Conhur Pty Ltd

Environmental Impact Assessment

Dunedin compost facility

April 2020

MACQUARIE FRANKLIN

Consultants for business, agriculture and environment

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List of abbreviations

AMM	Approved Management Method for Biosolids Reuse 2006
EPA	Environmental Protection Authority
LIST	Land Information System Tasmania
NVA	Natural Values Atlas
OU	Odour Unit
STP	Sewage Treatment Plant
TBRG	Tasmanian Biosolids Reuse Guidelines 2020 (draft)

Executive summary

Conhur Pty Ltd (Conhur) is proposing to develop a composting facility at 'Dunedin', 91 Blessington Rd, St Leonards, located approximately 10 km east of Launceston. An aerobic windrow composting method will predominantly be utilised to improve class 3 biosolids from TasWater's sewage treatment plants (STPs) in northern Tasmania, into a product suitable for direct application to land. The project will initially process 3000-5000 wet tonnes of biosolids and 3000-5000 tonnes of wood pin chips (from Forico's Longreach timber operations) per annum. This will produce approximately 4000-6000 wet tonnes of finished biosolid compost per annum. The facility will be developed on agricultural land zoned as "rural resource" under the *Launceston Interim Planning Scheme 2015.*

The proposal is deemed a level 2 activity as defined under Schedule 2, clause 3 (d)(i) of the *Environmental Management and Pollution Control Act 1994* (EMPC Act) on the basis that compost production capacity will be greater than 100 tonnes per year and, in the longer term, Conhur may transport composted material to alternate properties for land spreading. However, the intent is to use the compost on the Dunedin property. The proposal will be assessed by the Environmental Protection Authority (EPA) board under s25(1) of the EMPC Act. This Environmental Impact Statement (EIS) describes the proposed operation and management of the project.

The compost facility is to be developed as part of an integrated statewide biosolids management program. At this time biosolids that do not meet class 2 quality requirements (as prescribed by the draft Tasmanian Biosolids Reuse Guidelines TBRG 2020), cannot be processed or utilised in the northern region of Tasmania. Currently class 3 biosolids must be transported for reprocessing at facilities in the South and North-West of the state.

Application of biosolids to land is widely accepted as beneficial, with a range of agricultural and financial benefits. Biosolids provide a sustainable soil nutrient supply, while reducing synthetic fertiliser use and waste sent to landfill. The application of biosolids to agricultural soils also improves soil water holding capacity and increases soil carbon. A facility with the capacity to reprocess class 3 biosolids to meet class 2 requirements, in accordance with the draft TBRG (2020), will provide a cost-effective sustainable waste management outcome for TasWater and the community.

Key issues for the project include the potential impacts of odour on surrounding residences and contamination of surface and / or groundwater from leachate runoff. Results of modelling completed by specialist consultants Tarkarri Engineering (2020), show predicted ground level concentrations of odour are above the Tasmanian Environment Protection Policy (Air Quality) 2004 criterion level of 2 Odour Units (OUs) at the project boundary, although the project boundary is less than 100m away. However, a substantial land buffer exists between the project boundary and the Tasman Highway (approximately 0.8 km) and the closest residential receptor (1.2 km).

In addition, a very conservative prediction model resulted in a ground level concentration at the closest residential receiver also below the criterion. However, the 2 OU level was slightly exceeded at the Tasman Highway. While this scenario is unlikely (due to the highly conservative nature of the model) it does suggest some risk of adverse impact should upset conditions at the site develop. Management controls and measures are provided to minimise the potential for upset conditions to develop.

Modelling suggests that odour, dust and noise emissions from the proposed facility are unlikely to significantly impact the amenity of surrounding land uses including residential receptors.

Prior to commencement of composting operations an engineered pad and leachate dam are to be constructed. Uncontrolled leachate runoff from the site has the potential to carry nutrients and contaminants into the groundwater system and Hills Creek. All surface water from the compost pad will be managed onsite (e.g. directed into a sump and piped to the leachate dam) to avoid runoff and infiltration into the groundwater. Ongoing quarterly surface water and groundwater monitoring will be implemented to detect any impact on Hills Creek and the groundwater system.

The proposed planning measures and commitments demonstrate that appropriate management measures can be implemented to minimise any potential impacts or risks to public health and the environment. As a result, no significant environmental impacts are expected.

1 Introduction

1.1 Project background

Conhur Pty Ltd (Conhur) have a three year contract with TasWater to manage biosolids (from sewage treatment plants) across Tasmania. As part of the solution for managing biosolids in northern Tasmania it is proposed that a composting facility be developed on agricultural land zoned as "rural resource", on the property known as 'Dunedin' located at 91 Blessington Rd, St Leonards. The Dunedin property is located approximately 10 km east of Launceston. The location and extent of the Dunedin "property boundary" is provided in Figure 1. The "project boundary", also referred to as the "composting site" or "composting facility" is provided in Figures 2 and 3.

Composting operations at Dunedin will be conducted in accordance with the draft Tasmanian Biosolids Reuse Guidelines 2020 (referred to hereafter as draft TBRG (2020)) which have been issued by the EPA but not yet formally adopted. All biosolid compost (and biosolids) utilised at Dunedin for land application must be classified as class 2. Biosolids quality classification will be based on an assessment of:

1. Contaminant grade: the level of chemical/metal contamination; and
2. Stabilisation grade: the degree of pathogen reduction, vector attraction and odour.

For biosolids classification to be class 2, both stabilisation and contaminant grade must be a minimum of Grade B. Non class 2 material requires further processing (e.g. composting) prior to application to land. Contaminant and stabilisation acceptable thresholds are specified in the draft TBRG (2020).

The proposed facility includes a 2.1ha composting pad and a 2.5ha clay lined leachate capture dam, with a capacity of 26.4ML. The facility will process class 3 biosolids from TasWater's northern treatment plants into class 2 material using an aerobic windrow composting method for stabilising and blending to manage contaminants. It is expected that the facility will:

- Process 3000-5000 wet tonne biosolids per annum.
- Utilise 3000-5000 tonne per annum of wood pin chips/fines as the compost carbon source. This material is being obtained from Forico Longreach, with some material now stockpiled at Dunedin.
- Produce an estimated 4000-6000 wet tonnes of finished biosolid compost (class 2 biosolids) per annum.
- Retain leachate from the composting pad in a 26.4ML dam with a 10,900m^2 liquid surface area.
- A site plan is provided in Figure 3 and shows the project boundary, proposed composting pad with leachate dam and other associated infrastructure.

Composting and maturation of materials is expected to take approximately 12 weeks. Under current legislation composted material is still considered biosolids and, once assessed as achieving class 2 quality requirements defined within the draft TBRG (2020), will be used within the Dunedin property for pasture improvement in accordance with a biosolids management plan prepared for the site

(Appendix B). In the future, composted material may be transported to alternate properties for land spreading (once approved biosolids management plans are in place for any recipient properties).

At the time of this assessment, no other composting facilities permitted to received biosolids are operating or proposed for the area. The closest biosolids composting facility (Dulverton Waste Management) is located at Latrobe, approximately 75km north west of Dunedin.

Figure 1. Location map

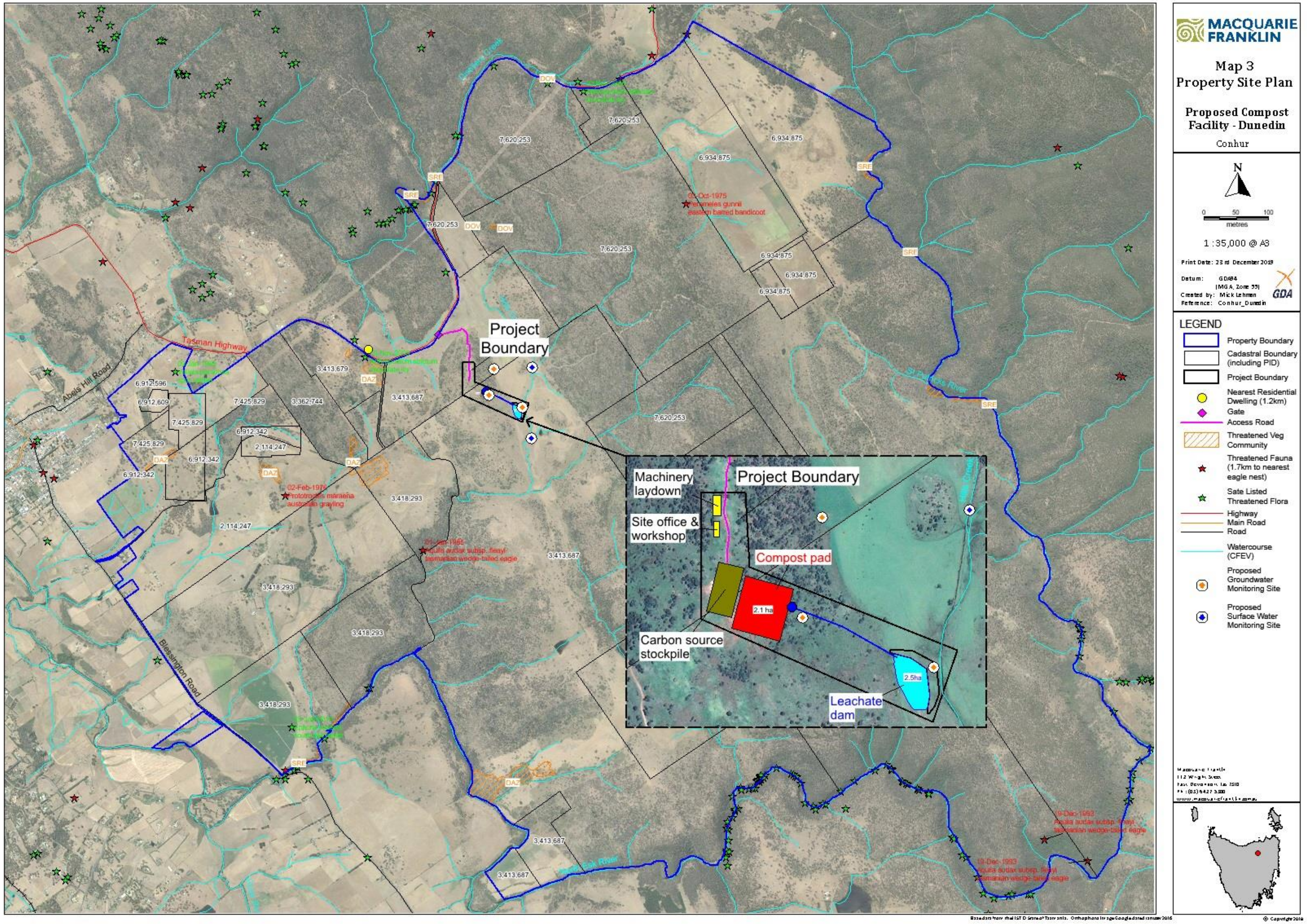

Figure 2. Dunedin location map

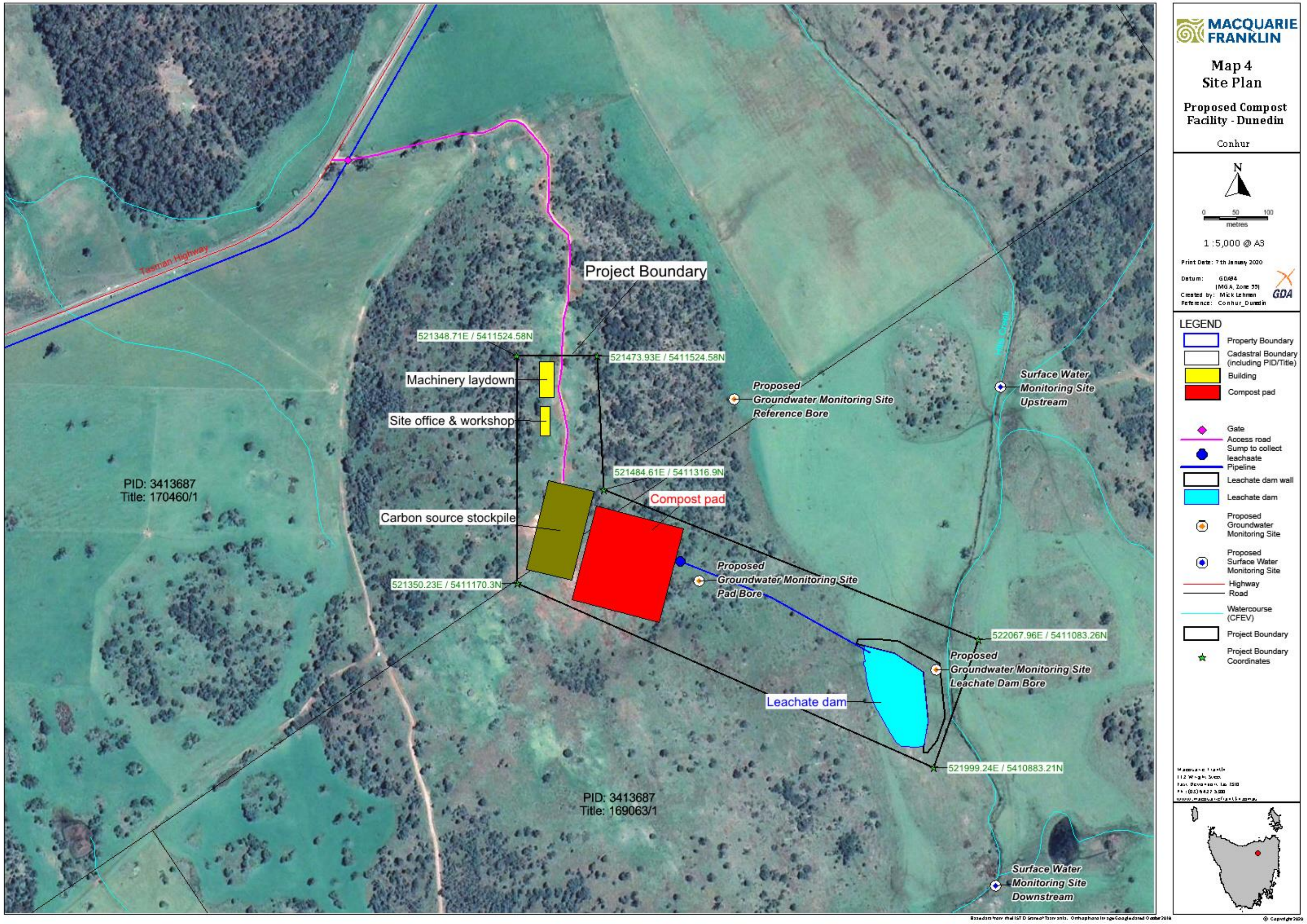

Figure 3. Site plan

1.2 Project proponent

Conhur was established in 1999. Conhur specialises in sludge dredging, sludge dewatering and biosolids transport, management and reuse for wastewater and water enterprises, along with large construction and industrial companies in Australia, New Zealand and the Pacific Islands. Conhur currently hold and service biosolids management contracts for TasWater, Townsville Water, Sydney Water and Barwon Water.

Conhur will fund and manage the construction and operation of the proposed composting facility at Dunedin. Conhur has entered into an arrangement with the landowners of Dunedin (Marcus Griffin and Samantha Hogg) for long term use of their site.

Proponent details:

Conhur Pty Ltd

PO BOX 659, Hervey Bay Qld 4655

ABN: 42 100 277 996

Proponent contact:

Dean Hurlstone: 0405 628 777

dean@conhur.com

Land Owners:

Marcus Griffin and Samantha Hogg: 0467 580 809 (Marcus)

Dunedin – 91 Blessington Road, St Leonards

marcus@griffingroup.org

1.3 Relevant legislation and guidelines

Conhur operates under and complies with a variety of Acts, Regulations, policies and guidelines that are relevant to the development of the project, including:

- *Aboriginal Heritage Act 1975*
- Australian Water Quality Guidelines as per ANZECC (2000)
- *Environmental Management and Pollution Control Act 1994*
- Environmental Management and Pollution Control (Waste Management) Regulations 2010
- Environment Protection Policy (Air Quality) 2004
- Environment Protection Policy (Noise) 2009
- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
- *Groundwater Act 1985*

- *Launceston Interim Planning Scheme 2015*
- *Nature Conservation Act 2002*
- State Policy on Water Quality Management 1997
- Tasmanian Biosolids Reuse Guidelines 1999
- *Threatened Species Protection Act 1995*
- *Water Management Act 1999*
- *Weed Management Act 1999*
- *Workplace Health and Safety Act 2012*

The proposal is deemed a level 2 activity as defined under Schedule 2, clause 3 (d)(i) of the *Environmental Management and Pollution Control Act 1994* (EMPC Act) on the basis that:

1. Compost production capacity will be greater than 100 tonnes per year.
2. In the future, the proponent may transport composted material to alternate properties for land spreading.

It should be highlighted that the intent is to use the biosolid compost on the Dunedin property.

The proposal will be reviewed and assessed by the Environmental Protection Authority (EPA) board under s25(1) of the EMPC Act. Composting activities and the reuse of biosolids within the Dunedin property will be conducted in accordance with the draft TBRG (2020). The draft TBRG (2020) provide a framework for managing safe and beneficial use of biosolids.

2 Proposal description

2.1 General information

2.1.1 Infrastructure

An aerobic windrow composting method will be utilised to improve TasWater sourced stabilisation grade C biosolids to stabilisation grade B, or grade C contaminated biosolids (requiring dilution of contaminants) and produce class 2 biosolids suitable for land application. The proposed facility will involve the development of the following infrastructure and facilities:

- 2.1ha composting pad, including storage areas for biosolids and wood pin chips (as at January 2020 approximately 13,000 tonnes of wood pin chips are stored at the site).
- 2.5ha clay lined leachate capture dam (26.4ML), with a 10,900 m^2 liquid surface area.
- 1 km gravel access road from the Tasman Highway to the composting pad.
- Site office, workshop, shed, portable toilet, generator.
- Machinery laydown area.
- Water tanks (2 x 20,000L).
- Skip bin for general waste and general recycling bins.
- Machinery – Front End Loader (FEL), tractor, over the row compost turner and spreading equipment.
- Firefighting equipment and truck washdown equipment.

Access to the composting facility will be off the Tasman Highway, via an existing farm access road, 3.7km east of the junction with Abels Hill Road. The composting pad is located approximately 0.8 km south of the Tasman Highway. Anticipated vehicle movements include:

- One 24 tonne truck per day of wood pin chips (carbon source) from Forico's Longreach timber operations.
- One 20 tonne truck per day of biosolids sourced from TasWater sites across Northern Tasmania.
- Daily light vehicle access by site personnel (approximately two to four per day).

In the longer term, Conhur may transport composted material to alternate properties for land spreading. However, the intent is to use the biosolid compost on the Dunedin property. In the event that biosolid compost is transported to alternate properties for spreading, then empty trucks leaving the facility will be used to transport biosolid compost, thus no significant increase in traffic is anticipated (refer to section 6.17).

Biosolid spreading equipment may occasionally access Bullocks Hunting Ground from Hunting Ground Rd (8.9 km east of the junction with Abels Hill Road) (refer to Appendix B, Figure 1).

The compost facility and associated equipment will be operated by Conhur.

Operational hours for the site will be 0700 to 1800 Monday to Saturday.

2.1.2 Raw materials

Biosolids will be sourced from Sewage Treatment Plants (STPs) in the northwest and north of Tasmania. Biosolids from all TasWater STP's are tested regularly for grading purposes in accordance with the draft TBRG (2020). Biosolids classification from each plant is generally consistent and the classification grade for both stability and contaminants is known for each plant. Only class 3 biosolids will be composted.

Biosolids characteristics from relevant STPs are provided in Tables 1 and 2. It should be highlighted that not all biosolids from these STPs will be transported to the compost facility for processing. As discussed in section 1.1, only 3000-5000 wet tonnes of biosolids will be composted at the facility per annum.

Table 1. North West STPs

STP	Burnie	Cradle	Pardoe	Ulverstone	Wynyard	Rosebery
Approx % solids[1]	15	15	25	15	20	15
Annual tonnes	3516	100	3410	1315	3483	100
Stabilisation grade	C	C	C	C	C	C
Contaminant grade	B	B	B	B	B	B
Other contaminants	-	-	-	-	-	Metals?
Class (draft TBRG 2020)	3	3	3	3	3	3
Notes	2	-	3	-	-	2

Notes. 1: Estimated, 2: Non-compliant for metals, direct to landfill, 3: Primary sludge, composted at receival location.

Table 2. Northern STPs

STP	Ti Tree	Hoblers Bridge	Riverside	Norwood	St Helens
Approx % solids[1]	20	20	20	20	17
Annual tonnes	6124	870	184	0	136
Stabilisation grade	B	B	B	B	B
Contaminant grade	C	B	C	Unknown (currently B)	B
Other contaminants	TPH	TPH?	TPH?	-	-
Class (draft TBRG 2020)	3	2?	3	2?	2
Notes	3	-	-	2	-

Notes. 1: Estimated, 2: Sludge drying lagoon emptied March/April each year, 3: Mechanical dewatering project underway. Volume and end use TBD. Future state to be determined.

All transport of biosolids will be undertaken by Conhur, a K130 licenced transporter. Each load will be weighed, and its source recorded. Monthly weighbridge and transport data will be supplied to TasWater.

Biosolids will be delivered with a 20 tonne truck with a purpose designed load container (spirotainer). Biosolids trucks will be fully enclosed to mitigate risk of spillage and odour. There is a biosolids management plan in place for the Dunedin property (Appendix B). It should be highlighted that this initial plan will be updated within the second six months (i.e. within the first year) of the facility being operational and increased to match proposed spreading needs (from both biosolid compost and direct application of biosolids) as material becomes available/as necessary.

A mass balance for the site is as follows:

- Maximum input of biosolids: 5000 wet tonnes (equivalent to 5000 m^3, 1000 dst).
- Mixed with 5000 m^3 (approx. 1200 dst) of wood pin chips to give 10,000 m^3 (maximum).
- 30% volume reduction during composting process.
- 7000 m^3 of finished biosolid compost.
- Expected wet density of 700kg/m^3 (equivalent to 4900 wet tonnes).
- Expected dry density of 300kg/m^3 (equivalent to 2100 dry tonnes).
- Expected 50% Nitrogen Limited Application Rate (NLAR) of composted biosolids of 10 dry tonnes/ha, (33 wet tonnes/ha) therefore requires approximately 210ha of land or 630 ha of land over 3 years.

It should be highlighted that the above figures are based on the maximum production capacity which is unlikely to occur in the first year of operation. The initial biosolids management plan confirmed that 194ha are available (Biosolids Management Plan, Appendix B) and suitable for spreading at the Dunedin property, with more than 1300ha potential available for biosolids spreading.

Large quantities of biosolid compost will not be stored on the pad for any significant amount of time. Furthermore, biosolid compost will not be stored off the compost pad.

It is not proposed that all biosolids in northern Tasmania will be managed at Dunedin. It is also not proposed that all current class 3 biosolids will necessarily be managed at Dunedin only. Biosolids management plans may also be prepared for other properties to provide further biosolids spreading area if required.

The AMM allows for biosolids to be spread at a maximum rate of 50 wet tonnes per ha, regardless of the moisture content, unless the spreading rate is further limited by nitrogen or contaminants. Spreading rates for biosolids are therefore often compared as wet tonnes per ha, with moisture content of biosolids (as provided by the producer) used to convert Nitrogen Limited Application Rate (NLAR) and Contaminant Limited Application Rate (CLAR) to wet tonnes. Note that NLAR and CLAR values are calculated as dry tonnes from the analytical data.

If analytical data suggests that an application rate greater that the 50 wet tonnes per ha allowed under the AMM is desirable for agronomic reasons, approval may be sought under a Regulation 12 (Approval for Handling a Controlled Waste) to increase the application rate above 50 wet tonnes per ha.

Wood pin chips from Forico's Longreach operations will also be stockpiled onsite adjacent to the composting pad (refer to Figure 4). Approximately 13,000 tonnes of wood pin chips are currently stockpiled on the site. If Forico pin chips unexpectedly became unavailable alternative carbon sources (chips) will be obtained from onsite milling operations at Dunedin and/or Artec's pine log yard operations located at Bell Bay. All pin chip deliveries will be recorded by site personnel. Pin chip stockpiles will be regularly monitored for temperature.

Figure 4. Wood pin chips sourced from Forico's Longreach operation.

2.1.3 Composting process

The proposed methodology is based on the draft TBRG (2020) and previous composting experience and will be adjusted in accordance with windrow performance. The composting process is summarised below.

1. Biosolids will be delivered to the compost site by truck and stored on the compost pad ready for integration into a windrow for composting or blending, depending on their classification. Class 2 biosolids suitable for direct land application will not be delivered to the composting site, unless required for blending. Class 2 biosolids for land application will be directly applied to land.
2. Trucks delivering biosolids will be cleaned with a high-pressure spray hose before leaving the site. Cleaning will occur on the compost pad with runoff wash water collected in the sump and discharged into the leachate dam.
3. Biosolids from each plant are classified by TasWater. Contaminant and stabilisation grade C biosolids will be stored separately on the pad.
4. Once sufficient biosolid material is onsite a windrow will be formed and the composting process will commence. The management of different grades of biosolids is provided in Table 3, with explanatory notes below.

Table 3. Management pathways for biosolids grades

Contaminant grade	Stabilisation grade	Biosolids classification	Delivery point on pad	Management pathway	Product biosolids classification
Grade B	Grade B	Class 2	Not composted	Direct to land	
Grade B	Grade C	Class 3	Stabilisation grade C area	Meet draft TBRG (2020), table 8.5 composting: Temperature maintained > 40 ^{0}C for a minimum of 5 days including 4 hrs during 5 day period > 55 ^{0}C ⇨ Stabilisation grade B	Class 2 to land
Grade C	Grade B	Class 3	Contaminant grade C area	Mix with Class 2 biosolids and / or pin chips, retest to confirm ⇨ Contaminant grade B	Class 2 to land
Grade C	Grade C	Class 3	Keep separate if this occurs	Must meet both conditions above, composted and retested	Class 2 to land

5. Stabilisation grade C biosolids will be reprocessed such that they can be reclassified as stabilisation grade B and hence class 2, prior to land application. Contaminant grade C biosolids once blended will be tested to determine contaminant grading to ensure that they can be reclassified as contaminant grade B biosolids and hence class 2 biosolids prior to land application.

   Blending of contaminant grade C biosolids to achieve grade B will follow the process outlined below:
   - Contaminant grade C biosolids are known (tested by TasWater).
   - Contaminant levels of all class 2 biosolids are known or can be estimated.
   - Appropriate blending ratios can therefore be calculated to achieve target contaminant levels for contaminant grade B classification.
   - Blending maybe done with class 2 biosolids and/or pin chips.
   - Class 2 biosolids for blending maybe either brought onto the land direct from TasWater facilities or the class 2 biosolids reprocessed onsite.
   - Contaminant grading of blended stabilised contaminant grade C biosolids, will be undertaken as outlined in Table 12 (section 7.1.1), to ensure they can be graded as contaminant grade B.
   - Contaminant grade B and C biosolids with a known hydrocarbon contamination (such as C6 – C9 and C10 – C36 petroleum hydrocarbons from Ti Tree Bend STP) will be identified and managed in a similar manner to the above. Further detail is provided in sections 7.1.1 and 7.1.2.

6. The below outlines the intended composting process. Changes may be made as necessary once composting begins in response to windrow performance. Windrows will be formed with layers of biosolids and pin chips at an approximate 1:1 ratio by volume. Windrow dimensions as determined by the turner and pad are expected to be:

   - Length: 120 m.
   - Height: 1.25 m.
   - Base width: 3.5 m.
   - Top width: 1 m.
   - Width between windrows: 2 m.

   The number and length of windrows are based on the following assumptions:
   - 5000 wet tonnes of biosolids/year (maximum production capacity).
   - 96 wet tonnes/week.
   - 2.6 m^3/windrow.
   - 50% mixing ratio by volume.
   - 1.3 wet tonnes biosolids/metre.
   - 74 metre of windrow/week.
   - 12 weeks in windrow. Note, windrows remain in the same location for 12 weeks, potential to conduct metals and microbiological sampling at week 9.

- 888 metres of windrow required.
- 120 metres windrow length.
- 8 windrows required.
- Approximate windrow area: 50m x 140m, equivalent to 1/3 of the pad (based on dimensions above).

Starting carbon to nitrogen ratios will be targeted at 20:1 to ensure optimal thermophilic conditions. This may be adjusted in the future to further optimise the process. Windrows will be maintained at a minimum temperature of 40 ^{0}C for >14 days, and at an average temperature of >45 ^{0}C and 4 hours >55 ^{0}C as outlined in Table 8.1 (vector attraction reduction) of the draft TBRG (2020). Row management will be focussed on temperature requirements. Temperature and turning are the key process controls to be monitored, and a good indicator that other variables are inherently within a satisfactory range. If temperature profiles are not as expected, other variable such as moisture, C:N ratios and pH will be adjusted as necessary, until the temperature conditions are met.

pH levels will be maintained between 6 and 7.5 and is particularly important if composting materials are high in nitrogen. If required, acidifying agents will be used to maintain pH levels. Moisture levels are critical for composting and odour control. In row moisture content between 50% and 60% is typically considered optimal for aerobic composting. Conhur will manage moisture levels to maintain a satisfactory temperature profile. Water from the leachate pond will be added if necessary. It may be necessary to remake rows to manage any excess moisture. This may be achieved by turning and/or adding more bulking agent i.e. wood pin chips. Furthermore, biosolids have inherent characteristics that assist in maintaining row moisture, including:

- High moisture content at delivery (Typical moisture content 80%).
- Fine particle size and presence of polymers give a high water holding capacity.
- Once mixed with a wood carbon source, windrows made with biosolids have a greater capacity to absorb moisture and maintain porosity (reducing slumping).
- Leachate from the capture dam and water stored onsite will be used to maintain moisture levels within the windrows. Monitoring of the compost windrows is discussed in section 7.1.1.

Windrows will be turned three times a week during the thermophilic stage (or every other day) by an over the row compost turner (Figure 5). Turning and aeration of windrows will increase oxygen levels and prevent anaerobic conditions. Windrow temperature will be measured prior to each turning. Composting process duration will be approximately 12 weeks. Once the thermophilic stage is complete (1 – 6 weeks) and the compost is in the final maturation stage (7 – 12 weeks), windrows will be turned once per week.

Biosolid compost windrows will remain in the same location throughout the 12 week process. It is not intended to store biosolid compost on the pad (once processed) if conditions are suitable for spreading. However, a compost storage area of 40 metres square, can store 3200

m^3 at an average depth of two metres, which is equivalent to 24 weeks production at maximum capacity. This area can be accommodated on the current pad design.

Figure 5. Over the row compost turner

2.1.4 Proposed use of compost

Biosolid compost will be applied to agricultural land within the Dunedin property. The management of compost (and biosolids) including indicative areas of use, application rates and withholding periods are defined in the BMP (Appendix B). The application of compost (and biosolids) to agricultural land will be conducted in accordance with the BMP.

A Regulation 12 application may be made and the BMP updated once the quality of the final compost product is available, to ensure nutrient application rates are at a beneficial level. Due to the dilution of biosolids (and therefore nitrogen and other nutrients) in the final compost, it is possible that desired land application rates will exceed the low application rate (defined by the AMM) of 50 wet tonne/ha/3yr period.

Additional biosolids spreading areas will be identified as the land manager determines priorities and cropping programs for the coming years. Before additional areas are utilised the areas will be assessed, baseline soil testing completed, and mapping updated to inform spreading. Each year updated mapping will include a reflection of areas that have already received biosolids. Up to 194ha have already been assessed and are available for spreading at the Dunedin property (BMP, Appendix B), with more than 1,300ha available for potential biosolids spreading. The BMP will be updated within the second six months (i.e. within the first year) of the facility being operational and increased to match proposed spreading needs (from both biosolid compost and direct application of biosolids) as material becomes available.

2.1.5 Existing land use

Dunedin is located at St Leonards, approximately 10 km east of Launceston. The property covers an area of approximately 5700ha between St Leonards and Nunamara. It is bounded by the St Patricks river to the East, the North Esk river to the south, the Tasman Highway to the north and Blessington Rd to the east. The Dunedin property is currently a mix of pasture, livestock grazing and areas of forest.

Dunedin is currently undergoing major development under the direction of owners Marcus Griffin and Samantha Hogg. Development underway includes dam construction, roading, pipelines and centre pivot irrigation along with improvement of old pastures. The primary focus is currently livestock production, but it is envisaged that significant cropping operations will be a feature as development occurs.

Public access to the property is limited with no through roads or public areas within the property.

2.2 Construction

2.2.1 Composting pad

The proposed compost pad is to be located on the eastern facing slope of the site and covers an area of 2.1ha (151m x 140m). A site layout is provided in Figures 3 and 6. A geotechnical investigation and earthworks methodology were conducted for the site, compost pad and leachate dam (Geoton 2019, Geoton 2020 in Appendix C). The EPA (as stated in the project specific guidelines) require that the pad be constructed with compacted clay to a minimum thickness of 400mm and have a permeability equal to or less than 1×10^{-9}m/s. The laboratory results of the in-situ silty clay soils encountered across the site during the initial investigation (Geoton 2019) indicate that the material will be suitable for use as a compacted clay liner.

Earthworks conducted at the site will be in accordance with the methodology provided by Geoton (2020) and will be signed off by an appropriately qualified person. During excavation, site visits will be made by a suitably qualified person (e.g. Geotechnical Engineer) to assess the exposed subgrade conditions to ensure all organic, soft or deleterious materials are removed. The exposed natural subgrade soils are to be proof rolled and approved prior to commencement of filling.

The pad will consist of 400mm of clay won from the site compacted to achieve a minimum density of at least 98% standard compaction and shall be tested by a NATA registered laboratory. Material will be placed in layers not thicker than 250mm loose with a moisture content of plus three percent to minus one percent (+3% to -1%) of standard optimum moisture content in accordance with AS1289 – Method of Testing Soils for Engineering Purposes. The basic earthworks methodology for the placement and compaction of fill materials at the site is provided in Geoton (2020) (Appendix C).

Surface water runoff is to be diverted around the compost pad with the installation of cut-off drains uphill of the compost pad (Geoton 2019). Water diverted around the site will not enter the collection system. A collection sump is to be installed at the lowest point of the compost pad to collect leachate. Leachate will be piped from the collection sump to the leachate capture dam via a 200mm pipe. Bunding will be constructed along the downslope edge of the compost pad at a height of 200-400mm to ensure that all runoff is diverted to the collection sump and prevented from discharging onto the ground adjacent to the pad.

The sizing of the bunds, sump and pipe to the leachate dam were calculated using results generated from Geoscience Australia's Australian Rainfall and Runoff Regional Flood Frequency Estimation Model. Based on a pad catchment area of 0.021km^2 and Annual Exceedance Probability (AEP) of 1% (i.e. 1 in 100 years flood event) the peak discharge would be in the order of 0.03m^3/s (or 30L/s). An AEP of 10% (i.e. 1 in 10 year flood event) the peak discharge would be approximately 0.02m^3/s (or 20L/s).

The distance from the sump to the dam is approximately 325m with a constant grade of approximately 8.5% (27.5m fall), the proposed 200mm polyethylene pipe can deliver up to 110 L/s over this distance and grade, and can therefore easily convey the design flow rate to the dam with surplus capacity and inbuilt redundancy. It should be noted that the sump pit is simply a collection point to direct flow into the transfer pipeline rather than a storage area.

All biosolids delivered to the facility for composting will be located within the bunded pad.

2.2.2 Leachate capture dam

A 26.4ML leachate capture dam (leachate dam) is to be situated approximately 325m downslope from the compost pad. The dam will be constructed in accordance with advice from Geoton Geotechnical Consultants (Appendix C) and any permit conditions supplied by DPIPWE via the standard dam approval process (application not yet submitted). Leachate from the pad will be applied back to compost to maintain moisture levels. The design features of the leachate capture dam are summarised in Table 4.

Table 4. Leachate dam design features (based on Geoton 2019).

Feature	Details
Wall height from lowest RL to crest RL	4.45m (RL 228.7)
Crest length of dam	230m
Upstream Slope	1V:3H
Downstream Slope	1V:3H
Crest Width	4m
Type of Dam	Upstream clay lined zoned earth fill
FSL Storage Capacity (including earthfill)	26.4ML
Dam earthfill volume (above existing ground Level)	9,902m^3
1 in 10 Year Wet Free Board	0.2m
Spillway Width	3m
Spillway Depth + Freeboard below crest	1.0m (including 0.25m dry free board)

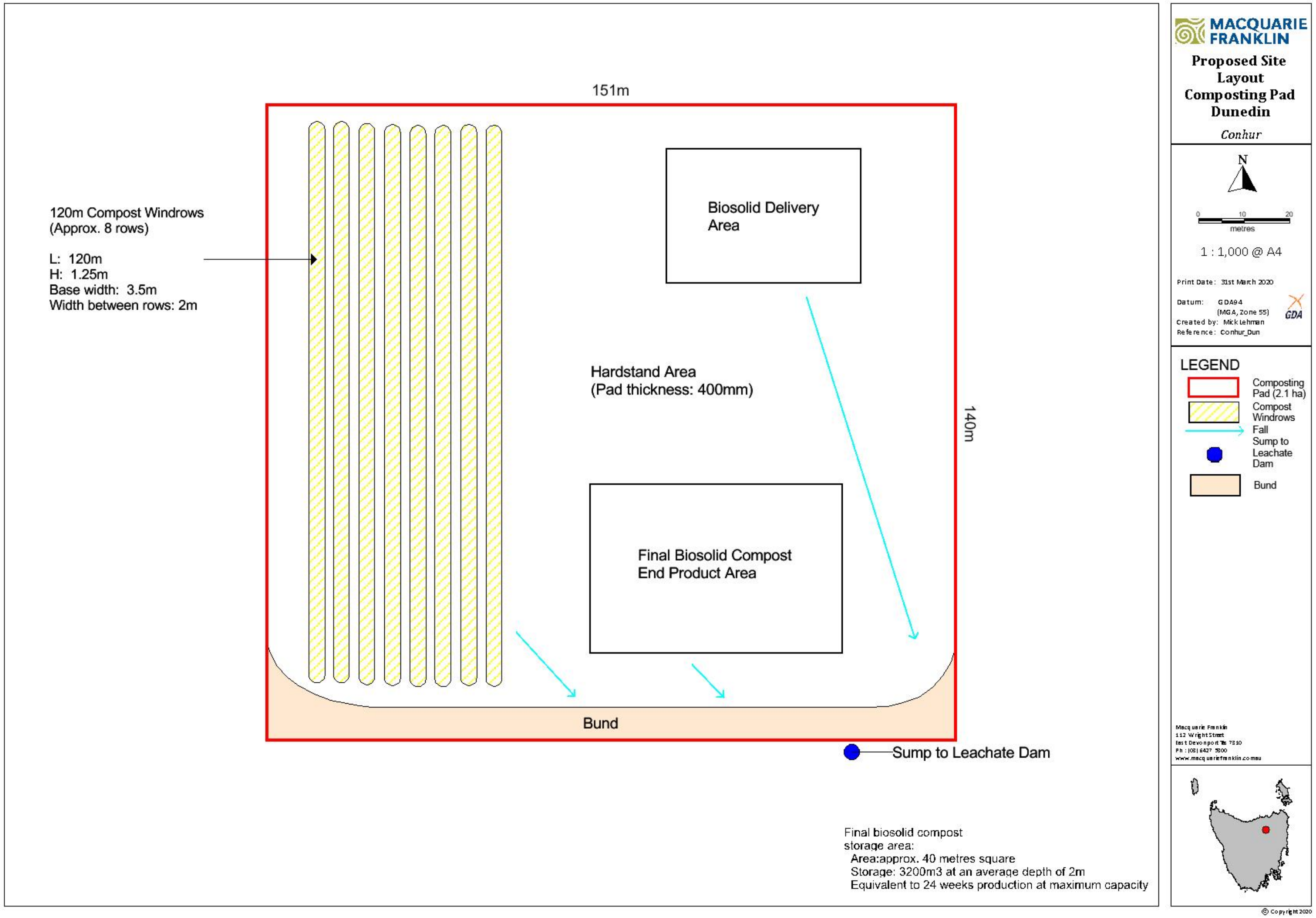

Figure 6. Proposed site layout

2.3 Commissioning

An approximate timetable for the construction and commissioning of the facility is as follows.

- Meetings with local stakeholders and EIS preparation – August 2019 to January 2020.
- Submit EIS – April 2020.
- EPA assessment – Early 2020.
- Commence construction of compost pad and leachate dam – Early 2020.
- Commissioning of leachate dam – Early 2020.
- Commence sludge delivery and composting operations – Early 2020.

Conhur will commence construction of the project following EPA assessment and approval.

2.4 Location map

The location of the proposed composting facility is provided in Figure 1. Land tenure and zoning under the Interim Planning Scheme is presented in Appendix A.

2.5 Site plan

A site plan showing the location of the composting pad, leachate capture dam and other onsite infrastructure is provided in Figures 2 and 3.

2.6 Off-site infrastructure

No offsite or external infrastructure (e.g. power transmission lines, water supply, etc) are required for the proposed facility.

3 Project alternatives

3.1 Site selection

Dunedin was selected as a preferred site due to its size and suitability for biosolids application and proximity to biosolids from TasWater's northern STPs and wood pin chips from Forico's Longreach timber operations. The proposed facility is located within an agricultural area, zoned as "rural resource" and is consistent with the surrounding land use. The site is to be located on the eastern slope of a low hill so the facility would not be visible from the Tasman Highway, located approximately 0.8 km north of the site.

Aerobic windrow composting was selected as the preferred technology and is one of the most reliable and cost-effective methods of composting. Effective management of inputs ensures aerobic conditions, low odour and dust emissions and produces a high-quality product for agricultural reuse.

3.2 Project benefits

The proposed facility is to be developed as part of an integrated statewide biosolids management program. At this time biosolids that do not meet class 2 quality requirements (as prescribed by the draft TBRG (2020)), cannot be processed or utilised in the northern region of Tasmania. Currently class 3 biosolids must be transported for reprocessing at facilities in the South and North-West of the state.

A recent review of biosolids quality by TasWater has determined that biosolids produced in North-Western Tasmania are predominantly non-stabilised (and class 3) and therefore cannot be directly applied to land. Whilst wastewater process improvements may occur over time, in the short-term, cost-effective options are required to manage this material close to its source.

Application of biosolids to land is widely accepted as beneficial. Biosolids provide a sustainable nutrient supply and have been demonstrated to soil improve water holding capacity and increase soil carbon. A facility with the capacity to reprocess class 3 biosolids to meet class 2 requirements, in accordance with the draft TBRG (2020), will provide a sustainable waste management outcome for TasWater and the community.

4 Public consultation

The proposed facility is consistent with other agricultural activities in the region and conducted on appropriately zoned land. Consultation has targeted the following key stakeholders:

- Launceston City Council
- TasWater
- Closest residential neighbour (located approximately 1.2 km from the facility)
- Dunedin landowner (Marcus Griffin and Samantha Hogg)

The Dunedin landowners have engaged with the closest resident (located approximately 1.2 km north west of the site) to discuss the proposed project and key issues such as odour, noise and traffic. No objections to the project were raised from the consultation. Conhur will continue to consult with neighbours, regulators and other key stakeholders throughout the life of the project.

Modelling conducted by Tarkarri Engineering (2020) found that odour and noise impacts from the site were unlikely to significantly impact the amenity of surrounding land uses including residential receptors, provided proposed management measures were implemented (refer to sections 6.1 and 6.5).

5 Existing environment

5.1 Planning aspects

Marcus Griffin and Samantha Hogg own the freehold to Dunedin. Land title is specified in Table 5. The surrounding land is predominantly agricultural land, with steeper forested hillsides to the east and rural land to the north, south and east of the site.

Table 5. Property address, ID and title reference.

Property Address	91 Blessington Rd, St Leonards
Property ID	3413687
Title Reference	170460/1, 169063/1

The composting facility will be developed on agricultural land zoned as "rural resource" under the *Launceston Interim Planning Scheme 2015*. The operation of the land complies with the allowed uses outlined in the *Launceston Interim Planning Scheme 2015*.

Launceston City Council has advised that the proposed activity is deemed a "resource processing" use under the *Launceston Interim Planning Scheme 2015,* and that a planning permit is required (refer Appendix E - email from Council Planner Iain More).

5.2 Environmental aspects

5.2.1 Topography

The topography of the region consists of lowland plains and gentle to steep vegetated ranges. Elevations across the site range from 230m above sea level near Hills Creek up to 265m at the proposed compost pad.

5.2.2 Local climate

The region is characterised by a cool, wet climate. January and February are the warmest months of the year with mean maximum temperatures of 24.5°C and 24.6°C respectively. June and July are the coldest months with mean minimum temperatures of 2.9°C and 2.3°C respectively (Launceston Ti Tree Bend Weather Station, BOM 2019).

Rainfall occurs throughout the year; with a mean annual rainfall of 703.3mm (Launceston Distillery Creek Weather Station, BoM 2019). Mean rainfall is highest between July and August (81.4 – 86.1mm) and lowest in February and March (34.5 – 39.6mm).

5.2.3 Geology and soils

The site is located on Jurassic aged dolerite and related rocks with the lower portion of the site around Hills Creek mapped on Tertiary aged sediments comprising of gravel, sand, silt, clay and regolith. Soils in the area consist of non-dispersive clay soils over highly weathered material/dolerite or cobbles within a silty clay matrix, with refusal depths between 0.7-3.0 metres (Geoton 2019).

The red and brown soils on basalt occur on the lower plains. These soils tend to extend from the colluvial soils at the toe-slopes of dolerite banks to small areas of alluvial soils in the valley drainage lines. As commonly seen in Tasmania, levels of chromium and nickel are very high in soils derived from dolerite and basalt. As seen in other soils derived from similar volcanic parent rocks, levels of other metals are often also elevated to some degree.

In general, the soils are imperfectly drained, with relatively low natural levels of phosphorous, high buffering capacity and Fe levels. No signs of sheet, rill or gully erosion are present within the site.

Examination of the LIST Landslide Planning Map indicates that the site is not mapped within a known landslide hazard area (Geoton 2019). A search of the LIST map identified no acid sulphate soil sites in or near the proposed project.

5.2.4 Biodiversity and natural values

The Dunedin property has a long history of agriculture, with a long history of grazing and improved pastures. The proposed compost pad and leachate dam are both located on existing farmland, so much of the native vegetation has been cleared or heavily grazed from stock, with only some native and introduced grasses remaining (refer to Figures 7 and 8). As a result, the natural values of the site are generally low.

A threatened species assessment was prepared for the project (Appendix F). The assessment included a desktop search of the relevant databases for populations, species and communities listed as threatened under the *Threatened Species Protection Act 1995* (TSP Act). A search of the natural values atlas (NVA) database was undertaken to determine threatened species listed under the TSP Act, that may occur within 5km of the site. A review of the aerial photography was conducted to determine the ecological value of the site (remnant sizes, connectivity) in the context of the surrounding landscape and historical land uses. An initial site visit was conducted on 10 October 2018. The compost pad site consisted of dolerite bedrock, heavily grazed pasture grasses, scattered Acacia species and some native grasses. Introduced pasture species dominate the alluvial flats and have a strong presence on the dolerite rise.

Several listed threatened flora and fauna records and TASVEG 3.0 Communities occur within, and adjacent to, the greater Dunedin property (within 5km). However, no listed threatened flora or fauna species were identified within 1km of the proposed facility footprint. Key features are included in the general location map (Figure 2).

5.2.4.1 Vegetation communities

Two TASVEG 3.0 vegetation communities were identified within the proposed footprint and include, Bursaria – Acacia woodland and scrub (NBA) and Agricultural Land (FAG) (Appendix F). The Acacia woodland has been heavily grazed by sheep, mostly cleared and is in poor condition with only a few isolated trees remaining.

Six key TASVEG 3.0 vegetation communities were identified within 1km of the project and include:

1. Bursaria – Acacia woodland and scrub (NBA)
2. Agricultural Land (FAG)
3. Lowland grassland complex (GCL)
4. *Eucalyptus viminalis* grassy forest and woodland (DVG)
5. *Eucalyptus amygdalina* forest and woodland on dolerite (DAD)
6. *Leptospermum scoparium* heathland and scrub (SLS)

No threatened communities (TNVC 2014) were identified within 1km of the project.

Three threatened communities (TNVC 2014) were identified on the greater Dunedin property and include, *Eucalyptus amygdalina* inland forest and woodland on Cainozoic deposits (DAZ), *Eucalyptus ovat*a forest and woodland (DOV) and Eastern Riparian Scrub (SRE). The location of these vegetation communities are provided in Figure 2. None of these communities were present in or near the proposed facility.

5.2.4.2 Threatened flora species

The NVA report identified several threatened flora species listed under the TSP Act near the boundary and outside of the greater Dunedin property, including *Epacris exserta* (endangered), *Persicaria decipiens* (vulnerable) and *Velleia paradoxa* (vulnerable) (Figure 2). The latter two species were last recorded in 1951 and 1965 respectively. No threatened flora species were identified within 1km of the proposed project footprint.

5.2.4.3 Threatened fauna

There are also several threatened fauna species (listed under the TSP Act) that may potentially occur in the area (based on general distribution), including the Green-lined Ground Beetle *Catadromus lacordairei* and Tussock Skink *Pseudemoia pagenstecheri* (both listed as vulnerable). No listed threatened fauna species were identified within 1km of the proposed project.

The NVA report identified one raptor (Tasmanian Wedge-tailed Eagle) nest within the greater Dunedin property. Observed as non-active in 1985, being located 1.7km south-west of the compost facility and in a heavily vegetated gully (Figure 2). Two other fauna species were identified, the Eastern Barred Bandicoot (3km northeast of the compost site) and an Australian Grayling, a native fish (2.3km southwest of the compost site).

Due to ongoing grazing activities and pasture development, there is a general lack of suitable habitat for terrestrial fauna at the proposed site. The area may provide some low value habitat in terms of foraging and roosting in isolated Acacia trees around the site.

The threatened species assessment identified that the project is unlikely to significantly impact any matters of national environmental significance protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). As a result, the project will not be referred to the Commonwealth Department of the Environment and Energy for approval under the EPBC Act.

5.2.4.4 Introduced weeds

The NVA report identified no weeds listed under the Tasmanian *Weed Management Act 1999* within 1 km of the proposed compost facility.

A weed assessment was conducted by Macquarie Franklin for the general project area on 7 January 2020 (Appendix J). The area was walked (via zigzag pattern) and surveyed for known environmental or declared weeds (or any unusual plants). The location of identified weed species are presented in Appendix J.

Minimal weed infestation was identified at the site, with limited species and numbers of weed plants found. Common grass weeds or exotic herbs have not been listed (e.g. Scotch thistle (*Cirsium vulgare*), Yorkshire fog grass (*Holcus lanatus*), century plant (*Centaurium erythraea*), as they are ubiquitous throughout Tasmania and no special management requirements are necessary (Macquarie Franklin 2020).

Three declared weeds (listed under the *Weed Management Act 1999*) were found at the site (gorse, blackberry and slender thistle). All are listed as Zone B weeds under their respective statutory weed management plans. There was one weed noted as an environmental weed (briar rose) and another (prunus), although not strictly considered an environmental weed. These are weeds that while not listed under the *Weed Management Act 1999*, can still have negative impacts on environmental or agricultural values, and where appropriate should be controlled.

Recommendations for the control of these weed species (based on principles outlined in the Weed and disease planning and hygiene guidelines (Department of Primary Industries Parks Water and Environment, 2015)) are provided in section 6.8.4 and Appendix J.

No conservation reserves or areas of high-quality wilderness (as identified in the Tasmanian Regional Forest Agreement) are located on or within 1km of the proposed facility. No geoconservation sites, acid sulfate soils or known biosecurity risks were identified with 1 km of the site.

Figure 7. Location of the proposed compost pad.

Figure 8. Location of the proposed leachate capture dam.

5.2.5 Groundwater

The groundwater of the immediate area of the proposed compost pad will likely include unconfined aquifers sitting on the dolerite and fractured aquifers within the dolerite. The test pits completed by Geoton found that the unconfined aquifer was between the depths of 2.0m and 2.7m below ground level within the lower eastern portion of the site. The proposed compost pad lies within a groundwater recharge zone on top of the hill, while it is likely that the lower slopes and Hills Creek fall within groundwater discharge zones. A conceptual hydrogeological model in section 6.4.1 provides more details of the groundwater system of the site.

There are three groundwater bores located within 5km of the site, the nearest of these are two bores approximately 2.8km to the west. All three bores have been installed by DPIPWE, two have been capped and one abandoned. The bores have all been drilled into dolerite at depths greater than 40m below ground level.

5.2.6 Surface Water

The North Esk River is the largest water course in the region and is situated approximately 3km south of the proposed facility. The compost pad, leachate dam and associated infrastructure is in the upper portion of the Hills Creek catchment.

The compost pad will be located within the upper western portion of the catchment, which has a gentle to moderate fall (1-5°) towards the east with a patchy cover of mature native trees and scrub with boulders, cobbles and bedrock outcropping on the ground surface. A drainage depression is located immediately to the south of the proposed compost pad running downhill towards the east into the ephemeral Hills Creek, which flows from north to south. The proposed leachate capture dam is to be located within the lower portion of the site where the ground surface is near level and has a low grass cover with patches of scrub and occasional mature trees (Geoton 2019).

5.3 Socio-economic aspects

The proposed facility is situated in the locality of St Leonards-White Hills within the City of Launceston. The locality has a population of 2,230 (ABS 2018) and a population density of 0.24 person per hectare. Economic activity in the local area is primarily agriculture and therefore the proposed project is consistent with this economic zone.

The proposed facility will employ approximately five local contractors during the construction phase and one full time position during the operation of the project. The construction and commissioning of the project will take approximately three months. Furthermore, the facility will process 3000-5000 wet tonnes of biosolids and 3000-5000 tonnes of wood pin chips per annum and provide a cost-effective sustainable waste management outcome for TasWater and the community.

6 Potential impacts and their management

6.1 Air quality

6.1.1 Existing conditions

An air emission assessment was conducted for the site by Tarkarri Engineering (2020). The assessment report is provided in Appendix D and summarised below. Three major sources of odour were included in the assessment and include:

- Delivery and initial storage of biosolids.
- Composting windrows.
- Leachate dam.

The screening air dispersion model SCREEN3 was used to provide conservative odour ground level concentrations values from the facility. SCREEN3 uses a Gaussian plume model that incorporates source related factors and meteorological factors to estimate pollutant concentration from continuous sources. The following model settings were used:

- All sources were modelled as area sources.
- Rural dispersion coefficient.
- Receptors at ground level.
- Simple flat terrain.
- Full meteorology (i.e. all stability classes and wind speeds considered).

This is a conservative assumption with winds in the area predominantly from the north and northwest taking air emissions away from receptors.

There are currently no known or significant air pollutants in the Dunedin area.

6.1.2 Performance requirements

Air emissions from the project are assessed against the relevant requirements of the *Environmental Management and Pollution Control Act 1994* and Environment Protection Policy (Air Quality) 2004.

6.1.3 Potential impacts

Air emissions from the composting windrows (e.g. odour and dust) and leachate dam (e.g. odour) have the potential to cause environmental nuisance if not managed appropriately. The closest residential receptor is located approximately 1.2 km west of the facility. The Dunedin property boundary and boundary with the Tasman Highway is situated approximately 0.8 km north of the facility (Figure 1).

Results from the Tarkarri Engineering (2020) modelling study show predicted ground level concentrations of odour are above the Tasmanian Environment Protection Policy (Air Quality) 2004 (EPP 2004) criterion level of two Odour Units (OUs) at the project boundary, although the project boundary is less than 100m away. However, a substantial land buffer exists between the project boundary and the Tasman Highway (approximately 0.8 km) and the closest residential receptor (1.2 km) (Figure 1). The TBRG 1999 (not stated in the draft TBRG (2020)) recommend a minimum buffer zone of 500m to minimise the impact of odour problems from compost turning activities.

Predicted ground level concentrations at the Tasman Highway are cumulatively (i.e. combined concentration from all three sources) less than 2 OUs and at the closest residential receptor are below 1 OU. This suggests that the current buffer (provided by the greater Dunedin property) between the facility and sensitive receptors is adequate, and that odour emissions from the site are unlikely to significantly impact the amenity of surrounding land uses.

Wind roses from Launceston Airport and Launceston (Ti Tree Bend) Bureau of Meteorology weather stations indicate that strong winds occur from the north and northwest, and that winds from the east and northeast are rare (Tarkarri Engineering 2020). Therefore, the closest residential receptor (located approximately 1.2 km north west of the facility) is unlikely to be impacted.

In addition, a second and more conservative model was conducted using the initial emissions rate (of 0.80 $OU/m^2/s$) across the area during the thermophilic stage of composting (weeks 1-6) and a 200% increase in emissions from the maturation stage (weeks 7-12). The resulting predicted ground level concentration at 1.2 km distance (i.e. distance to closest residential receptor) for all cumulative sources (including biosolids delivery, windrows and leachate dam) was 1.45 OUs. However, at the Tasman Highway (also the Dunedin property boundary, located 0.8 km from the facility) the predicted ground level concentration slightly exceeded the 2 OUs criterion (at 2.14 OUs).

It should be noted that the second study was based on a highly conservative model (i.e. a flat open modelling area with prevailing winds in the direction of sensitive receptors with very conservative odour emission rates) and no management intervention of the compost windrows, therefore high odour emissions for the entire composting period. While this scenario is unlikely it does suggest some risk of adverse impact should upset conditions at the site develop. With this in mind, a list of critical considerations for control of the composting process are provided with a view to minimising the potential for upset conditions to develop. Management measures outlined below will prevent these conditions from occurring (refer to section 6.1.4).

Potential dust emission sources associated with the site and their potential impact and / or management include:

- Internal traffic movements: The frequency of movements is not expected to add significant quantities of dust to the local airshed.
- Dry composting surface: Maintenance of composting moisture levels with the application of leachate and regular turning should minimise the potential of dust emissions from this source.
- Storage of pin chips for input to compost: The pin chips are not expected to produce significant quantities of dust.

The impact of dust emissions from the site is not expected to be significant to the surrounding land uses and the closest residential receptor.

6.1.4 Avoidance and mitigation measures

The following avoidance and mitigation measures will be implemented to provide optimal conditions for composting while controlling odour and dust emissions from the project:

- Windrow temperature will be maintained at a minimum temperature of 40 ^{0}C for >14 days, and at an average temperature of >45 ^{0}C and 4 hours >55 ^{0}C as outlined in the draft TBRG (2020).
- Oxygen concentrations will be maintained by regular turning of windrows (three times a week during the thermophilic stage).
- In row moisture levels between 50% and above 60% moisture content are often considered optimal for aerobic composting. Conhur will manage moisture levels to maintain a satisfactory temperature profile. Moisture levels will be maintained with leachate from the capture dam. It may also be necessary to remake compost windrows to manage the excess moisture.
- Starting carbon to nitrogen ratios will be targeted at 20:1 to ensure optimal thermophilic conditions.
- pH levels will be maintained between 6 to 7.5 to provide optimal conditions. Controlling pH is particularly important if composting materials are high in nitrogen. If required, acidifying agents will be used to maintain pH levels.

Maintenance of aerobic conditions in the leachate capture dam will be key to controlling odorous emissions such as reduced sulphur compounds. If required, subsurface aeration will be considered under such circumstances.

6.1.5 Assessment of net impacts

Despite predicted odour emissions exceeding the EPP (2004) criterion level of two OUs at the project boundary, a considerable land buffer (the Dunedin property) is present between the project boundary and sensitive land uses such as the Tasman Highway and residential receptors (see Figure 1). At the closest residential receptor predicted odour concentrations are below the criterion and suggests that odour emissions from the site are unlikely to significantly impact the amenity of surrounding land uses.

Implementation of the above avoidance and mitigation measures will ensure that odour and dust emissions from the site will be low and not cause environmental nuisance to the closest residential receptor or at the land boundary.

The impact of dust emissions from the construction and operation of the project is not expected to be significant to the surrounding land uses and the closest residential receptor.

Number	Management measures	Timing
1	Monitor and maintain optimal conditions for composting (e.g. temperature, oxygen, moisture, C:N ratio and pH) to control odour and dust emissions.	Operation

6.2 Risk assessment

An assessment was conducted to identify the key risks to surface water and groundwater from the proposed project. A standard likelihood/consequence numerical risk approach (Figure 9) was adopted for this assessment.

The consequence and likelihood for each risk are scored and compared against other risks. The analysis provides a residual risk rating and proposed management and monitoring actions required to manage the risk. Table 6 summarises key risks to surface water and groundwater, and relevant mitigations associated with activities at the composting site.

			Consequence				
			1	2	3	4	5
			Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	5	Almost Certain	5	10	15	20	25
	4	Likely	4	8	12	16	20
	3	Possible	3	6	9	12	15
	2	Unlikely	2	4	6	8	10
	1	Rare	1	2	3	4	5

Low	Medium	High	Extreme

Figure 9. Risk matrix used in risk assessment

Table 6. Surface and groundwater risk assessment

Risk	Potential Causes	Potential Impacts	Mitigation Plans	Consequence	Likelihood	Residual Risk Rating	Monitoring required to inform risk management
Surface water Disturbance during construction	Soil disturbance during construction activities.	Release of sediments to Hills creek	Minimise disturbance, Implement an erosion and sediment control plan during construction	2	2	4 - Low	Regular maintenance and monitoring of erosion and sediment controls
Surface water – compost pad Composting activities contaminate stormwater	Compost runoff overflows bunds or sump during high rainfall event	Release of contaminants (nutrients) to Hills creek catchment	Bunds, sump and pipe to leachate dam designed with an Annual Exceedance Probability (AEP) of 1% (i.e. 1 in 100 years flood event) and a 1 in 10 year storm/rain event (refer to section 2.2.1). Regular inspections of bunds, sump and pipe.	2	3	6 - Medium	
Surface water - Dam Overflow of leachate dam	Pond overflows during high rainfall event	Moderate risk of nutrient rich water entering the receiving environment of Hills Creek	Dam designed with an Annual Exceedance Probability (AEP) of 1% (i.e. 1 in 100 years flood event) and an additional 1 in 10 year storm/rain event.	3	2	6 - Medium	Weekly inspection of gauge boards
Groundwater - pond Leaking clay liner of pond	Pond liner leaks	Contamination of groundwater with elevated nutrients	Pond is engineered to wastewater pond standard to	2	3	6 - Medium	Monitor groundwater

Risk	Potential Causes	Potential Impacts	Mitigation Plans	Consequence	Likelihood	Residual Risk Rating	Monitoring required to inform risk management
			ensure seepage from the pond is prevented				downslope of the pond
Groundwater – Compost pad Current activities contaminate groundwater	Compost pad bund overflows bunded area during high rainfall event (when bunded area is already at capacity)	Release of contaminants (nutrients) to groundwater	Bunds, sump and pipe to leachate dam designed with an Annual Exceedance Probability (AEP) of 1% (i.e. 1 in 100 years flood event) and a 1 in 10 year storm/rain event (refer to section 2.2.1). Compost pad constructed as per recommendations of the geotechnical engineering report (Geoton 2019, 2020) Regular inspections of bunds, sump and pipe.	2	2	4 - Low	Monitor groundwater downslope of pad
Surface water - Transport Spill during transport of biosolids	Spill when transferring biosolids to the compost pad	Contamination of surface waters with nutrients	Biosolids are transported by a licenced contractor in a licenced vehicle. Spill procedure is followed to prevent biosolids from entering waterways. Transfer to occur on bunded pad.	2	1	4 - Low	Report spills if they occur. Inspection of spill area post clean up

6.3 Water quality (surface and drainage)

6.3.1 Existing conditions

The compost pad and leachate dam are located in the upper catchment of the ephemeral Hills Creek. Hills Creek enters the North Esk River approximately three km downstream of the site. The North Esk catchment, surrounding land and site all have a long history of stock grazing and agriculture. All surface water runoff from the proposed compost pad and leachate dam site drains towards Hills Creek (Figure 3).

Surface water monitoring of Hills Creek was conducted on September 4, 2019 and November 25, 2019 (approximately 3 months between sampling events). Two sites were sampled during each monitoring event, upstream and downstream of the proposed leachate capture dam. The location of the sampling sites is presented in Figure 3. Surface water results are provided in Table 7.

Given the rural location of Hills creek and surrounding land use (i.e. livestock grazing and improved pasture), baseline surface water results are within the expected ranges for all analytes, except for electrical conductivity, which appears to be elevated. Further monitoring will be required to form an understanding of the site-specific baseline data over time. Nitrate as N and Nitrite + Nitrate as N values were slightly higher downstream of the proposed leachate capture dam site (Table 7). Electrical conductivity, total dissolved solids, thermotolerant coliforms and E.coli levels were higher in November compared to September.

Table 7. Site-specific baseline surface water monitoring results from Hills Creek.

Parameter	Units	Site 1 (Upstream of the leachate dam)		Site 2 (Downstream of the leachate dam)	
		4 September 2019	25 November 2019	4 September 2019	25 November 2019
pH	pH unit	7.2	7.46	7.5	7.85
Electrical Conductivity (EC)	µs/cm	541	896	425	834
Total Dissolved Solids (TDS)	mg/L	316	460	292	415
Aluminium (Al) (Dissolved metals)	mg/L	0.02	0.01	0.05	0.02
Arsenic (As)	mg/L	<0.001	<0.001	<0.001	<0.001
Barium (Ba)	mg/L	0.039	0.039	0.028	0.038
Chromium (Cr)	mg/L	<0.001	<0.001	<0.001	<0.001
Cobalt (Co)	mg/L	<0.001	<0.001	<0.001	<0.001
Copper (Cu)	mg/L	<0.001	<0.001	<0.001	0.001
Lead (Pb)	mg/L	<0.001	<0.001	<0.001	<0.001
Manganese (Mn)	mg/L	0.037	0.044	0.009	0.032
Nickel (Ni)	mg/L	0.001	0.001	<0.001	0.001
Selenium (Se)	mg/L	<0.01	<0.01	<0.01	<0.01
Vanadium (V)	mg/L	<0.01	<0.01	<0.01	<0.01
Zinc (Zn)	mg/L	<0.005	<0.005	<0.005	<0.005
Iron (Fe)	mg/L	0.15	0.12	0.14	0.12
Fluoride (F)	mg/L	<0.1	<0.1	<0.1	0.1
Ammonia as N	mg/L	0.06	<0.01	0.06	<0.01
Nitrite as N	mg/L	<0.01	<0.01	<0.01	<0.01
Nitrate as N	mg/L	<0.01	0.02	0.04	0.05
Nitrite + Nitrate as N	mg/L	<0.01	0.02	0.04	0.05

Parameter	Units	Site 1 (Upstream of the leachate dam)		Site 2 (Downstream of the leachate dam)	
		4 September 2019	25 November 2019	4 September 2019	25 November 2019
Total Kjeldahl Nitrogen as N	mg/L	0.6	0.2	0.4	0.6
Total Nitrogen as N	mg/L	0.6	0.2	0.4	0.6
Total Phosphorus as P	mg/L	0.03	<0.01	0.02	<0.01
Reactive Phosphorus as P	mg/L	<0.01	<0.01	<0.01	<0.01
C6 - C9 Fraction (TPH)	µg/L	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	<50	<50	<50	<50
C10 - C36 Fraction (sum)	µg/L	<50	<50	<50	<50
C6 - C10 Fraction (TRH)	µg/L	<20	<20	<20	<20
C6 - C10 Fraction minus BTEX (F1)	µg/L	<20	<20	<20	<20
>C10 - C16 Fraction	µg/L	<100	<100	<100	<100
>C16 - C34 Fraction	µg/L	<100	<100	<100	<100
>C34 - C40 Fraction	µg/L	<100	<100	<100	<100
>C10 - C40 Fraction (sum)	µg/L	<100	<100	<100	<100
>C10 - C16 Fraction minus Naphthalene (F2)	µg/L	<100	<100	<100	<100
Benzene (BTEXN)	µg/L	<1	<1	<1	<1
Toluene	µg/L	<2	<2	<2	<2
Ethylbenzene	µg/L	<2	<2	<2	<2
meta- & para-Xylene	µg/L	<2	<2	<2	<2
ortho-Xylene	µg/L	<2	<2	<2	<2
Total Xylenes	µg/L	<2	<2	<2	<2
Sum of BTEX	µg/L	<1	<1	<1	<1
Naphthalene	µg/L	<5	<5	<5	<5
Thermotolerant coliforms	cfu/100 ml	<10	31	<10	20
E. coli	cfu/100 ml	<10	31	<10	20
Enterococci	MPN/100 ml	<10	NS	<10	NS

NS: Not sampled.

6.3.2 Performance requirements

The management of surface water will comply with the relevant requirements of the:

- State Policy on Water Quality Management 1997
- *Water Management Act 1999*Australian Water Quality Guidelines as per ANZECC (2000)
- Protected Environmental Values (PEVs) for the Tamar Estuary and North Esk Catchments (DPIWE 2005)

The relevant PEVs appropriate to the receiving environment (based on the Tamar Estuary and North Esk Catchments for surface waters flowing through private land) include:

A: Protection of Aquatic Ecosystems

(ii) Protection of modified (not pristine) ecosystems

a. from which edible fish are harvested

B: Recreational Water Quality & Aesthetics
(ii) Secondary contact water quality

It is noted that Coralynn is located approximately 5.5 km downstream of the site on the North Esk River and is considered a primary contact recreational area.

6.3.3 Potential impacts

If not managed, leachate and runoff from the site has the potential to carry nutrients and contaminants into Hills Creek and the North Esk River. The failure of the leachate capture dam, sump and bunds may result in emissions into the unconfined aquifer and Hills Creek, leading to a reduction in aquatic values and water quality, and impacting PEVs. Furthermore, ground disturbance during construction can lead to erosion and sediment runoff causing downstream impacts to Hills Creek.

6.3.4 Avoidance and mitigation measures

All surface water runoff is to be diverted around the compost pad and leachate dam with the installation of cut-off drains located uphill of the infrastructure.

Surface water runoff and leachate from the compost pad will be directed into a collection sump located on the downslope corner of the pad (Figure 6). Leachate will be piped from the collection sump to the leachate capture dam via a 200mm pipe. Bunding will be constructed along the downslope edge of the compost pad at a height of 200-400mm to ensure that all runoff is diverted to the collection sump and prevented from discharging onto the ground adjacent to the pad.

All bunds, cut-off drains and the leachate collection sump will be regularly inspected and recorded by site personnel.

Moisture levels within the compost windrows will be monitored by site personnel. If required, leachate water will be pumped from the dam and added to the windrows. In the event that leachate water is not available, water will be pumped from the 2 x 20,000L onsite water tanks.

The leachate dam design, criteria and consequence assessment are provided in Geoton (2019) (Appendix C). The leachate dam (capacity 26.4ML) has been designed for an additional 1 in 10 year storm event. The consequence assessment for the failure of the leachate dam, as a worst credible scenario is “Low” based on the intent of the ANCOLD Guidelines on the Consequence Categories for Dams, 2012. A break in the dam wall is considered to generally have a ‘Medium’ environmental impact, with an impact duration of 1 to 5 years affecting stock and fauna within an area of $1km^2$ to $5km^2$ downstream (Geoton 2019). Erosion and sediment laden runoff will be managed during the construction phase to minimise downstream impacts. Sediment control bunds and traps will be installed prior to construction to manage surface water runoff during works. Design and construction details for the compost pad and leachate dam are provided in sections 2.2.1 and 2.2.2 respectively.

6.3.4.1 Water balance

Water balance calculations have been completed for the leachate dam and include:

- Mean annual rainfall.

- 10^{th} percentile annual rainfall.
- 90^{th} percentile annual rainfall.

A summary of the water balance calculations is presented in Table 8. Calculations are based on rainfall figures from Distillery Creek, Launceston (Weather Station No. 91181) and evaporation data from Scottsdale, West Minstone Road (Weather Station No. 91219). It should be noted that the 90^{th} percentile annual rainfall data is calculated for each month for the 12 months and therefore is considered conservative. Water balance calculations are attached in Appendix I.

Table 8. Summary of water balance calculations.

Rainfall Condition	Annual Rainfall (mm/year)	Maximum available for irrigation (ML)	Irrigation requirement (ML/ha/Annum)	Irrigation area (ha)
Mean rainfall	703.3	14.1	1.7	8.3
10^{th} percentile	530.5	-0.3	2.7	0
90^{th} percentile*	903.6	30.3	0.8	37.9
90^{th} percentile^{+}	903.6	22.6	0.8	28.3

*Based on 100% runoff from pad (2.1ha). $^{+}$Based on 70% runoff from pad (1.47ha)

It should be highlighted that a conservative approach has been adopted for the water balance. The available irrigation volumes are considered maximums, as the water balance assumes that no leachate dam water is used to maintain moisture levels of the compost windrows during dry periods. Furthermore, that 100% of rainfall from the pad is directed into the dam, it is likely that some water will be absorbed into the compost windrows and evaporated, particularly in the drier months. To account for this discrepancy, volumes have also been calculated at 70% runoff from the pad for a wet year (90^{th} percentile) as this is considered a more realistic scenario.

In a mean rainfall year, maximum flows into the dam (minus evaporation) would be up to 14.1 ML/annum, with an irrigation requirement of 1.7 ML/ha/annum and therefore an irrigation area of up to 8.3 ha may be required.

In a dry year (10^{th} percentile) maximum flows into the dam (minus evaporation) would be -0.3 ML/annum, with an irrigation requirement of 2.7 ML/ha/annum, therefore no irrigation is required.

In a wet year (90^{th} percentile) maximum flows into the dam (minus evaporation) would be up to 30.3 ML/annum, with an irrigation requirement of 0.8 ML/ha/annum and therefore an irrigation area of up to 37.9ha may be required. Based on 70% runoff from the pad, the maximum volume available for irrigation would be 22.6 ML and require an irrigation area of 28.3 ha.

6.3.4.2 Leachate monitoring and irrigation

A comprehensive site assessment will be conducted prior to any irrigation to determine the following:

- Biosolid compost leachate irrigation water quality.
- Critical distances and buffer zones.
- Local climate and landscape.

- Soil sampling assessment, to understand the baseline conditions, characteristics and suitability of the proposed irrigation area.

This information will inform a leachate irrigation management plan. Irrigation will be managed in accordance with requirements of the Environmental Guidelines for the Use of Recycled Water in Tasmania (DPIWE 2002).

Leachate dam water quality monitoring will occur on a quarterly basis (during groundwater and surface water monitoring, refer to sections 7.2 to 7.4) ensuring that data is available before any irrigation occurs. The frequency of monitoring and the sample analysis suite will be reviewed one year after the leachate dam is operational and a minimum of four sampling events have been undertaken.

The quality of leachate water with respect to the concentration of key contaminants is difficult to accurately predict prior to testing. However, water quality in the leachate dam is most likely to be impacted by the transfer of particulate matter from the pad to the leachate dam, rather than the dissolved contaminants in runoff from the pad. The transfer of particulate matter will be minimised by good pad management, for example keeping materials contained within windrows on the pad.

Key risks for the sustainable reuse of leachate water are; salinity, sodicity and nutrient accumulation. Sodium inputs are expected to low as there is no identifiable source in the inputs. Accumulation of sodium in the surface soils or on the cation exchange is therefore unlikely. It is likely that there will be some transfer of nitrogen and phosphorus to the leachate dam as they are present in biosolids in significant levels. Nutrient levels in the dam will be monitored (refer to section 7.2) and there is land available at the site to adjust the leachate irrigation area as necessary to manage nutrient application rates.

Other potential risks to the sustainable reuse of water include metals in the leachate water. Significant transfer of metals is unlikely but can be managed by adjusting application area or shandying the leachate with freshwater. Dam water levels (i.e. volumes available for irrigation) and tested water quality parameters will determine the required irrigation area and/or application rates in any given year.

Contaminant levels will be assessed against the recommended maximum concentration of metals in irrigation waters (Table 4.2 of the Environmental Guidelines for the Use of Recycled Water in Tasmania, 2002).

Water levels in the leachate dam will be monitored with gauge boards. Site personnel will ensure that a safe freeboard is maintained, and a contingency plan will be implemented if the level reaches 80% (section 7.2). If required, leachate water will be pumped back up to the compost pad and applied to windrows to maintain moisture levels. If monitoring identifies high water levels in the leachate dam and water cannot be irrigated, then water will be recycled to compost windrows.

Effective management of the composting operations on the pad (to minimise runoff into the dam) and levels in the leachate dam (drawing down prior to winter) are therefore key to mitigating risk of leachate overflow. In the unlikely event that leachate water cannot be either recycled back onto the compost windrows or irrigated to land, then water will be directly removed from the dam via a water truck and disposed at an approved offsite facility. However, given the designed capacity of the leachate dam (26.4 ML) and the ability manage water levels throughout the year, this is considered highly unlikely. Further information on leachate monitoring is provided in section 7.2.

Based on the indicative water balance (Table 8), an area of up to approximately 28.3 ha may be required for leachate irrigation. It is anticipated that the paddocks north of the proposed leachate dam up towards the Tasman Highway will be utilised. Given the large area available for irrigation on the Dunedin property, finding suitably sized areas will not be an issue.

The proposed location of the leachate irrigation areas is provided in Figure 10 and include a primary irrigation area of 8.3 ha (suitable for a mean rainfall year) and an additional contingency irrigation area of 32.3 ha (suitable for a 90th percentile year). Buffer zones include 50 m from the Hills creek and 100 m from the Tasman Highway.

It should be noted that biosolid compost (and biosolids) will not be applied to leachate irrigation areas, and areas where biosolids have been spread will not be irrigated with leachate water, thus avoiding entrainment and/or runoff of biosolids. No overlap of biosolids and leachate dam irrigation water will occur. In addition, normal irrigation practice does not include application of a leaching fraction. Results from a soil test pit located just north of the leachate dam found the water table at depths between 2.0m and 2.7m below ground level (Geoton 2019).

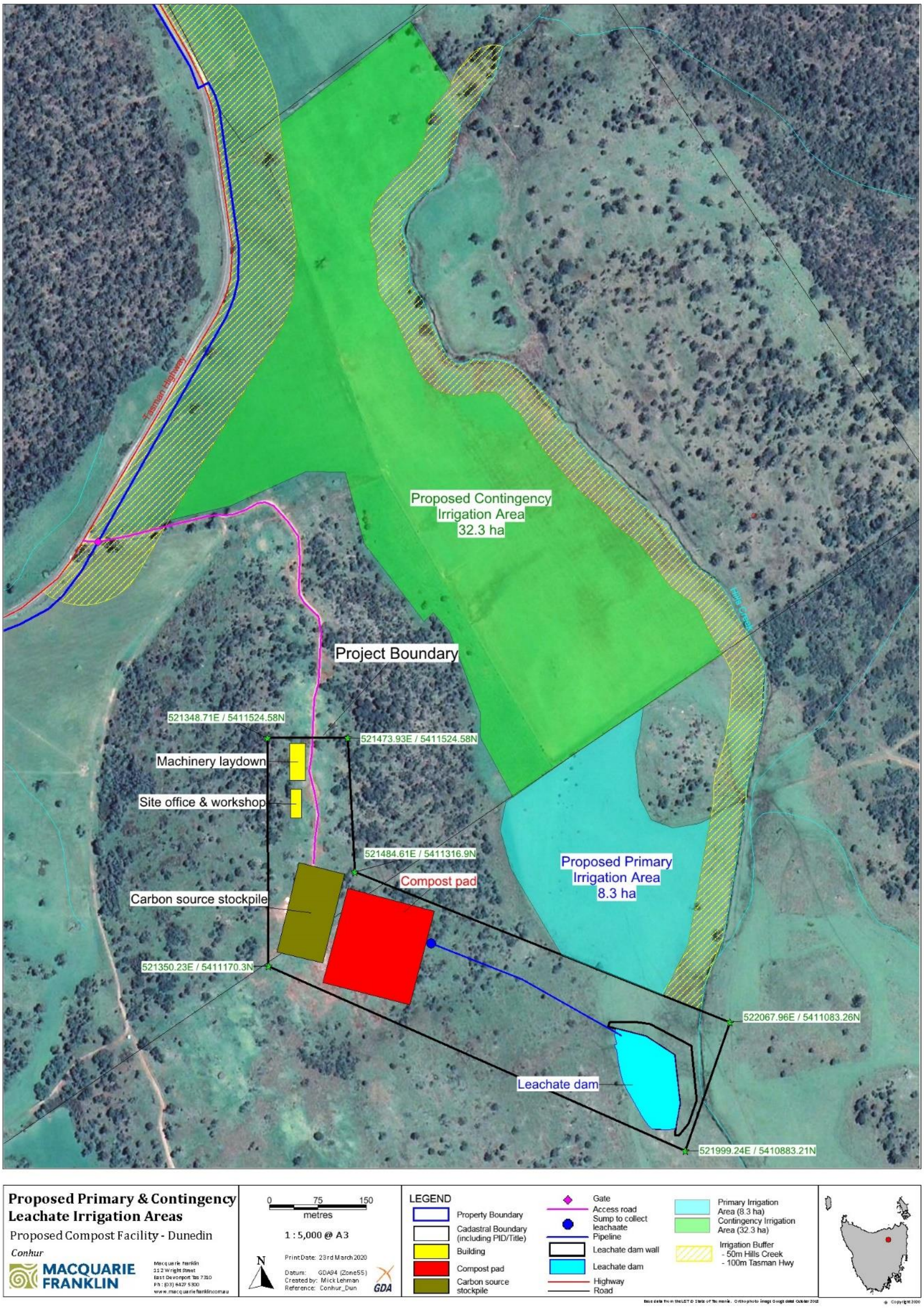

Figure 10. Proposed primary and contingency leachate irrigation areas

Soils in the area consist of non-dispersive clay soils over highly weathered material/dolerite or cobbles within a silty clay matrix, with refusal depths between 0.7-3.0 metres (Geoton 2019). The area surrounding the leachate dam that may be used for leachate irrigation is area 2 of the BMP. Detailed soil test results are found in Appendix C of the BMP. Soil in the immediate area is colluvial and derived from the surrounding dolerite hills and has the following general characteristics:

- Satisfactory pH, pH_{CaCl} 5.6, pH_{water} 6.4.
- Non-saline, EC_{se} 0.6.
- Non-sodic, exchangeable Na 2.8%.
- Good organic matter, 6.4%.
- Low phosphorous, Colwell P 20, PBI 150 (deficient).
- Sown to permanent pasture.

Similar soils are commonly irrigated in Tasmania with a range of irrigation equipment. In this case, it is likely that a traveling gun will be used. Adjacent areas to the north not initially assessed but very similar, are also suitable for irrigation.

It should be noted that the pivot irrigation infrastructure, located in the north eastern corner of the Dunedin property (as shown in Appendix B of the BMP) will not be used for leachate. Water for pivot irrigation is sourced from a nearby dam. While biosolids may be applied to the pivot irrigated area, the risk of this leading to nutrient run off is low. The application of water in the pivot irrigation area managed by the landowner is based on deficit irrigation and biosolids application will occur at less than 50% NLAR (as per the AMM). Furthermore, normal irrigation practice does not include application of a leaching fraction.

6.3.4.3 Surface water monitoring

Further surface water monitoring data will be collected prior to construction and will be continued during operation at two locations (upstream and downstream of the leachate dam) on a quarterly basis. The frequency of monitoring and the sample analysis suite will be reviewed one year after operations commence and a minimum of four sampling events have been undertaken.

The monitoring program will determine if nutrients and/or contaminants from the composting pad and leachate dam are impacting Hills Creek. Further discussion on the surface water monitoring program is provided in section 7.3.

No hydrocarbons (diesel fuel and oils) will be stored in permanent tanks at the compost facility. Fuel and oil will be stored on a light vehicle and transferred directly to machinery and therefore pose only a low risk. A hydrocarbon spill kit will be placed in an accessible location to contain a spill. Any spill will be cleaned up immediately and recorded in a site register. Site personnel will be trained in spill response procedures. Waste oil will be recycled at a waste management facility.

Any onsite mobile toilet will be managed in accordance with the specifications by a local licenced contractor. No emissions are therefore expected.

6.3.5 Assessment of net impacts

Implementation of the above avoidance and mitigation measures will ensure that surface water runoff is managed and therefore will not cause any adverse impacts to the surface water values of Hills Creek.

Number	Management measures	Timing
2	Sediment control bunds and traps will be installed prior to construction to manage erosion and sediment runoff.	Pre-construction
3	Water quality in the leachate dam will be monitored on a quarterly basis.	Operation
4	Surface water monitoring will be conducted at Hills Creek on a quarterly basis, upstream and downstream of the leachate dam.	Operation
5	A leachate irrigation management plan will be developed.	Prior to leachate irrigation.

6.4 Groundwater

6.4.1 Existing conditions

The conceptual hydrogeological model in Figure 11 shows Jurassic-age dolerite underlying the hill (265mASL) which the compost pad will be constructed on. A veneer of unconsolidated Cenozoic-age sand, silt, clay and gravel occupies the bed of Hills Creek, and extends upslope to the west under the proposed leachate dam. The thickness of Cenozoic cover is unknown and is shown schematically in Figure 11.

No information is available about subsurface conditions in the dolerite, but based on hydrogeological principles and Tasmanian experience, the rock is expected to be of variable weathering and degree of fracturing (both decreasing with depth), with unconfined groundwater conditions in a gravity-driven system like that depicted in Figure 11. Groundwater is recharged in elevated areas and moves (only) through fractures in the dolerite towards low-lying discharge areas, including Hills Creek. The hill is a major influence on groundwater conditions, with groundwater flowing radially from it. The water table depth depicted in Figure 11 is somewhat conceptual beneath the hill, but is known from the recent geotechnical assessment (Geoton 2019) to be within a few metres (Test Pit 19 had groundwater between 2.0 - 2.7m bgl) of the land surface on the lower slopes of the hill.

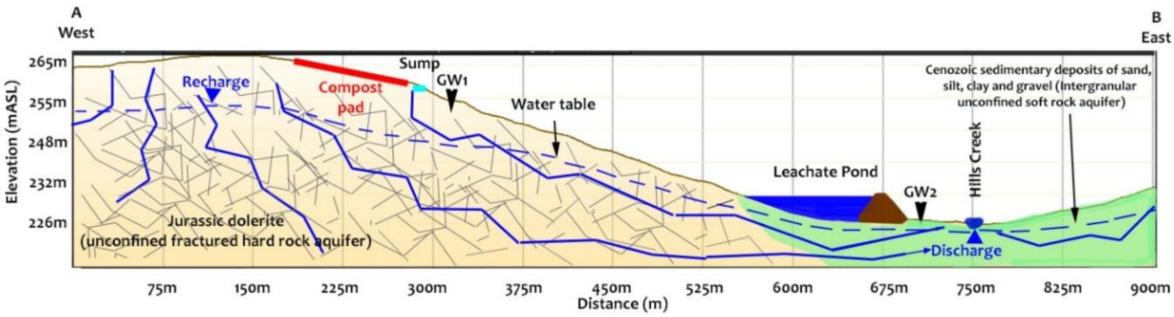

Figure 11. Conceptual hydrogeological model for Dunedin Compost facility.

The compost pad is to be located on the eastern facing slope of the site and covers an area of 2.1ha (approximately 151m x 140m) (Figures 3 and 6). The design and construction methodology for the compost pad and bunds are described in section 2.2.1

Surface water runoff is to be diverted around the compost pad with the installation of cut-off drains uphill of the compost pad (Geoton 2019). Water diverted around the site will not enter the collection system. A collection sump is to be installed at the lowest point of the compost pad to collect leachate. Leachate will be piped from the collection sump to the leachate capture dam via a 200mm pipe. Bunding will be constructed along the downslope edge of the compost pad at a height of 200-400mm to ensure that all runoff is diverted to the collection sump and prevented from discharging into the groundwater, adjacent to the pad. All biosolids delivered to the facility and composting windrows will be located within the bunded composting pad.

At present, there are no groundwater monitoring bores at the site. It is proposed to develop three new groundwater monitoring bores prior to the construction. The location of the three proposed bores are presented in Figure 3 and will include one reference bore and one bore each, located downslope from the compost pad and leachate dam. These two monitoring bores will be used to understand the groundwater flow and processes at the site, and if there is any downgradient movement of contaminants from the pad and leachate dam. Groundwater quality data from these bores will be assessed against the reference bore.

6.4.2 Performance requirements

The management of surface water from the project will comply with the relevant requirements of the:

- State Policy on Water Quality Management 1997
- *Environmental Management and Pollution Control Act 1994*
- *Water Management Act 1999*
- *Groundwater Act 1985*

6.4.3 Potential impacts

The potential impacts include the discharge of nutrient and contaminant laden groundwater into Hills Creek and the associated downstream impacts from contaminated water.

6.4.4 Avoidance and mitigation measures

The key avoidance and mitigation measure proposed for protecting groundwater are similar to those for managing surface water (section 6.3.4). Minimising surface water runoff and infiltration from the composting pad and leachate dam is key to minimising impacts to groundwater.

The compost pad and leachate dam have been engineered to minimise infiltration to groundwater. The pad will be regularly inspected and maintained where required to prevent infiltration to groundwater. Bunding, cut-off drains and the leachate sump will also be inspected to ensure surface water is piped into the leachate dam.

Groundwater monitoring is to be undertaken quarterly. The frequency of monitoring and the sample analysis suite will be reviewed one year after operations commence and a minimum of four sampling events have been undertaken. The monitoring program will determine if nutrients, and or contaminants from the composting pad and leachate dam are present in the groundwater. Further discussion on the groundwater monitoring program is provided in section 7.4.

6.4.5 Assessment of net impacts

The proposed facility is located on existing rural land and is not expected to significantly impact the local groundwater system provided the composting pad, bunding, collection sump and leachate dam are managed to prevent infiltration to groundwater. The measures outlined above will ensure that potential impacts to groundwater are avoided and minimised.

Number	Management measures	Timing
6	Groundwater monitoring will be conducted on a quarterly basis at the compost pad, leachate dam and reference bore.	During construction and operation

6.5 Noise emissions

6.5.1 Existing conditions

A noise emission assessment was conducted for the site by Tarkarri Engineering (2020). The assessment report is provided in Appendix D and summarised below. There are currently no known or significant noise emissions in the Dunedin area.

6.5.2 Performance requirements

Noise emissions from the proposed project will comply with the relevant requirements of the *Environmental Management and Pollution Control Act 1994* and Environment Protection Policy (Noise) 2009 (EPP 2009). The acoustic environment indicator levels used in the assessment are provided in Table 9.

Table 9. Acoustic environment indicator levels.

Specific environment	Critical health effect(s)	L_{Aeq} [dB(A)]	Time base [hours]	L_{Amax}fast [dB]
Outdoor living area	Serious annoyance, daytime and evening	55	26	-
	Moderate annoyance, daytime and evening	50	16	-
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

6.5.3 Potential impacts

Noise emissions from the construction and operation of the project have the potential to cause nuisance at noise sensitive premises and nearby land users, and impact livestock and wildlife.

Four significant sources of noise (and their sound power level (SWL)) have been identified as part of the project relating to the delivery of materials, staff entry to site and management of the composting process. These include:

1. Trucks – delivery of biosolids and pin wood chips to the site (SWL 107).
2. Light vehicles – Staff entry and exit to the site (SWL 98).

3. Front end loader – Loading and unloading materials and management of windrows (SWL 104).
4. Over row compost turner – Turning and aeration of windrows (SWL 107).

Predicted environmental noise levels generated from the site were assessed at the closest noise sensitive receiver. Vehicle noise levels on entry to the site (i.e. at the entry gate) and vehicle noise generated at the composting pad were also assessed (Table 10).

Table 10. Predicted noise emission levels at the closest receiver (Tarkarri Engineering 2020).

Predicted SPLs at closest residential receiver (dBA)			
Activity	**Noise source**	**Distance to closest receiver (m)**	**Predicted SPL**
Site Entry	Truck	780	41
	Light vehicle		32
Compost pad operations	Truck	1200	37
	Light vehicle		28
	Front End Loader		34
	Over Row Compost Turner		37
Cumulative (compost pad operations): 42			

SPL – Sound Pressure Level

The predicted noise levels from the site were well below all three relevant acoustic indicator levels identified in the EPP (2009). The noise environment in the vicinity of sensitive receivers to the northwest of the site (including the closest noise sensitive receiver) is likely to be dominated by traffic noise from the Tasman Highway. Given this, the predicted levels are considered unlikely to add significantly to the existing noise environment and effect on amenity is expected to be minimal (Tarkarri Engineering 2020).

6.5.4 Avoidance and mitigation measures

Although noise generated from the site is not expected to significantly impact the closest noise sensitive receiver or local amenity, vehicles and machinery used on the site will be properly maintained and serviced regularly to reduce noise emissions. Operational hours for the site will be 0700 to 1800 Monday to Saturday.

6.5.5 Assessment of net impacts

The proposed facility is located on existing rural land. The activity proposed is not expected to add significant additional noise emissions that will impact wildlife and livestock than is already generated by existing agricultural activity and highway traffic.

Number	Management measures	Timing
7	All vehicles and machinery used on the site will be properly maintained and serviced regularly to reduce noise emissions.	Construction and operation

6.6 Waste management

6.6.1 Existing conditions

While most of the inputs to the facility will be processed into compost, a small quantity of recyclable and non-recyclable waste will be produced during operations. Runoff from the compost pad will directed into a sump and piped into the leachate capture dam and when required, recycled back onto the compost windrows. The management and monitoring of leachate water is discussed in sections 6.3.4 and 7.2. A mobile toilet will be situated next to the site office and managed by a licensed contractor.

6.6.2 Performance requirements

Relevant waste management legislation and regulations include the *Environmental Management and Pollution Control Act 1994 and* Environmental Management and Pollution Control (Waste Management) Regulations 2010.

6.6.3 Potential impacts

If not managed, solid waste has the potential to cause environmental harm, such as surface and groundwater pollution.

6.6.4 Avoidance and mitigation measures

All waste will be recycled where possible. Recyclable materials will be separated into dedicated bins before being taken to an approved waste transfer station. A closed skip bin will be used to collect and store non-recyclable waste at the site prior to regular disposal at an approved waste transfer station.

6.6.5 Assessment of net impacts

If standard waste management measures are followed, then no adverse impacts are expected.

Number	Management measures	Timing
8	Any onsite mobile toilet will be managed in accordance with the specifications by a local licenced contractor.	Construction and operation
9	Recyclable materials will be separated into dedicated bins before being taken to a waste transfer station. A closed skip bin will be used to collect and store non-recyclable waste at the site prior to regular disposal at a waste transfer station.	Construction and operation

6.7 Dangerous goods and environmentally hazardous materials

6.7.1 Existing conditions

The proposed facility is located on existing farmland which has been extensively grazed. No historical contamination issues from dangerous goods or environmentally hazardous materials are present at the site.

Diesel fuel and oil will be stored in tanks on light vehicles and transferred directly to machinery. Light vehicles will leave the site at the end of each day. No storage tanks containing diesel fuel will be located on the site. No other dangerous goods or environmentally hazardous materials (other than diesel fuel and oil) will be used at the site.

6.7.2 Performance requirements

Relevant legislation, regulations and guidelines include:

- *Environmental Management and Pollution Control Act 1994*
- Environmental Management and Pollution Control (Waste Management) Regulations 2010
- *Work Health and Safety Act 2012*

6.7.3 Potential impacts

Spills from incorrect handling may result in the surface water and groundwater contamination.

6.7.4 Avoidance and mitigation measures

Mitigation measures to avoid potential impacts include appropriate training in the storage and use of hydrocarbons, personal protective equipment (PPE) and clear signage and labelling of storage tanks on vehicles. A hydrocarbon spill kit will be placed in an accessible location to contain a spill. Any spill will be cleaned up immediately and recorded in a site register.

A procedure for the prevention, control, corrective action and reporting of oil, fuel and chemical spills is provided in Conhur's Environmental Management Plan (Appendix G). Site personnel will be trained in spill response procedures. Waste oil will be recycled at a waste management facility.

6.7.5 Assessment of net impacts

The avoidance and mitigations measures outlined above will ensure that impacts from the storage and use of diesel fuel will be negligible.

Number	Management measures	Timing
10	A hydrocarbon spill kit will be placed in an accessible location to contain a spill. Any spill will be cleaned up immediately and recorded in a site register. Site personnel will be trained in spill response procedures.	Construction and operation
11	Waste oil will be recycled at a waste management facility.	Construction and operation

6.8 Biodiversity and natural values (Vegetation and Fauna)

6.8.1 Existing conditions

The proposed compost facility is located on existing grazing farmland, so much of the native vegetation (and fauna habitat) has been cleared or heavily grazed, with only some paddock trees, native and introduced grasses remaining.

Two TASVEG 3.0 vegetation communities were identified within the proposed footprint and include, Bursaria – Acacia woodland and scrub (NBA) and Agricultural Land (FAG) (Appendix F). The Acacia woodland has been heavily grazed by sheep, mostly cleared and is in poor condition with only a few isolated trees remaining. No threatened communities (TNVC 2014) were identified within 1km of the project.

Several threatened flora species listed under the TSP Act were identified near the boundary and outside of the greater Dunedin property, including *Epacris exserta* (endangered), *Persicaria decipiens* (vulnerable) and *Velleia paradoxa* (vulnerable). The latter two species were last recorded in 1951 and

1965 respectively. No threatened flora species were identified within 1km of the proposed project footprint (Figure 2).

There are also several threatened fauna species (listed under the TSP Act) that may potentially occur in the area (based on general distribution), including the Green-lined Ground Beetle *Catadromus lacordairei* and Tussock Skink *Pseudemoia pagenstecheri* (both listed as vulnerable). No listed threatened fauna species were identified within 1km of the proposed project.

The NVA report identified one raptor (Tasmanian Wedge-tailed Eagle) nest within the greater Dunedin property. Observed as non-active in 1985, being located 1.7km south-west of the compost facility and in a heavily vegetated gully (Figure 2). Two other fauna species were identified, the Eastern Barred Bandicoot (3km northeast of the compost site) and an Australian Grayling, a native fish (2.3km southwest of the compost site). Impacts to these species as a result of the proposed project are likely to be negligible.

The threatened species assessment (Appendix F) found that the habitat where the compost pad, leachate dam and associated infrastructure will be constructed is unsuitable for three of the identified threatened species (e.g. South Esk Heath, Slender Knotweed and Green-lined Ground beetle). Two species (Spur Velleia and Tussock Skink) which may have historically had suitable habitat present are unlikely to be present, even if populations had existed in the area due to the long history of grazing and pasture improvement. The long history of clearing, pasture improvement and grazing by sheep and cattle make it unlikely that the area to be disturbed is critical to the survival of any threatened species found in the area.

A weed assessment found minimal weed infestation at the site, with limited species and numbers of weed plants (Figure 1 in Appendix J). Three declared weeds (listed under the *Weed Management Act 1999*) were found at the site (gorse, blackberry and slender thistle).

Two gorse plants were identified within the facility footprint, with an additional large infestation along the access track into the facility. At least three separate blackberry infestations (each consisting only of one or two plants) were identified within the facility footprint. At least two separate slender thistle infestations were identified within the facility footprint, with an additional large infestation along the access track into the facility. This infestation appears to have been controlled. Weed species located within the compost pad and leachate dam footprint will be removed during construction.

There was one weed noted as an environmental weed (briar rose) and another (prunus), although not strictly considered an environmental weed. These are weeds that while not listed under the *Weed Management Act 1999*, can still have negative impacts on environmental or agricultural values, and where appropriate should be controlled.

It should be highlighted that raw material inputs to the site, such as biosolids and pin wood chips will be weed free and pose a low risk to introducing weeds to the site.

6.8.2 Performance requirements

The management of biodiversity and natural values must comply with the following key legislation:

- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

- *Nature Conservation Act 2002*
- *Threatened Species Protection Act 1995*
- *Weed Management Act 1999*

6.8.3 Potential impacts

No listed threatened flora or fauna species or TNVC (2014) communities were identified within 1km of the proposed composting facility. As a result, the project is unlikely to significantly impact upon these natural values. Increased light vehicle and truck movements to the site are unlikely to adversely impact threatened fauna. If not managed appropriately, weeds can pose a threat to natural and agricultural systems.

6.8.4 Avoidance and mitigation measures

As no listed threatened flora or fauna species or TNVC (2014) communities were identified within 1km and the likelihood of them occurring at the site is very low, no adverse impacts are expected.

The site will be managed to prevent the introduction and spread of weeds during construction and operation of the project. The following weed management measures (based on principles outlined in the weed and disease planning and hygiene guidelines (DPIPWE 2015)) will be implemented at the site:

- Selective spot spraying of declared weed species (gorse, blackberry and slender thistle) to minimise the chance of further spread of these species as a result of activities at the site. Further recommend control actions for these weed species are provided in Appendix J.
- Weed hygiene and management procedures will be communicated to site personnel and contractors during inductions and toolbox meetings.
- Regular inspections of the site to monitor weed infestations.

Conhur is committed to working with the property owner to prevent the introduction and possible spread of weeds from its operations. Furthermore, good housekeeping practices will be implemented at the site, including regular waste removal and fencing to prevent animals from entering the site.

6.8.5 Assessment of net impacts

The long history of clearing, pasture improvement and grazing by sheep and cattle make it highly unlikely that the proposed facility footprint is critical to the survival of any threatened species found in the area, nor does it provide essential breeding, foraging or roosting habitat for threatened fauna. The threatened species assessment determined that the compost pad, leachate dam and associated infrastructure will not impact on any threatened species. Weeds will be managed to prevent further spread.

Number	Management measures	Timing
12	Good housekeeping practices will be implemented at the site, including weed spraying and inspections, waste removal and fencing to prevent animals from entering the site.	Construction and operation

6.9 Marine and coastal

The proposed facility is located approximately 10 km south east of the Tamar River estuary and 50 km south of the north coast. The project will not impact any marine or coastal areas.

6.10 Greenhouse gases and ozone depleting substances

6.10.1 Existing conditions

Aerobic composting of biosolids and wood chips will produce significantly less greenhouse gases than landfill operations and no ozone depleting substances. Some emissions will arise during the construction and operation of the project from light vehicles, machinery and trucks transporting biosolids and wood chips to the site but is expected to be minimal.

6.10.2 Performance requirements

Legislative and policy responses to climate change and greenhouse gas emissions are outlined in Tasmania's Climate Change Action Plan 2017 – 2021. There are no reporting requirements relating to the National *Greenhouse and Energy Reporting Act 2007*.

6.10.3 Potential impacts

Whilst there will be a small volume of emissions from transporting raw materials to the site and mechanical turning of piles, there are substantial benefits from diverting biosolids from landfill. Landfill operations produce methane, which is 25 times more potent than carbon dioxide over a 100 year period (IPCC 2007). Composting is an effective method for reducing methane emissions from landfill. Application of compost to agricultural land also increases soil structure and carbon storage. Furthermore, greenhouse gas emissions from applying compost to soil are less than for inorganic fertilisers, due to high energy inputs required to produce synthetic fertilisers.

6.10.4 Avoidance and mitigation measures

All light vehicles, machinery and trucks will be properly maintained and regularly serviced to minimise greenhouse gas emissions. No ozone depleting substances will be used during the construction and operation of the project. Compost windrows will be monitored regularly by site personnel to prevent anaerobic conditions and methane emissions.

6.10.5 Assessment of net impacts

The project will not produce significant volumes of greenhouse gas emissions and is expected to have a net environmental benefit compared to landfilling due to the reduction of methane emissions. In addition, USEPA (2018) estimates that centralised composting of organics results in a net carbon storage of 0.18 $MTCO_2E$ per wet ton of organic inputs composted and applied to agricultural soil.

Number	Management measures	Timing
13	Compost windrows will be monitored regularly by site personnel to prevent anaerobic conditions and methane emissions.	Operation

6.11 Socio-economic issues

This proposed biosolids composting facility is to be developed as part of an integrated statewide biosolids management program. At this time biosolids that do not meet class 2 quality requirements (as prescribed by the draft TBRG (2020)), cannot be processed or utilised in the northern region of Tasmania. Currently, class 3 biosolids must be transported for reprocessing at facilities in the South and North-West of Tasmania.

A recent review of biosolids quality by TasWater has determined that significant volumes of biosolids produced in Northern Tasmania are non-stabilised (and class 3) and therefore cannot be directly applied to land. Whilst wastewater process improvements may occur over time, in the short-term, cost-effective options are required to manage this material close to its source.

Application of biosolids to land is widely accepted as beneficial, with a range of agricultural and financial benefits. Biosolids provide a sustainable soil nutrient supply, while reducing synthetic fertiliser use and waste sent to landfill. The application of biosolids to agricultural soils also improve soil water holding capacity and increases soil carbon. A facility with the capacity to reprocess class 3 biosolids to meet class 2 requirements in accordance with the draft TBRG (2020), will provide a sustainable waste management outcome for TasWater and the community.

The proposed facility presents a low environmental and social risk, and associated impacts can be mitigated with standard environmental management procedures and good housekeeping practices. The facility will employ approximately five local contractors during the construction phase and one full time position during the operation of the project.

6.12 Hazard analysis and risk assessment

A preliminary hazard analysis and proposed mitigation measures are provided in Table 11. A site-specific induction and appropriate training will be provided to all site personnel and contractors. The induction will cover the identification of hazards and appropriate plans and procedures for mitigation. A separate risk assessment for surface water and groundwater is provided in Table 6.

Table 11. Preliminary hazard analysis and proposed mitigation measures.

Identified Hazard	Proposed Mitigation Measures
Fire (igniting from pin wood chip stockpiles or compost windrows)	<u>Pin wood chip stockpiles</u> • Inspect and monitor temperature levels of pin wood chip stockpiles. In high temperatures, stockpiles will be watered and/or opened to reduce internal temperatures <u>Compost windrows</u> • Monitor and maintain optimal conditions for compost windrows. Optimal ranges for temperature, moisture, oxygen and pH are provided in section 2.1.3. If hot spots are identified, then windrows will be turned and watered Adequate firefighting equipment will be stored at the site, including a dedicated trailer mounted water tank and fire pump and water tanks (2 x 20,000L). Fire management measures are provided in section 6.13.4
Vehicle and machinery accidents	• Obey road speed signs • Drive to conditions • Only appropriately licensed personnel to operate machinery

Identified Hazard	Proposed Mitigation Measures
Fuel spills/contamination	• Diesel fuel will be stored in dedicated tanks on work vehicles and will leave the site each night. No permanent in-situ tanks will be used at the site • No other chemicals are hazardous materials will be stored on site • Inspection of vehicle storage tanks by site personnel • Appropriate training provided to site personnel • Clear signage and labelling of storage tanks • Personal protective equipment (PPE) • Hydrocarbon Spill Kit
Inhalation/ingestion of pathogens from biosolids	The TBRG (1999) (not currently stated in draft TBRG (2020)) provides the following advice for protection of personnel working with biosolids: • Always wash hands before eating, drinking or smoking. • Cover cuts and abrasions with waterproof dressings. • Do not eat or drink while working with biosolids. • Protective clothing, including eye and dust protection (where appropriate) should be worn when working with biosolids. • Promptly clean body areas that become contaminated with biosolids. • In addition to the above, a Hepatitis A vaccination is recommended for site personnel working with biosolids
Deep water (leachate dam)	• All site personnel are to wear a Personal Flotation Device (PFD) when working near the leachate capture dam • Site will be stock fenced to prevent unauthorised access
Anaerobic conditions in the leachate dam	• Regular monitoring of water quality. If required, subsurface aeration will be employed to increase oxygen levels.

Overall, the preliminary hazard analysis found that the risks from the proposed facility can be managed with standard operating procedures and therefore presents a low risk to site personnel and the environment.

Number	Management measures	Timing
14	A Health, Safety and Environment (HSE) Plan will be prepared prior to construction.	Pre-construction

6.13 Fire Risk

6.13.1 Existing conditions

Aerobic composting requires thermophilic conditions (>40ºc) to achieve the effective breakdown of organic matter and pathogens. Despite the relatively high temperatures, the likelihood of spontaneous combustion is low, provided that internal temperature and moisture levels are regularly monitored and managed. During warm to hot weather conditions, temperature levels within the pin wood chip and compost piles will be monitored and turned when required.

6.13.2 Performance requirements

Fire management procedures will be developed in accordance with the Tasmanian Fire Service. The procedures will be consistent with the existing local fire authority objectives and management plans. The procedures will set out the objectives and management principles required to effectively prevent and respond to a fire event originating from within the site (and escaping into adjacent areas) and bushfires that originate from outside the site. Fire management procedures will be implemented during the construction and operation of the project. The use of machinery during total fire ban days will be managed in accordance with the Tasmanian Fire Service requirements.

6.13.3 Potential impacts

Uncontrolled fires have the potential to cause significant damage to life, property and the environment. The composting pad and leachate dam will be located in farmland that has been previously cleared and grazed, although some isolated trees and grasses remain, with appropriate fire management procedures the area represents a low bushfire risk.

6.13.4 Avoidance and mitigation measures

The following fire control measures will be implemented at the site:

- Inspection and monitoring of windrows (e.g. temperature and moisture levels). If hot spots are identified, then windrows will be managed to reduce temperatures (e.g. turning, reduce windrow size and/or adding more carbon).
- Inspection and monitoring of pin wood chip stockpiles. In high temperatures, stockpiles will be watered and/or opened to reduce internal temperatures.
- Monitoring of ambient temperature and wind conditions during high fire risk days (as required).
- Windrows are spaced a minimum of 2 metres apart.
- A fire management procedure which outline roles, responsibilities, communication protocols and resources (i.e. equipment) for preventing and responding to fires.
- Fire extinguishers will be fitted to all vehicles, machinery and storage areas.
- Adequate firefighting equipment will be stored at the site, including a dedicated trailer mounted water tank and fire pump and water tanks (2 x 20,000L).
- Fire training for site personnel (as required).
- Smoking in designated areas only.

6.13.5 Assessment of net impacts

If avoidance and mitigation measures (outlined above) are followed, then the potential fire risk at the site is considered to be low.

Daily monitoring of windrow temperature and moisture levels will reduce the likelihood of a fire event. Fire management procedures will outline emergency response measures in the event of a fire from within and adjacent to the site.

Number	Management measures	Timing
15	Fire management measures include: • Inspection and monitoring of windrows (e.g. temperature and moisture levels). If hot spots are identified, then windrows will be managed to reduce temperatures (e.g. turning, reduce windrow size and/or adding more carbon). • Inspection and monitoring of pin wood chip stockpiles. In high temperatures, stockpiles will be watered and/or opened to reduce internal temperatures. • Monitoring of ambient temperature and wind conditions during high fire risk days (as required). • A fire management procedure which outlines roles, responsibilities, communication protocols and resources (i.e. equipment) for preventing and responding to fires. • Fire extinguishers will be fitted to all vehicles, machinery and storage areas • Adequate firefighting equipment will be stored at the site, including a dedicated trailer mounted water tank and fire pump and water tanks (2 x 20,000L). • Fire training for site personnel (as required).	Construction and operation

6.14 Infrastructure and off-site ancillary facilities

All infrastructure required for the project will be contained within the site. The development of the facility is not expected to impact any existing infrastructure (e.g. roads, ports and quarries). Power for the site will be supplied from a diesel generator and will not require connection to the electricity grid. There will be a minimal increase in traffic to the Dunedin property. No road upgrades are required for the project. Traffic impacts and management are discussed in section 6.17.

6.15 Environmental management system

The construction and operation of the composting facility will be conducted in accordance with Conhur's Environmental Management Plan (Appendix G). The plan is based on the requirements of AS/NZS ISO 14001 standards and provides environmental systems and controls to all work performed by Conhur, and its subcontractors. The plan outlines Conhur's environmental policy, organisational structure and the environmental responsibilities of management and site personnel. The plan also includes procedures and methodologies to ensure that the works are carried out in an appropriate manner to minimise adverse environmental effects. It includes monitoring and reporting procedures to ensure that the required standards are being met.

Specific environmental management procedures include:

- Dust suppression.
- Erosion and sediment control.
- Construction noise management.
- Vibration monitoring and control.
- Spill contingency.
- Litter and waste control.

Conhur's environmental management methodologies include:

- Site inspections (both daily and weekly).
- Environmental monitoring.
- Incident management.
- Auditing.
- Training.

All personnel will be made aware of the requirements of the plan during safety inductions undertaken prior to employees commencing work on site. Environmental requirements will also form part of the agenda for toolbox meetings. Relevant training and education will be provided to personnel to ensure adverse environmental impacts from the project are avoided and minimised. The Site Supervisor will be responsible for ensuring that the project is managed in accordance with Conhur's environmental management plan.

6.16 Cumulative and interactive impacts

At the time of writing, no other development projects are known or proposed in the region. As a result, cumulative and interactive impacts have not been considered in this assessment.

6.17 Environmental impact of traffic

Access to the composting facility will be off the Tasman Highway, via an existing farm access road, 3.7km east of the junction with Abels Hill Rd (Figure 1). All vehicles will enter and exit the composting facility at this point.

This access is established for trucks with the gate set back from the road by approximately 40m. The Tasman Highway is two-lane and two way at this location, and is generally flat, straight and lacks roadside vegetation. Light vehicles and trucks enter the site at an uncontrolled intersection onto a gravel access road. Exiting the site via the access road has a satisfactorily line of sight down the Tasman highway, approximate sight distances are in excess of 265m in each direction (Figures 12 and 13). The speed limit at the access point to the site is 100km/hr.

Operational hours for the site will be 0700 to 1800 Monday to Saturday.

The Tasman Highway is classified as a ‘Category 4’ road under the Department of State Growth’s road hierarchy. Category 4 roads are classified as roads to travel between towns, major tourist destinations and industrial areas. State road traffic statistics provided be the Department of State Growth (Station A0113863P) indicate that approximately 150 truck and 1700 light vehicle movements per day occur on the Tasman Highway in the vicinity of the site. The addition of 2 to 4 light vehicle (staff entry and exit) and 2 to 4 truck movement (for the delivery of biosolids and pin chips) per day is not expected to add significantly to traffic noise emission impact at residential locations to the north-west of the site (Tarkarri Engineering 2020). In the longer term, Conhur may transport composted material to alternate properties for land spreading. However, the intent is to use the compost primarily on the Dunedin property. In the event that compost is transported to alternate properties for spreading, then empty trucks leaving the facility will be used to transport compost, thus no significant increase in traffic is anticipated. The traffic generated from the proposed project is unlikely to have any significant adverse impact on the efficiency of the existing road network or road safety.

Figure 12. Line of sight on the Tasman Highway. North-east of the access point.

Figure 13. Line of sight on the Tasman Highway. South-west of the access point.

6.18 Aboriginal Heritage

6.18.1 Existing conditions

An Aboriginal Heritage Assessment was conducted within the composting facility study area by Cultural Heritage Management Australia (CHMA). The assessment included a search of the Aboriginal Heritage Register (AHR) and field survey, conducted on 7 June 2019 by Stuart Huys (CHMA archaeologist) and Vernon Graham (Aboriginal Heritage Officer). The Aboriginal Heritage Assessment Report was accepted by Aboriginal Heritage Tasmania (AHT) on 2 August 2019. The key findings from the report are summarised below. The report has not been included in the EIS (Appendix H) due to its confidential nature.

A search of the AHR identified 11 registered Aboriginal sites that are situated within an approximate 4km radius of the study area. Of these 11 sites, three sites are classified as artefact scatters and eight sites are classified as isolated artefacts. None of the registered Aboriginal sites are situated within or in the immediate vicinity of the study area boundaries. The closest sites are AH10126 and AH10127 (both isolated artefacts) which are located approximately 1km north-west of the study area.

No Aboriginal sites or stone resources were identified during the field survey assessment of both the compost pad and leachate dam footprints. The stone bedrock across the study area is dolerite which is typically not suited for artefact manufacturing. Additionally, there are no stone outcrops occurring anywhere across the study area, so there is no possibility of Aboriginal rock shelters or rock art sites to be present.

Within the compost pad footprint, the potential for undetected Aboriginal heritage sites to be present is very low. Previous research has shown that site and artefact densities in this type of landscape setting are typically sparse. There is a slightly increased potential for undetected artefact deposits to be present within the leachate dam footprint due to its location on the fringes of a small open valley, within 100m of Hills Creek which is an ephemeral water course.

6.18.2 Performance requirements

The *Aboriginal Heritage Act 1975* (the Act) is the primary Act for the treatment of Aboriginal cultural heritage. The Act applies to 'relics' which are any object, place and/or site that is of significance to the Aboriginal people of Tasmania (as defined in section 2(3) of the Act). There are also a number of Federal Legislative Acts that pertain to cultural heritage. The main Acts being; The *Australian Heritage Council Act 2003*, The *Aboriginal and Torres Strait Islander Heritage Protection Act 1987* and the *Environment Protection and Biodiversity Conservation Act 1999.* Conhur will comply with the legal and procedural requirements of these Acts.

6.18.3 Potential impacts

The development of the proposed facility will not impact any known Aboriginal site (CHMA 2019).

6.18.4 Avoidance and mitigation measures

If previously undetected archaeological sites or objects are located during the construction of the facility, processes outlined in the Unanticipated Discovery Plan will be followed. A copy of the Unanticipated Discovery Plan will be kept on site during all ground disturbance and construction work. All construction personnel will be made aware of the Unanticipated Discovery Plan and their obligations under the *Aboriginal Heritage Act 1975*.

6.18.5 Assessment of net impacts

No impacts are expected.

Number	Management measures	Timing
16	If previously undetected archaeological sites or objects are located during the construction of the facility, processes outlined in the Unanticipated Discovery Plan will be followed. A copy of the Unanticipated Discovery Plan will be kept on site during all ground disturbance and construction work. All construction personnel will be made aware of the Unanticipated Discovery Plan and their obligations under the *Aboriginal Heritage Act 1975*.	Construction

7 Monitoring and Review

Monitoring programs for biosolid compost, leachate dam water, surface water and groundwater are detailed in this section. TasWater will be responsible for providing biosolid classification data to Conhur. Onsite monitoring will be conducted to ensure impacts to health and the environment are avoided and include:

- Biosolid compost monitoring (sections 7.1.1 and 7.1.2)
- Leachate dam monitoring (section 7.2)
- Surface water monitoring (section 7.3)
- Groundwater monitoring (section 7.4)

7.1 Biosolid compost monitoring

7.1.1 Compost windrows

Each new windrow will be assigned a batch identification code for the purpose of process tracking and recording movement of biosolids with different classifications (e.g. contaminant and stabilisation grade material). The proposed compost monitoring methodology is based on the draft TBRG (2020) and previous experience. The methodology will be adjusted in accordance with windrow performance.

Compost windrows will be managed in accordance with the process outlined in section 2.1.3. Windrow monitoring is summarised in Table 12 below. Monitoring frequency will be adapted to accommodate changes in temperature and moisture. This will be determined by experienced site personnel.

Table 12. Compost windrow monitoring

Parameter	Process	Timing/Frequency
C:N ratio	Starting target C:N ratio 20:1 by calculation from inputs. May be adjusted in the future based on windrow performance.	Prior to building windrow. Initial calculation from known inputs.
pH	Target pH between 6 and 7.5. pH of biosolids inputs known. pH will be monitored during production for the first year, to assist in optimising C:N ratios and minimising N loss through ammonia. Acidifying agents may be used to regulate pH.	pH of each row will be monitored on a monthly basis for the first year. Frequency will be reviewed after this period as required.
Moisture	Determined by site personnel	Observed 3 times a week during turning of windrows.
Temperature	Target maximum temperature of between 55 ^{0}C and 60 ^{0}C, whilst maintaining a minimum temperature of 40 ^{0}C for >14 days, and at an average temperature of >45 ^{0}C to meet vector attraction reduction requirements of the draft TBRG (2020).	Tested immediately before turning, approximately 3 times a week during the thermophilic stage, and as required.

Parameter	Process	Timing/Frequency
Process odours	Determined by site personnel	Daily
Stabilisation: Vector attraction reduction	Using approved processes for stabilisation grade B as per the draft TBRG (2020), to meet the following: • minimum temperature 40 ^{0}C for >14 days, • an average temperature of >45 ^{0}C • minimum of 4 hours >55 ^{0}C	-
Stabilisation: Microbiological criterion	<2,000,000 E. coli CFU (or MPN) per gram (geometric mean of at least 7 sample results), from table 8.4 of the draft TBRG (2020).	Initial verification and routine
Heavy metals	Testing of reprocessed contaminant grade C biosolids will be undertaken to ensure material can be classified as class 2. Sampling will be conducted in accordance with the batch sampling technique draft TBRG (2020). Minimum of four grab samples will be thoroughly mixed to form one composite sample, to represent a maximum of 100 dry solid tonnes of biosolids. Testing will include metals as per Table 7.1 draft TBRG (2020), excluding mercury, unless considered necessary because of levels in biosolid inputs.	Windrows will be approximately 120m in length. These windrows are not expected to exceed 100 dry solid tonnes. Therefore, one composite sample will be taken per windrow.
Persistent organic pollutants	Testing for persistent organic pollutants will not be undertaken unless they are shown to be present in the biosolid inputs. If a persistent organic pollutant (e.g. Perfluorinated Alkylated Substances (PFAS), draft TBRG (2020)) is present in biosolid inputs, testing for these pollutants will be included in the analysis of samples taken for heavy metal analysis, see above.	-
TPH	Testing for TPH will be done if TPH levels in biosolids are known to be high.	-

7.1.2 Final biosolid compost product

All biosolid compost (and biosolids) to be used for land application must be classified as class 2 (in accordance with the draft TBRG (2020)). The classification and management of biosolids and biosolid compost for land application is discussed in section 2.1.3 (Composting process) and the biosolids management plan (BMP) (Appendix B). Routine monitoring for stabilisation and contamination will be conducted to verify the composting process prior to application in accordance with Table 12. This will include:

- Evidence that the process achieves vector attraction reduction requirements (Table 8.1 of the draft TBRG (2020)).
- Test results from a suitably accredited laboratory showing compliance with maximum pathogen levels for Stabilisation Grade B (Table 8.4 of the draft TBRG (2020)).
- Measurement of relevant process criteria to ensure compliance with the stabilisation process.

Petroleum hydrocarbons are a known contaminant in the Ti Tree Bend STP catchment. Maximum total concentrations for petroleum hydrocarbons are not included in the TBRG and therefore will be based on the Information Bulletin No. 105 - Classification and Management of Contaminated Soil for Disposal (EPA 2018). For Level 1 fill material the maximum total concentration (dry weight) is as follows:

- C6 – C9 petroleum hydrocarbons – 65 mg/kg.
- C10 – C36 petroleum hydrocarbons – 1,000 mg/kg.

Approval will be sought from the EPA (in accordance with Information Bulletin No. 105) if biosolids with a known risk of petroleum hydrocarbons are to be managed at the Dunedin compost site.

Biosolids from the Ti Tree Bend STP (with known hydrocarbon contamination) will be managed in a similar manner to contaminant grade C material as per the process outlined in section 2.1.3. This material (having initially been tested by TasWater) will be identified upon arrival at the pad. Blending ratios will be determined by initial contaminant concentrations and final target levels. Final contaminant testing will be conducted (using the silica gel method at a NATA accredited laboratory) prior to land application.

The BMP (Appendix B) will be updated within the second six months (i.e. within the first year) of the facility being operational and increased to match proposed spreading needs (from both biosolid compost and direct application of biosolids).

Number	Management measures	Timing
17	Compost windrows will be monitored as per Table 12.	Operation

7.2 Leachate dam monitoring

Water quality in the leachate dam will be monitored on a quarterly basis. The frequency of monitoring and the sample analysis suite will be reviewed one year after the leachate dam is operational and a minimum of four sampling events have been undertaken. Laboratory testing will include the same analytes as those tested during the surface water monitoring, listed in Table 13.

To ensure a detailed understanding of storage capacities, water levels in the leachate dam will be monitored with gauge boards on a weekly basis and after heavy rainfall events. Water levels in the leachate dam will be monitored more frequently as necessary when dam levels are elevated, to ensure that a safe freeboard is maintained.

At any time, the dam storage level reaches 80% of capacity (21.1ML), Conhur will implement an internal contingency plan to ensure that spillage from the dam does not occur. This contingency plan will include pumping leachate water back up to the compost windrows to maintain moisture levels and irrigating to adjacent and suitably identified paddocks.

In the event that leachate water cannot be either recycled back onto the compost windrows or irrigated to land, then water will be directly removed from the dam via a water truck and disposed at an approved offsite facility to prevent an overflow event. However, given the designed capacity of the leachate dam and the ability manage water levels throughout the year, this is considered highly unlikely to occur.

Further information on leachate dam monitoring and irrigation of leachate water is provided in section 6.3.4.2.

Number	Management measures	Timing
3	Water quality in the leachate dam will be monitored on a quarterly basis.	Operation
18	Water levels in the capture dam will be monitored and managed to ensure leachate is contained.	Operation

7.3 Surface water monitoring

As the proposed compost pad and leachate dam are situated uphill from Hills Creek, surface water monitoring is required to detect any potential impact on the ephemeral watercourse.

Surface water monitoring is to be conducted at two locations (upstream and downstream of the leachate dam) on a quarterly basis. The location of surface water sampling sites are presented in Figure 3. The frequency of monitoring and the sample analysis suite will be reviewed after one year and a minimum of four sampling events have been undertaken. Testing at a NATA accredited laboratory will include the analytes listed in Table 13.

The investigation guideline values to be used when reviewing surface water quality results will be based on historical site specific data collected from Hills Creek (Table 7). Site specific data provides a benchmark, or current status, for the site which can be used to assess further change and recognises that the site has already been historically impacted from agricultural activities. Where relevant, regional data from the Tasmanian default guideline values (DGV) for the North Esk Catchment (DPIWE 2005) will also be used. Guideline values may be reviewed over time as more site specific data becomes available.

It should be noted that trigger values for lowland rivers in south-east Australia from the Australian and New Zealand Environment and Conservation Council Guidelines for Fresh and Marine Water Quality (ANZECC 2000) are only relevant where no other data are available.

Table 13. Leachate and surface water quality monitoring requirements.

Analyte	Units	Initial frequency
pH	pH unit	Quarterly
Electrical Conductivity (EC)	µS/cm	Quarterly
Total Dissolved Solids (TDS)	mg/L	Quarterly
Chloride (Cl)	mg/L	Quarterly
Aluminium (Al) (Dissolved metals)	mg/L	Quarterly
Arsenic (As)	mg/L	Quarterly
Barium (Ba)	mg/L	Quarterly
Chromium (Cr)	mg/L	Quarterly
Cobalt (Co)	mg/L	Quarterly
Copper (Cu)	mg/L	Quarterly
Lead (Pb)	mg/L	Quarterly
Manganese (Mn)	mg/L	Quarterly
Nickel (Ni)	mg/L	Quarterly
Selenium (Se)	mg/L	Quarterly
Vanadium (V)	mg/L	Quarterly
Zinc (Zn)	mg/L	Quarterly
Iron (Fe)	mg/L	Quarterly
Ammonia (NH_3) as N	mg/L	Quarterly
Nitrate as N	mg/L	Quarterly
Total Kjeldahl Nitrogen (TKN)	mg/L	Quarterly
Total Nitrogen (Total N)	mg/L	Quarterly
Total Phosphorus (Total P)	mg/L	Quarterly
Total Petroleum Hydrocarbons (TPH/TRH) (C4-C10), (C10-C40)	µg/L	Quarterly
Biochemical Oxygen Demand (BOD)	mg/L	Quarterly
Thermotolerant coliforms	cfu/100 ml	Quarterly

Number	Management measures	Timing
4	Surface water monitoring will be conducted at Hills Creek on a quarterly basis, upstream and downstream of the leachate dam.	Operation

7.4 Groundwater monitoring

At present, there are no groundwater monitoring bores at the site. Three new groundwater monitoring bores will be developed prior to operation of the facility. One reference bore will be located approximately 300m north of the compost facility to determine background groundwater quality. Two other monitoring bores will be installed downslope of the compost pad and leachate dam to determine if there is any downgradient movement of contaminants. The approximate locations of the three proposed bores are presented in Figure 3, locations are subject to ground conditions and accessibility.

Groundwater monitoring will be conducted on a quarterly basis. Samples are to be collected following relevant standards and guidelines outlined in:

- Geoscience Australia Record 2009/27: Groundwater Sampling and Analysis – A Field Guide.
- Environment Protection Authority Victoria 2000 - Groundwater Sampling Guidelines.

Samples are to be collected using high flow or low flow sampling methods as per industry standards. Low flow methods require field parameters to be stable prior to sample collection. This ensures consistent groundwater chemistry. The frequency of monitoring and the sample analysis suite will be reviewed one year after the leachate dam is operational and a minimum of four sampling events have been undertaken.

Field testing will be conducted in conjunction with collecting samples for laboratory analysis.

Field testing will include:

- pH.
- Electrical conductivity (EC).
- Redox (ORP).
- Temperature.
- Standing water level (SWL).

With the exception of samples collected for microbiological analysis, all groundwater samples are to be field-filtered (0.4µm filter) during collection and before submission to the NATA-registered testing laboratory. Laboratory reports will therefore list dissolved constituents only (except for thermotolerant coliforms). Laboratory testing will include the analytes listed in Table 14.

Site specific data collected from baseline monitoring (proposed for early 2020) will be used to develop the investigation guideline values for each bore. The key investigation guideline value analytes include electrical conductivity, pH, ammonia, nitrates, total nitrogen and total phosphorus (Table 14). These analytes have been chosen as they present the highest likelihood of being affected by the proposed project. Other analytes will be assessed and appropriately investigated if trend changes are identified. The investigation guideline values will be reviewed and updated throughout the monitoring program as more site specific data becomes available.

Table 14. Groundwater quality monitoring requirements.

Analyte	Units	Initial frequency
pH	pH unit	Quarterly
Electrical Conductivity (EC)	µS/cm	Quarterly
Total Dissolved Solids (TDS)	mg/L	Quarterly
Chloride (Cl)	mg/L	Quarterly
Aluminium (Al)	mg/L	Quarterly
Barium (Ba)	mg/L	Quarterly
Chromium (Cr)	mg/L	Quarterly
Cobalt (Co)	mg/L	Quarterly
Copper (Cu)	mg/L	Quarterly
Lead (Pb)	mg/L	Quarterly
Manganese (Mn)	mg/L	Quarterly
Nickel (Ni)	mg/L	Quarterly
Selenium (Se)	mg/L	Quarterly
Vanadium (V)	mg/L	Quarterly
Zinc (Zn)	mg/L	Quarterly
Iron (Fe)	mg/L	Quarterly
Ammonia (NH_3) as N	mg/L	Quarterly

Analyte	Units	Initial frequency
Nitrate (NO_3) as N	mg/L	Quarterly
Total Kjeldahl Nitrogen (TKN)	mg/L	Quarterly
Total Nitrogen (Total N)	mg/L	Quarterly
Total Phosphorus (Total P)	mg/L	Quarterly
Total Petroleum Hydrocarbons (TPH/TRH) (C4-C10), (C10-C40)	µg/L	Quarterly
Biochemical Oxygen Demand (BOD)	mg/L	Quarterly
Thermotolerant coliforms	cfu/100 ml	Quarterly

Number	Management measures	Timing
6	Groundwater monitoring will be conducted on a quarterly basis at the compost pad, leachate dam and reference bore.	During construction and operation

7.5 Trigger thresholds and response processes

In most cases trends in surface water and groundwater (relative to site specific baseline data) are at least as important as exceedances of guideline limits. An increasing (or decreasing) negative or undesirable trend from site specific baseline data can provide an early warning of potential issues, before any upper limits or trigger values are reached. This provides an opportunity for preventative actions to be implemented well before any negative environmental impacts are experienced.

Site specific data collected from baseline groundwater monitoring will be used to develop the investigation guideline values. The *State Policy on Water Quality Management 1997* (SPWQM) also provides guidance on groundwater quality criteria against potential uses. Relevant PEVs identified for the site include; irrigation, stock and ecosystem protection. Total Dissolved Solids (TDS) in groundwater for different PEVs (identified in Table 1 of the SPWQM) range from <1000 mg/L to 3500 mg/L TDS for irrigation, and <1000 mg/L up to >13,000 mg/L TDS for ecosystem protection. Guideline values will be reviewed and updated as site specific baseline data becomes available.

In environmental monitoring programs there are often fluctuations in various analytes and it is not unusual to see isolated peaks in single parameters, particularly due to seasonal variation. Additionally, guideline 'limits' for groundwater (e.g. ANZECC, 2000) are not necessarily valid or appropriate, and are usually referred to in the absence of site specific baseline data.

For these reasons, it is proposed that further investigation will only proceed when one of the following conditions are met:

1. An exceedance above a recommended guideline for one or more analytes (where it hasn't exceeded previously). For example, TDS levels identified in Table 1 of the SPWQM.
2. An increasing trend in an analyte by more than 20% over two consecutive sampling events from the baseline.

Coliform levels are known to be highly variable in water samples as they are strongly influenced by a range of factors which are not related to the proposed composting facility (e.g. livestock or wildlife grazing coinciding with a runoff event). Therefore, both the above points must apply when interpreting coliform test results for surface and groundwater.

7.6 Record keeping

Conhur will ensure that all records are accurately kept. The following information will be collected and supplied to TasWater and the Dunedin landowner each month:

- Weighbridge data of each load of biosolids removed from a TasWater STP.
- Weighbridge data of each load of pin wood chips delivered by Forico's Timber operations.
- Compost and Biosolid application data
  - Application date.
  - Spreading zones.
  - Application rates.
  - Batch identification codes.
- All monitoring data (section 7).

Transport data will be provided to TasWater on a monthly basis. Spreading records are to be returned to TasWater at the end of each financial year or as requested from time to time by TasWater.

Number	Management measures	Timing
19	Records will be kept for the following: • Weighbridge data of each load of biosolids removed from a TasWater STP and each load of pin wood chips delivered by Forico's Timber operations. • Compost and biosolid application data (e.g. source, application date, spreading zones, application rates and batch identification codes). • All monitoring data.	Operation

7.7 Review and reporting

The monitoring programs will be regularly reviewed and updated on an as needs basis. Results and recommendations from the monitoring programs will be reported to the EPA as a part of an Annual Monitoring Report. Environmental non-conformance at the site will be managed through Conhur's non-conformance control procedure, outlined in the Environmental Management Plan (Appendix G).

Number	Management measures	Timing
20	Results and recommendations from the monitoring programs will be reported to the EPA as a part of an Annual Monitoring Report.	Operation

8 Decommissioning and rehabilitation

In the event that composting operations cease at Dunedin, Conhur will be responsible for the safe and effective decommissioning of the site. This will include the removal of all raw materials, biosolid compost and site buildings. The composting pad and leachate dam will not be removed from the site, however the dam contents (including water and sludge) will be removed. Decommissioning activities will comply with any relevant statutory and legal obligations.

Number	Management measures	Timing
21	Conhur will be responsible for the safe and effective decommissioning of the site, including the removal of all raw materials, biosolid compost and site buildings.	Decommissioning

9 Management measures

A summary of management measures is provided in Table 15.

Table 15. Summary of management measures.

Number	Management measures	Report section	Timing
1	Monitor and maintain optimal conditions for composting (e.g. temperature, oxygen, moisture, C:N ratio and pH) to control odour and dust emissions.	6.1	Operation
2	Sediment control bunds and traps will be installed prior to construction to manage erosion and sediment runoff.	6.3	Pre-construction
3	Water quality in the leachate dam will be monitored on a quarterly basis.	6.3 & 7.2	Operation
4	Surface water monitoring will be conducted at Hills Creek on a quarterly basis, upstream and downstream of the leachate dam.	6.3 & 7.3	Operation
5	A leachate irrigation management plan will be developed.		Prior to leachate irrigation.
6	Groundwater monitoring will be conducted on a quarterly basis at the compost pad, leachate dam and reference bore.	6.4 & 7.4	During construction and operation
7	All vehicles and machinery used on the site will be properly maintained and serviced regularly to reduce noise emissions.	6.5	Construction and operation
8	Any onsite mobile toilet will be managed in accordance with the specifications by a local licenced contractor.	6.6	Construction and operation
9	Recyclable materials will be separated into dedicated bins before being taken to a waste transfer station. A closed skip bin will be used to collect and store non-recyclable waste at the site prior to regular disposal at a waste transfer station.	6.6	Construction and operation
10	A hydrocarbon spill kit will be placed in an accessible location to contain a spill. Any spill will be cleaned up immediately and recorded in a site register. Site personnel will be trained in spill response procedures.	6.7	Construction and operation
11	Waste oil will be recycled at a waste management facility.	6.7	Construction and operation
12	Good housekeeping practices will be implemented at the site, including weed spraying and inspections, waste removal and fencing to prevent animals from entering the site.	6.8	Construction and operation
13	Compost windrows will be monitored regularly by site personnel to prevent anaerobic conditions and methane emissions.	6.10	Operation
14	A Health, Safety and Environment (HSE) Plan will be prepared prior to construction.	6.12	Pre-construction
15	Fire management measures include: • Inspection and monitoring of windrows (e.g. temperature and moisture levels). If hot spots are identified, then windrows will be managed to reduce temperatures (e.g. turning, reduce windrow size and/or adding more carbon).	6.13	Construction and operation

Number	Management measures	Report section	Timing
	• Inspection and monitoring of pin wood chip stockpiles. In high temperatures, stockpiles will be watered and/or opened to reduce internal temperatures. • Monitoring of ambient temperature and wind conditions during high fire risk days (as required). • A fire management procedure which outlines roles, responsibilities, communication protocols and resources (i.e. equipment) for preventing and responding to fires. • Fire extinguishers will be fitted to all vehicles, machinery and storage areas • Adequate firefighting equipment will be stored at the site, including, a dedicated trailer mounted water tank and pump and water tanks (2 x 20,000L). • Fire training for site personnel (as required).		
16	If previously undetected archaeological sites or objects are located during the construction of the facility, processes outlined in the Unanticipated Discovery Plan will be followed. A copy of the Unanticipated Discovery Plan will be kept on site during all ground disturbance and construction work. All construction personnel will be made aware of the Unanticipated Discovery Plan and their obligations under the *Aboriginal Heritage Act 1975.*	6.18	Construction
17	Compost windrows will be monitored as per Table 12.	7.1	Operation
18	Water levels in the capture dam will be monitored and managed to ensure leachate is contained.	7.2	Operation
19	Records will be kept for the following: • Weighbridge data of each load of biosolids removed from a TasWater STP and each load of pin wood chips delivered by Forico's Timber operations. • Compost and Biosolid application data (e.g. source, application date, spreading zones, application rates and batch identification codes). • All monitoring data.	7.6	Operation
20	Results and recommendations from the monitoring programs will be reported to the EPA as a part of an Annual Monitoring Report.	7.7	Operation
21	Conhur will be responsible for the safe and effective decommissioning of the site, including the removal of all raw materials, biosolid compost and site buildings.	8	Decommissioning

10 Conclusion

As part of the solution for managing biosolids in northern Tasmania, Conhur is proposing to develop a composting facility on agricultural land zoned as "rural resource", on the property known as 'Dunedin' located at 91 Blessington Rd, St Leonards (located approximately 10 km east of Launceston). An aerobic windrow composting method will predominantly be utilised to improve TasWater sourced stabilisation grade C biosolids to stabilisation grade B, and hence produce class 2 biosolids suitable for application to agricultural land

The compost facility is to be developed as part of an integrated statewide biosolids management program. At this time biosolids that do not meet class 2 quality requirements (as prescribed by the draft TBRG 2020), cannot be processed or utilised in the northern region of Tasmania. Currently class 3 biosolids must be transported for reprocessing at facilities in the South and North-West of the state.

Application of biosolids to land is widely accepted as beneficial, with a range of agricultural and financial benefits. Biosolids provide a sustainable soil nutrient supply, while reducing synthetic fertiliser use and waste sent to landfill. The application of biosolids to agricultural soils also improves soil water holding capacity and increases soil carbon. A facility with the capacity to reprocess class 3 biosolids to meet class 2 requirements, in accordance with the TBRG, will provide a cost-effective sustainable waste management outcome for TasWater and the community. The proposed facility will employ approximately five local contractors during the construction phase and one full time position during the operation of the project. Aerobic windrow composting was selected as the preferred technology and is one of the most reliable and cost-effective methods for producing high-quality biosolid compost for agricultural use.

Key issues for the project include the potential impacts of odour and noise on surrounding residences and contamination of surface and/or groundwater from leachate runoff. Results of modelling completed by specialist consultants Tarkarri Engineering (2020), show predicted ground level concentrations of odour are above the Tasmanian Environment Protection Policy (Air Quality) 2004 criterion level of 2 Odour Units (OUs) at the project boundary, although the project boundary is less than 100m away. However, a substantial land buffer exists between the project boundary and the Tasman Highway (approximately 0.8 km) and the closest residential receptor (1.2 km) (Figure 1). Modelling suggests that odour, dust and noise emissions from the proposed facility are unlikely to significantly impact the amenity of surrounding land uses including residential receptors.

All surface water from the compost pad will be managed onsite (e.g. directed into a sump and piped to the leachate dam) to avoid runoff and infiltration into the groundwater. Ongoing quarterly surface water and groundwater monitoring will be implemented to detect any impact on Hills Creek and the groundwater system.

The proposed planning measures and commitments demonstrate that appropriate management measures can be implemented to minimise any potential impacts or risks to public health and the environment. As a result, no significant environmental impacts are expected.

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12 Appendices

Appendix A: Figures

Appendix B: Biosolids Management Plan (BMP)

Appendix C: Geotechnical Investigation - Compost Pad and Leachate Pond 'Dunedin' – 40205-40503 Tasman Highway, St Leonards - Geoton Geotechnical Consultants 2019. Earthworks Methodology - Compost Pad and Leachate Pond 'Dunedin' – 40205-40503 Tasman Highway, St Leonards - Geoton Geotechnical Consultants 2020

Appendix D: Dunedin Composting Facility - Air emission and environmental noise assessment – Tarkarri Engineering 2020

Appendix E: Email from Launceston Council Planner Iain More

Appendix F: Threatened Species Assessment

Appendix G: Conhur Environmental Management Plan. August 2019

Appendix H: Aboriginal Heritage Assessment – Cultural Heritage Management Australia 2019 - Confidential

Appendix I: Indicative water balance

Appendix J: Dunedin Weed Assessment