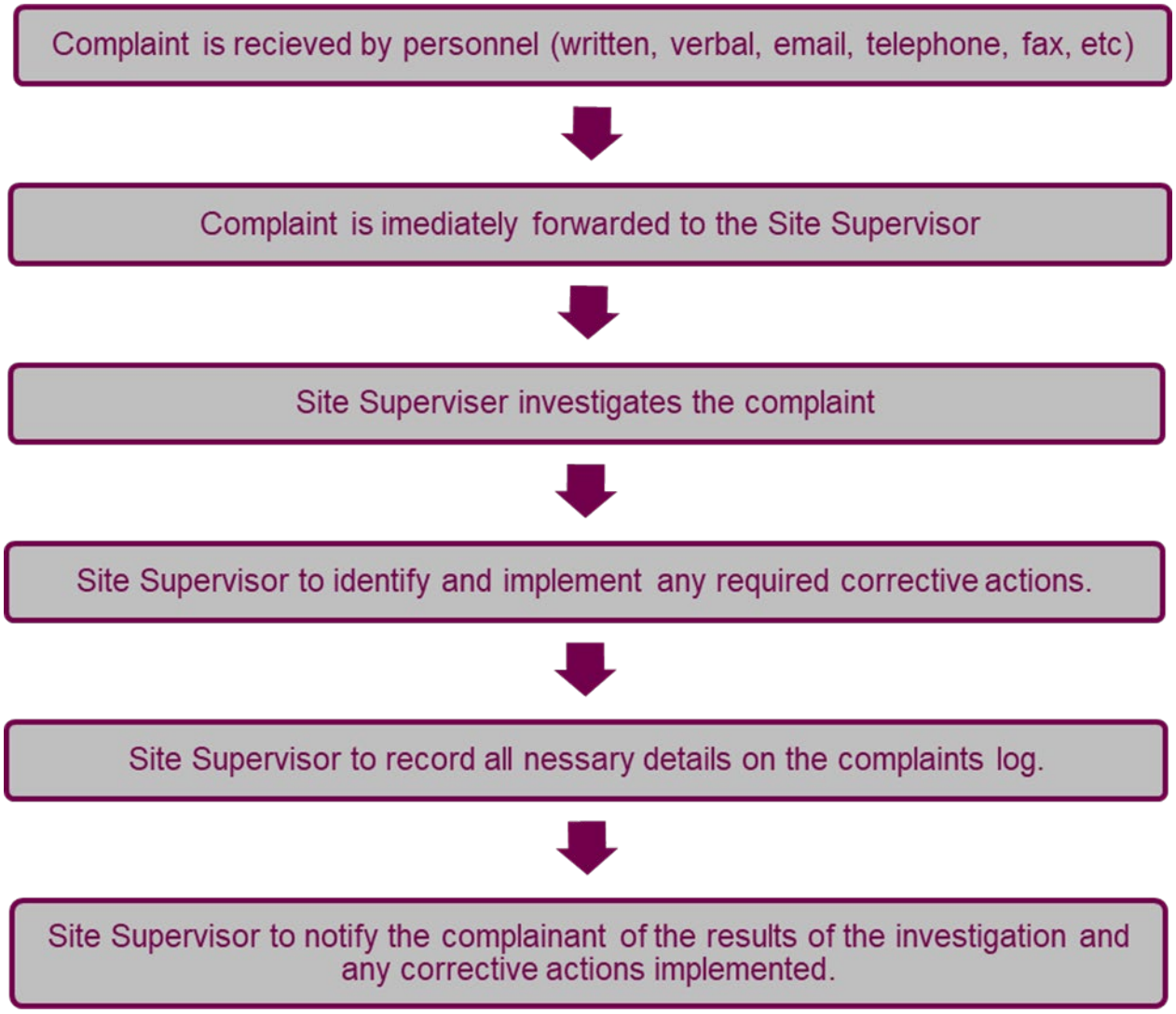


Figure 10 Complaints Procedure

6.1.5.2 Reporting and notification of incidents and complaints

All staff and sub-contractors are responsible for immediately notifying their direct supervisor of an environmental incident, who will in turn notify the CEO.

Records of incidents and complaints (i.e. other than trivial matters) shall be detailed in a Corrective Action Report form and logged in the CAR Register. The CAR will include, as a minimum:

- date and time of incident / non-compliance / complaint
- contact details of the person(s) who detected or notified the matter
- nature of the matter and potential impacts
- outcomes of any investigation of the matter
- details of the corrective actions undertaken.

6.1.5.3 Reporting environmental harm to regulatory authorities

DES shall be notified of any incident which has caused, or may cause, material or serious environmental harm (refer Terms & Abbreviations). The CEO is responsible for notifying DES of the nature and circumstance in which the event happened and potential environmental impacts.

Notification shall be made to DES immediately via the Pollution Hotline, and subsequently in writing via email as soon as practical but within 24 hours of becoming aware of a breach.

The following information must be obtained for notification purposes:

- name of person who identified the incident and person responsible for completing the notification
- name and telephone number of a designated contact person
- quantity and substance released
- person(s) involved
- the location and time of the release
- the suspected cause of the release
- a description of the effects of the release
- the results of any monitoring performed in relation to the release
- conclusions formed and actions taken to mitigate any environmental harm caused by the release
- proposed actions to prevent a recurrence of the release.

6.1.6 Record management

Records must be stored in a safe and secure manner which limits the potential for deterioration, damage or loss for a minimum of 5 years. Records to be maintained shall include:

- induction register including persons trained, date of training, trainer and summary of training delivered
- daily / weekly inspection reports, checklists, diary entries
- material origin, inspection and testing records demonstrating conformance with feedstock acceptance criteria, and compost quality objectives
- leachate and water quality monitoring results
- correspondence relating to environmental management matters
- incident and corrective action register
- non-conformance reports and / or correspondence regarding environmental incidents
- results, analysis and corrective actions
- waste tracking records
- records of compliance with relevant approvals
- other records identified in the environmental sub-plans and control procedures.

The above project records shall be made available to relevant authorities on request.

6.1.7 Environmental monitoring and review

Monitoring of compliance and general performance will be achieved through a program of inspection, sampling and analysis detailed in the SBMP. All monitoring shall be recorded and maintained in accordance with Section 5.1.6. Results of the environmental monitoring program shall be reviewed at least monthly.

The compost quality monitoring program shall comply with AS 4454-2012: Composts, soil conditioners and mulches.

Due to the low environmental risk that the proposed composting system poses to surface water and groundwater, a routine monitoring program is not required. However, if a complaint is received regarding potential surface water or groundwater issues, or where releases of leachate to the environment occur, a reactive surface water and/or groundwater monitoring program shall be implemented. The reactive monitoring ~~The surface water monitoring~~ shall incorporate the following elements:

- Methodologies based on Monitoring and Sampling Manual (DES 2018a) and AS/NZS 5667-1998: Water quality – Sampling

- ~~Development of site-derived WQOs based on select locations immediately upstream and downstream compost activity area with reference to Guideline: Environmental Protection (Water and Wetland Biodiversity) Policy 2009 2019 - Deciding aquatic ecosystem indicators and local water quality guidelines (DES 2018b 2022)~~

- ~~Routine and event based monitoring at select upstream (background) and downstream (impact) locations to monitor potential adverse impacts on downstream waters~~
- Assessment of water quality results against relevant WQOs for Warril Creek and 'other freshwater tributaries' as specified in the Bremer River environmental values and water quality objectives, until such time as site-derived WQOs have been established

- Assessment of water quality results against relevant WQOs for Warril Creek and 'other freshwater tributaries' as specified in the Bremer River environmental values and water quality objectives as per the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 and Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018).

- ~~Adoption of Guideline: Environmental Protection (Water and Wetland Biodiversity) Policy 2009 2019 - Deciding aquatic ecosystem indicators and local water quality guidelines (DES 2018b 2022) for the assessment of potential water quality impacts, and guidance from Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) where further investigation of potential water quality impacts is identified.~~

The Environmental Risk Assessment Register and SBMP (where appropriate) shall be reviewed on an as required basis guided by the environmental monitoring and CAR processes, yet no greater than every two years, to ensure the SBMP remains effective in achieving environmental objectives and performance targets.

6.2 Management Measures

6.2.1 Feedstock and Compost

Implementation of strict feedstock acceptance criteria and management (Section 5.2.2) shall provide a line of preventive measures against chemical and biological (i.e. pathogens and pests) contamination of the feedstock and finished product.

The composting methodology shall adopt processes and management measures described in AS 4454-2012: Composts, soil conditioners and mulches to ensure effective pasteurisation and finished product quality, to further mitigate risks to environmental receptors and food consumers.

A program for in-process monitoring and product validation shall be prepared as part of the SBMP. The monitoring program shall be undertaken by the Composting Supervisor (or delegate) to ensure conformance with AS 4454-2012 and best practice management. Visual monitoring for pest species (e.g. fire ants,

restricted plants) shall be on arrival of feedstock and then routinely (e.g. weekly minimum); this shall include both operational and surrounding areas. Finished product quality shall be validated prior to land application by Kalfresh use or sale through qualitative sampling and analysis based on the requirements and performance criteria specified in AS 4454-2012.

Non-conforming product shall be either treated to ameliorate parameters not complying with the adopted performance criteria, restricted for use under conditions that do not present a significant risk to the environment or public health, or lawfully disposed of offsite.

6.2.2 Feedstock acceptance - criteria and management

Quality management procedures for feedstock acceptance shall be developed as part of the SBMP incorporating, yet not limited to, the quality control strategies summarised in **Table 18**.

Table 18 Feedstock Acceptance Criteria

Feedstock	Control / acceptance criteria
All feedstocks	~~The Digestate Management Plan has included the following:~~ Contamination Removal: • The operator shall inspect the load and visually determine the contamination level within the load. • Manual removal shall be conducted on loads deemed to contain less than 10% contamination. • If the load is deemed to have a percentage contamination greater than 10% the Operations Manager / Site Engineer / Quality Officer must be contacted and the load may be rejected. This decision is at the discretion of the Operations Manager / Site Engineer / Quality Officer. • Where possible, the truck delivering the substrate does not unload and is turned away (>10% contamination). • The operator shall sift through the load, removing all inorganic material by hand and place the material in the 60 litre bins provided. (<10% contamination) • Each bin filled shall be counted and recorded. • The percentage contamination shall then be calculated for the load. • Removal of contaminants through macerator screening unit during solid handling process
Digestate liquid and solid fraction	Compliance with resource quality criteria of End of Waste Code Digestate (EOWC 010001054) or as non-conforming product for restricted use in compost activity.

Green waste (including wood chip)	Materials shall not be sourced from high-risk sites including, yet not limited to: – Waste or resource recovery facilities other than designated green waste handling areas (nominally municipal green waste management areas) – Airports, defence land or other areas potentially impacted by aqueous Film-Forming Foams (AFFF) or other potential Per- and polyfluoroalkyl substances (PFAS) containing substances – Fire ant restricted areas. Documented memorandum of understanding with suppliers regarding prohibition of unsuitable feedstocks (refer 'All feedstock') all and return to supplier policy

Table notes

1) As defined by the *Biosecurity Act 2014*
2) Refer PE 2020

6.3 Air and odour emissions

~~Air quality modelling was incomplete at the time this report was prepared. Regardless of these model outcomes~~ The activity shall adopt typical best practice air quality controls as a minimum including, yet not limited to, the following:

- Selection of plant and equipment which offer value for money air emission reduction technology, where possible.
- Avoid use of oversized plant and equipment.
- Avoiding dust generating activities during high wind conditions.
- Instigate control methods on polluting machinery and activities.
- Implement where feasible alternative work practices which generate less air and/or noise emissions, for such as use of electric equipment instead of fuel powered equipment.
- Repair and maintain plant and equipment in good working order.
- Where possible throttling down or shut down equipment used intermittently.
- Enforcement of speed limits that minimise dust generation.
- Maintenance, repair and wetting of access tracks to minimise dust.
- Routine monitor trucks leaving the site to ensure all loads are appropriately covered and tracking of soil onto external roads is minimised.
- Day-to-day monitoring of activities for potential nuisance air emissions.

6.3.1 Bioaerosols

Bioaerosols are airborne particulates and/or water droplets that may contain bacteria, fungi and fungal spores, pathogens or other microorganisms. As such, control measures for mitigating impacts from bioaerosols are similar to those used for controlling dust, for example:

- Outdoor dust-generating infrastructure (e.g. stockpiles and windrows) and equipment (e.g. grinders and screeners) are positioned in a part of the premises where their impact to sensitive receptors is minimised. This includes siting in a location furthest away from sensitive receptors and using topographical features or buildings to achieve shielding from the wind
- Sprinkler/misting systems must be fitted on outdoor dust-generating equipment such as grinders, screeners and windrow turners. High-pressure misting systems, where situations allow, are preferable to sprinkler systems (or hosing). This is because smaller water droplets in the misting systems have a greater surface area and greater capacity to bind onto and settle dust particles.
- All truckloads transporting feedstock, un-bagged finished compost product and residual physical contaminants (see Glossary) into or out of the premises must be covered.
- Stockpiles and windrows must be maintained in a damp state to prevent dust liftoff.

A study into the impacts from bioaerosols from composting activities was undertaken for the Phoenix Power Recyclers site in Yatala in 2017 (Department of Science, Information Technology and Innovation 2017). The Phoenix site is comparable in size to the proposed SRAIP compositing activities, as they manufacture in excess of 50,000 m^3 of finished compost per annum.

Results from the monitoring program indicated that bioaerosols generated by the composting facility do not present a health hazard in the local area. Bioaerosol and particle concentrations measured in this program did not exceed relevant health-based guidelines. Furthermore, bioaerosol dispersion from the composting facility appeared limited to within 350 to 500 m of the site (DSITI 2017). The site accepted the following general waste

streams at the time:

- Shredded green waste
- Animal effluent and residues
- Grease trap waste
- Sewage sludges and residue including nightsoil and septic tank sludges
- Liquid waste
- Residues from industrial waste treatment/disposal operations

6.4 Noise emissions

Modelling of noise emissions has predicted the activity can comply with the acoustic quality objectives of the Environmental Protection (Noise) Policy 2019 (MWA 2020b). The assessment was based on measured sound power levels for comparable plant with standard emission controls.

The activity shall therefore adopt typical best practice noise controls including, yet not limited to, the following:

- Operations shall be restricted to approved hours, if required.
- Selection of plant and equipment which offer value for money noise reduction technology, where possible.
- Avoiding use of oversized plant and equipment.
- Implementing, where feasible, alternative work practices which generate less air and/or noise emissions, for such as use of electric equipment instead of fuel powered equipment.
- Scheduling noisy activities around times of high background noise (local road traffic or when other local noise sources are active), to the extent practicable.
- Repair and maintain plant and equipment in good working order, including fitting of noise suppression mufflers (if required).
- Where possible throttling down or shut down equipment used intermittently.
- Keeping panels and covers of silenced plant shut.
- Day-to-day monitoring of activities for potential nuisance noise.

6.5 Leachate management

The leachate containment system shall be designed by a suitably qualified engineer; the preliminary design for the leachate collection ponds (DAM 1, DAM 2, DAM 4) and stormwater management system is provided in **Appendix C.**

Construction and maintenance of all material handling pads shall incorporate a leachate barrier and collection system designed by a suitably qualified engineer. Basic design principles shall include:

- separation of drainage from material handling pads (leachate) and other operational areas (stormwater) to the extent practicable
    - bunding and/or catch drains, ~~low permeability~~ impervious base and walls. An impervious barrier means a barrier with a thickness of at least 600 mm with an *in-situ* permeability (K) of less than 10^{-9} ms^{-1}
- clay- or synthetically-lined leachate ponds with a minimum design capacity for at least one-in-ten ARI (24 hour) storm events plus additional desired storage for leachate reuse and/or evaporation.

Integrity of the LCS shall be routinely inspected by the Composting Supervisor, and maintained as required.

A nil release approach under typical weather conditions shall be adopted under the SBMP. This shall involve the following management hierarchy (in order of preference) for collected leachate:

- onsite reuse for compost wetting
- evaporation
- collection and reuse at the AD facility, if possible
- collection by a licensed contractor for lawful disposal offsite.

A program for visual and quantitative surface waters monitoring of PCCoC shall be prepared as part of the SBMP. The program shall include both routine monitoring, and event based monitoring for exceptional circumstances where releases of leachate to the environment occur.

The water quality monitoring program shall be overseen by a suitably qualified person who shall review and report on monitoring results which respect to potential adverse environmental impacts and requirements for preventive and corrective actions.

6.6 Stormwater management

The stormwater management system shall be designed by a suitably qualified engineer; the preliminary design for the stormwater basin (DAM 3) and drainage system is provided in **Appendix C**. The stormwater system shall incorporate the following design principles:

- separation of leachate and stormwater to the extent practicable
- basins and drainage shall be designed with a minimum capacity for one-in-ten ARI (24 hour) storm events
- sediment storage capacity in accordance with industry best practice standards
- basin spillways designed for 50 year ARI critical event.

Where leachate and stormwater catchments are connected, or in the event stormwater becomes impacted by leachate the resultant water shall be managed as leachate.

Reuse of collected stormwater within the SRAIP shall be prioritised for compost wetting, dust suppression and crop irrigation.

A program for routine and event based visual and quantitative surface waters monitoring of PCCoC (Section 4) shall be prepared as part of the SBMP. The monitoring program shall be overseen by a suitably qualified person who shall review and report on monitoring results which respect to potential adverse environmental impacts and requirements for preventive and corrective actions.

6.7 Erosion and sediment control

An erosion and sediment control (ESC) plan shall be prepared by a suitably qualified person (e.g. Registered Professional Engineer of Queensland, or Certified Professional in ESC) as part of the SBMP, based on IECA ESC best practice standards.

6.8 Hazardous materials

Storage of hazardous materials (HAZMAT) within the subject area is not intended. Should HAZMAT storage be required appropriate control measures based on applicable standards and codes of practice (Section 1.7) shall be incorporated into relevant SOP(s) and/or ECP(s).

6.9 Waste and resource recovery

Waste and recoverable resources associated with the activity are limited to non-conforming product, reject

feedstock (where not returnable to the supplier), leachate, general solid waste associated with plant and equipment and personnel, and liquid waste from the site amenities.

The SBMP shall incorporate procedures for waste management and resource recovery based on the avoid, reduce, reuse, recycle, recover, dispose hierarchy. Previous sections outline control measures for avoiding management of reject feedstock, and managing potential bulk waste including non-conforming product and leachate.

The following outlines key control measures on which the procedures shall be based:

- Waste storage and management shall be limited to designated areas.
- All solid waste material will be transported from the site via a waste contractor on a weekly basis as part of the Kalfresh processing facility contract.
- All materials shall be collected and disposed of by a DES licensed operator.
- Reusable or recyclable materials will be separated onsite into dedicated bins/areas, where practicable, for either reuse onsite or collection by a contractor and transport to off-site facilities.
- Where practicable, and where materials cannot be separated on-site, they will be sorted off-site by a contractor.
- Materials packaging waste will be returned to suppliers where possible.
- All waste and recyclables will be stored in appropriate covered receptacles secure from wildlife or vermin. Receptacles shall be of sufficient capacity for site activities and visitor numbers, and situated at appropriate locations onsite.
- All wastewater from the site shall be transferred to the proposed SRAIP STP and managed in accordance with the associated SBMP.

6.10 Emergency preparedness and response

An emergency preparedness and response procedure addressing the following potential events shall be developed as part of the SBMP:

- Chemical spills on land
- Chemical spills on water
- Fire
- Heavy or prolonged rainfall.

6.11 Land rehabilitation

A land rehabilitation plan shall be developed as part of the SBMP. At this stage the most likely land use following cessation of the activity is a return to grazing pasture, or cropping.

7 CONCLUSION

This Environmental Assessment Report has been prepared to support the application for the proposed Environmentally Relevant Activity (ERA) 53(a) Composting for the Scenic Rim Agricultural Industrial Precinct (SRAIP) project located at 6200 – 6206 Cunningham Highway, Kalbar Queensland, properly described as Lot 3 and Lot 4 on SP192221.

This report addresses the requirements outlined in Section 125 of the *Environmental Protection Act 1994.*

The risk assessment has determined that the potential environmental risks resulting from the proposed composting operations will be effectively regulated through the effective implementation of environmental monitoring and management practices to avoid potential environmental impacts.

8 REFERENCES

Department of Science, Information Technology and Innovation 2017, *Emissions of bioaerosols from A Yatala composting facility*, Queensland Government, Brisbane.

Appendix A SRAIP Concept Plan

Yield Breakdown	
Industry Allotments	**Overall**
4000m² -1HA	3
1HA- 2.99HA	10
3HA +	2
Digester and Energy Site	1
Total Industry Allotments	**16**
Infrastructure	
Private Infrastructure Lot	1
Total Infrastructure Allotments	**1**
Rural Allotments	
Lot 18	1
Lot 19	1
Lot 20	1
Total Rural Allotments	**3**
Total Allotments	**20**

Land Budget		
	Overall	
	Area	**%**
Overall Area	**145.216 ha**	**100.0%**
Saleable Area		
Industry Allotments	**29.756 ha**	**20.5%**
Rural Allotments	**104.224 ha**	**71.8%**
Digester and Energy Site	**5.120 ha**	**3.5%**
Road		
Private Road	**3.849 ha**	**2.7%**
Wagners Access Track (Part Lot 70)	**0.820 ha**	**0.6%**
Common Property		
Stormwater Infrastructure	**0.382 ha**	**0.3%**
Utilities	**0.098 ha**	**0.1%**
Cunningham Highway Frontage	**0.267 ha**	**0.2%**
Infrastucture		
Sewer Treatment Plant, Water Treatment and Fire Fighting	**0.700 ha**	**0.5%**
Overland Flow (Part of Rural Lot 18)	***12.037 ha***	
Overland Flow (Part of Rural Lot 20)	***7.101 ha***	

0 10 20 40 60 80 1 : 2,500 @ A1

KALFRESH
SCENIC RIM AGRICULTURAL INDUSTRIAL PRECINCT
6206 CUNNINGHAM HWY, KALBAR 4309 QLD

SRAIP CONCEPT LAYOUT PLAN

PLAN REF: 142489 – 05
Rev No: AC
DATE: 23 FEBRUARY 2023
CLIENT: KALFRESH
DRAWN BY: NV
CHECKED BY: JC / PHE

Legend
- Site Boundary
- Existing Contours (1 metre)
- Existing Boundaries
- Existing Easement
- Proposed Stormwater Infrastructure (Common Property)
- Proposed Overland Flow (Easements, Part of Lot 18 and Lot 20)
- Proposed Cunningham Highway Frontage Common Property (3 metres wide)
- Proposed Utilities Common Property (4 metres wide)
- Proposed Bio Basin
- Proposed Water Storage Dam
- Proposed Effluent Irrigation
- Proposed Composting Lot
- Lechate Pond
- Proposed Formalised Vehicular Access
- Proposed Plant & Equipment
- Proposed Windrow & Finished Product
- Proposed Stormwater Basin
- Proposed Wagner Quarry Access - *(not part of the SRAIP proposal and subject to separate development approval)*
- Significant Vegetation Area
- Existing Vehicular Access to Composting Area
- Access Easement for Wagners Road Alignment
- Access Easement to Lot 19 (Composter) within Lot 11 (Digester)
- Swale
- Volumetric Lot - Lot 80 (1 metre below ground surface)

Note:
All Lot Numbers, Dimensions and Areas are approximate only, and are subject to survey and Council approval.

Dimensions have been rounded to the nearest 0.1 metres.

Areas have been rounded down to the nearest 5m².

The boundaries shown on this plan should not be used for final detailed engineers design.

Source Information:
Site boundaries: DCDB
Adjoining information: DCDB.
Contours: RPS Survey.
Aerial photography: RPS Survey.
Overland Flow Path: Aurecon.

URBAN DESIGN
Level 4 HQ South
520 Wickham Street
PO Box 1559
Fortitude Valley QLD 4006
T +61 7 3539 9500
W rpsgroup.com

Appendix B Composting Area Concept Layout Plan

0 10 20 30 40 60 1 : 2,000 @ A2

KALFRESH

SCENIC RIM AGRICULTURAL INDUSTRIAL PRECINCT

6206 CUNNINGHAM HWY, KALBAR 4309 QLD

PROPOSED COMPOSTER CONCEPT LAYOUT

PLAN REF:	**142489 – 08**
Rev No:	**F**
DATE:	31 JANUARY 2023
CLIENT:	KALFRESH
DRAWN BY:	NV
CHECKED BY:	JC / PHE

Legend

- Site Boundary
- SRAIP Precinct Boundary
- Existing Contours (2.5m)
- Existing Boundaries
- Existing Easement
- Proposed Overland Flow (Easement, Part of Lot 18)
- Proposed Composting Area
- Lechate Pond
- Proposed Composter Lot Access Track
- Proposed Plant & Equipment
- Proposed Windrow & Finished Product
- Proposed Stormwater Basin
- Access Track Connection to Composter Lot

Note:
All Lot Numbers, Dimensions and Areas are approximate only, and are subject to survey and Council approval.

Dimensions have been rounded to the nearest 0.1 metres.

Areas have been rounded down to the nearest 5m².

The boundaries shown on this plan should not be used for final detailed engineers design.

Source Information:
Site boundaries: DCDB
Adjoining information: DCDB.
Contours: RPS Survey
Aerial photography: RPS Survey
Overland Flow Path: Aurecon

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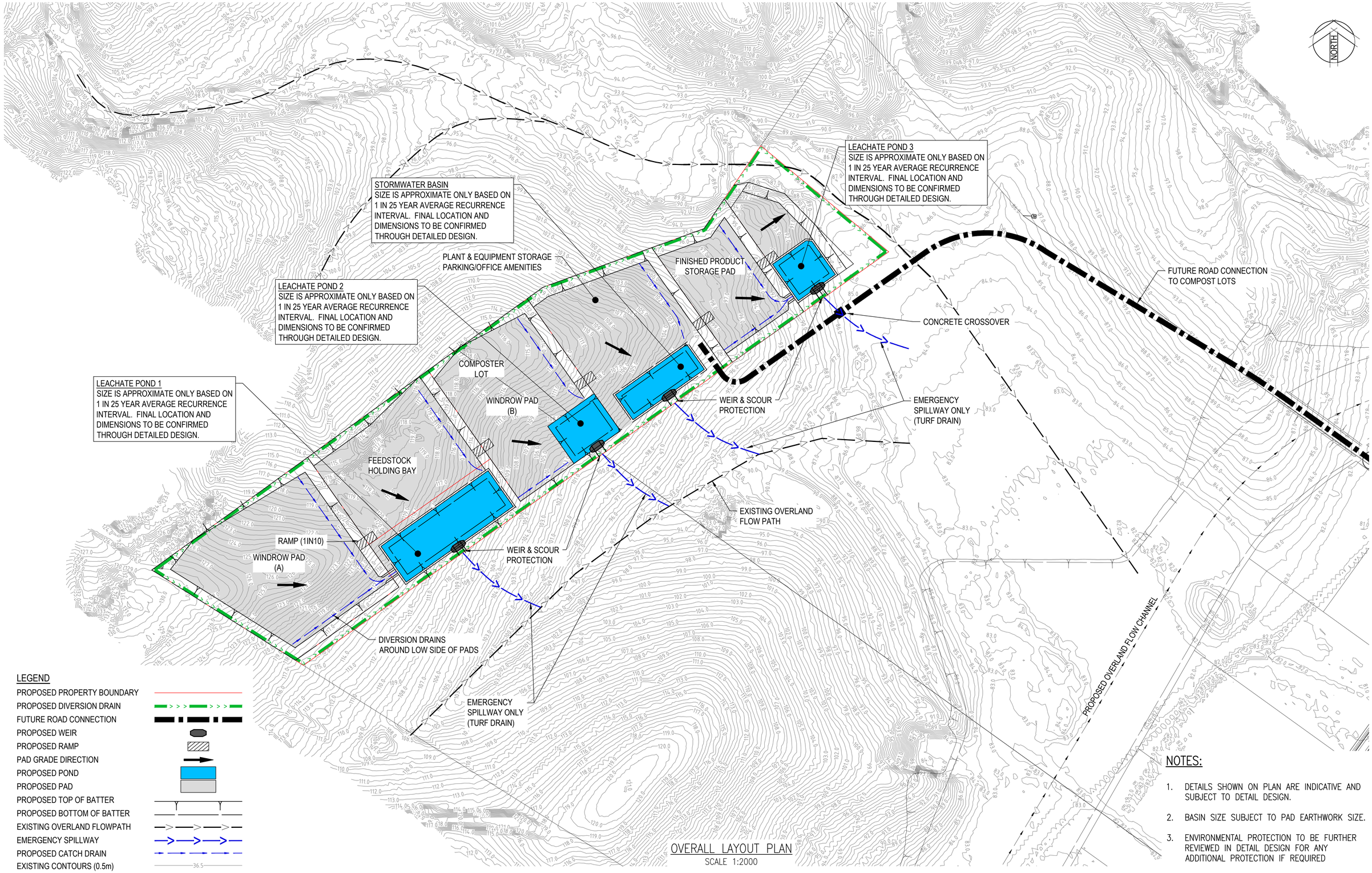
Appendix C Preliminary Leachate Pond and Stormwater Basin Design



LEGEND

- PROPOSED PROPERTY BOUNDARY
- PROPOSED DIVERSION DRAIN
- FUTURE ROAD CONNECTION
- PROPOSED WEIR
- PROPOSED RAMP
- PAD GRADE DIRECTION
- PROPOSED POND
- PROPOSED PAD
- PROPOSED TOP OF BATTER
- PROPOSED BOTTOM OF BATTER
- EXISTING OVERLAND FLOWPATH
- EMERGENCY SPILLWAY
- PROPOSED CATCH DRAIN
- EXISTING CONTOURS (0.5m) 36.5

OVERALL LAYOUT PLAN
SCALE 1:2000

NOTES:

1. DETAILS SHOWN ON PLAN ARE INDICATIVE AND SUBJECT TO DETAIL DESIGN.
2. BASIN SIZE SUBJECT TO PAD EARTHWORK SIZE.
3. ENVIRONMENTAL PROTECTION TO BE FURTHER REVIEWED IN DETAIL DESIGN FOR ANY ADDITIONAL PROTECTION IF REQUIRED

Stantec
Stantec Australia Pty Ltd | ABN 17 007 820 322
Level 6, Springfield Tower, 145 Sinnathamby Boulevard
Springfield Central QLD 4300
Tel: 07 3381 0111
Web: www.stantec.com/au

NOT FOR CONSTRUCTION

0 20 40 60 80 100 120 140 160m
SCALE IN METRES (1:2000 BEFORE REDUCTION)

KALFRESH PTY LTD
SCENIC RIM
AGRICULTURAL INDUSTRIAL PRECINCT

PROPOSED COMPOSTER FUNCTIONAL LAYOUT PLAN

Date	Scale	Size
26-09-2023	1:2000	A1

510357-007-SK001 (Drawing Number)

2 (Revision)

Appendix D Odour potential of Liquid Digestate

Following provision of a risk rating assessment to confirm the odour potential of Solid Digestate (Appendix C.3.5), the regulator requested Kalfresh to similarly confirm the risk rating for Liquid Digestate. Solid digestate is proposed to be used as a key feedstock to the composting activity whereas Liquid Digestate is proposed to be used as a composting wetting agent, as a partial or full replacement for bore water depending on its suitability. Leachate and stormwater from the composting activity is also proposed to be beneficially reused for this similar purpose.

The benefit of using Liquid Digestate produced from the AD Facility is that additional nutrients can be injected into the composting products.

Information provided by Alex Vogelsang, Director of Best Way to Energy, confirmed by email dated 26 September 2023 that although the use of Liquid Digestate will increase the level of nitrogen in the composting windrows, the odour rating will be less than that of Solid Digestate, given the concentration of nitrogen in Liquid Digestate will be highly diluted.

The below extract of the mass balance assessment contained within the digestate management plan (Appendix C.1.5) confirms the daily tonnages and the nitrogen concentration of each material:

SUBSTRATE RECEIVAL AND PRE-TREATMENT

Substrate		Sweet Corn Thrash	Chicken Manure	Paunch	Water	Liquid Digestate
Quantity	[kg/d]	60,000	5,479	42,000	82,192	41,096
Nitrogen	[g/l]	4.28	25.72	0.60	0.01	1.58
Phosphorus	[g/l]	0.75	12.25	0.21	0.00	0.23
Potassium	[g/l]	5.00	18.52	0.80	0.04	1.78
Cadmium	[mg/l]	0.05	0.36	0.03	0.00	0.03
Lead	[mg/l]	0.20	0.72	0.15	0.00	0.11
Chromium	[mg/l]	0.16	3.19	1.16	0.00	0.41
Nickel	[mg/l]	0.88	7.32	0.40	0.00	0.55
Mercury	[mg/l]	0.02	0.07	0.00	0.00	0.01

WHOLE DIGESTATE

Substrate	Total			
Quantity	[kg/d]	225,067		
Nitrogen	[g/d]	488,556	[g/l]	2.17
Phosphorus	[g/d]	130,488	[g/l]	0.58
Potassium	[g/d]	511,374	[g/l]	2.27
Cadmium	[mg/d]	7,319	[mg/l]	0.03
Lead	[mg/d]	26,842	[mg/l]	0.12
Chromium	[mg/d]	92,647	[mg/l]	0.41
Nickel	[mg/d]	132,605	[mg/l]	0.59
Mercury	[mg/d]	2,362	[mg/l]	0.01

LIQUID DIGESTATE

Liquid Digestate	5.00	%TS

Substrate		Liquid Digestate
Quantity	[kg/d]	197,596
Nitrogen	[g/l]	1.61
Phosphorus	[g/l]	0.23
Potassium	[g/l]	1.81
Cadmium	[mg/l]	0.03
Lead	[mg/l]	0.13
Chromium	[mg/l]	0.46
Nickel	[mg/l]	0.62
Mercury	[mg/l]	0.01

SOLID DIGESTATE

Solid Digestate	25.00	%TS

Substrate		Solid Digestate		Solid Digestate
Quantity	[kg/d]	27,471	[kg TS/d]	6,868
Nitrogen	[g/l]	6.22	[g/kg TS]	24.90
Phosphorus	[g/l]	3.09	[g/kg TS]	12.35
Potassium	[g/l]	5.58	[g/kg TS]	22.34
Cadmium	[mg/l]	0.03	[mg/kg TS]	0.12
Lead	[mg/l]	0.08	[mg/kg TS]	0.30
Chromium	[mg/l]	0.03	[mg/kg TS]	0.13
Nickel	[mg/l]	0.37	[mg/kg TS]	1.49
Mercury	[mg/l]	0.00	[mg/kg TS]	0.00

It is further noted that the (bioological) anaerobic digestion process uses bacteria to break down the organic material. These bacteria can only handle a certain concentration of nitrogen and would otherwise stop working. Therefore, the maximum nitrogen concentration of the (whole) digestate is naturally limited around the 0.35-0.5% mark (3,500-5,000mg/l).

The following extract from SOP-BEF-0000-100-0 COMPLIANCE; Kalfresh Digestate Quality Management Plan (Appendix C.1.5) which includes to monitor Nitrogen as part of the process control.

		adapt
Ammonium Nitrogen	➢ 3500 mg/L NH4 + (pH 7)	Inhibition increases at higher pH and higher temperature. Bacteria can adapt
Heavy Metals	Cu > 50 mg/l	Only dissolved metals are inhibitive

When comparing the different nitrogen concentrations to other feedstock types, it is demonstrated that the N concentration in Liquid Digestate is 16 times lower when compared to chicken manure which is rated as a “high” odorous feedstock. This is significantly lower than solid digestate which contains nitrogen level 4 times lower than chicken manure. Again, chicken manure is not proposed to be used as a feedstock in Kalfresh’s composting activity and is only used in this instance for comparison purposes.

Substrate	N concentration (%)	x times lower than chicken manure
Chicken Manure	0.25	
Whole Digestate	0.0217	12
Liquid Digestate	0.0161	16
Solid Digestate	0.0622	4

In receiving the request from the regulator, it was observed from the Weltec report that “the vast majority of nitrogen will stay in the Liquid Digestate”. This is still a correct statement, however consideration is needed to account for the different volumes being produced from whole, liquid and solid digestate. To illustrate this point, the table below confirms that although 65% of total nitrogen being produced is contained in the Liquid Digestate component, the dilution that occurs means that the concentration of nitrogen in Liquid Digestate is significantly less.

Digestate	**Tonnes (t/d)**	**Nitrogen concentration (5)**	**N (t/d)**	
Whole	225	0.0217	4.89	100%
divided into				
Liquid	197.6	0.0161	3.18	65%
Solid	27.4	0.0622	1.70	35%

From the above information, it is clear that the nitrogen concentration in Liquid Digestate is substantially lower than in Solid Digestate. Therefore, potential for Liquid Digestate to cause and odour risk is considered to be less than Solid Digestate. The risk rating associated with Liquid Digestate is therefore expected to be ‘low’.