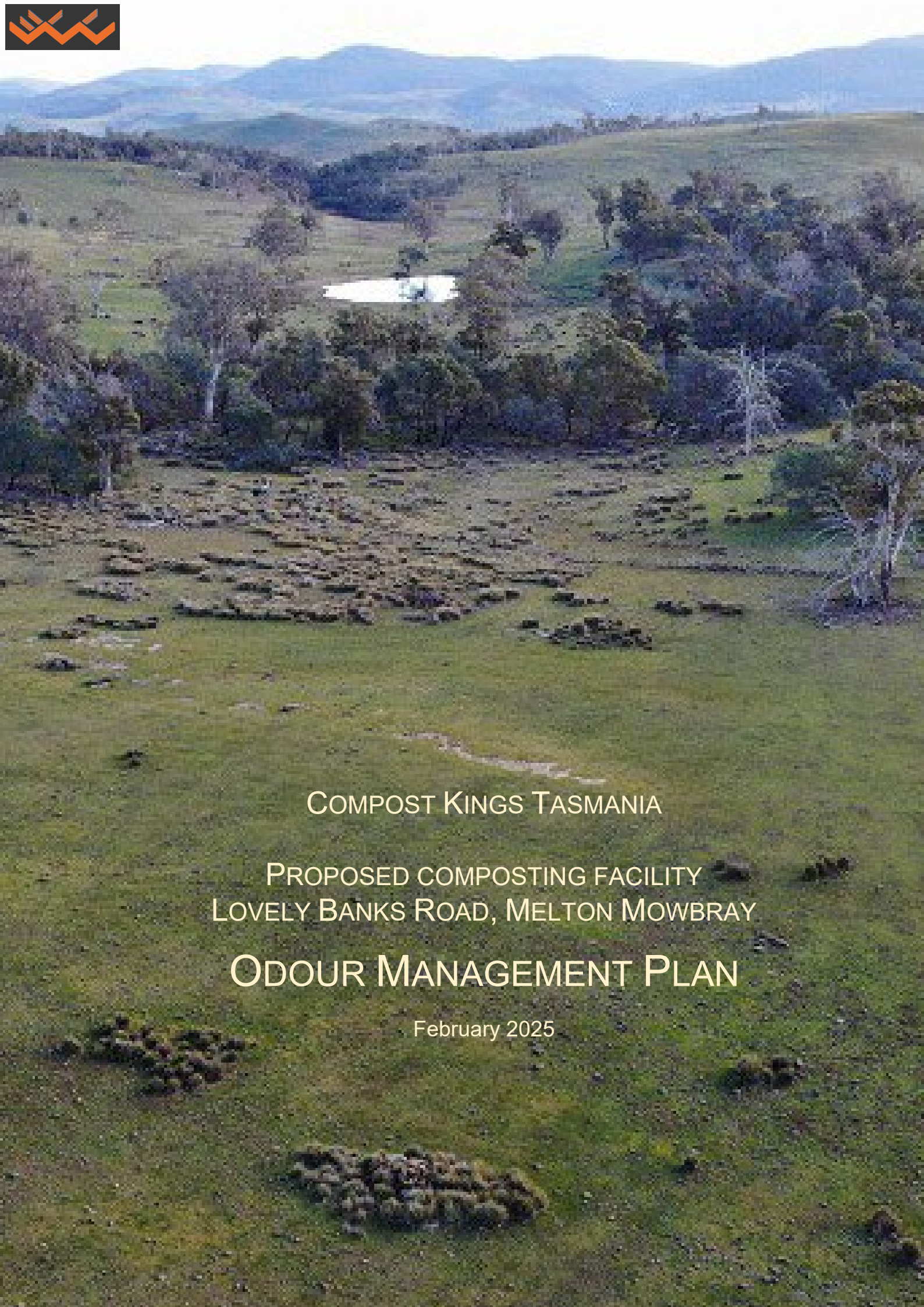

COMPOST KINGS TASMANIA

PROPOSED COMPOSTING FACILITY
LOVELY BANKS ROAD, MELTON MOWBRAY

ODOUR MANAGEMENT PLAN

February 2025

Cover photo

View west over part of the proposed composting facility. The property boundary between *Somerton* (foreground) and *Woodlands Run* is the line of trees running left to right in the middleground. Proposed Dam 1 is in the shallow depression in the centre middleground. Composting windrows will occupy the foreground.

Drone photo: 26 July 2021

Refer to this document as:

Cromer, W. C. (2025). *Odour Management Plan, proposed composting facility, Lovely Banks Road, Melton Mowbray*. Unpublished report for Compost Kings Tasmania by William C. Cromer Pty. Ltd., 12 February 2025

Contents

1 Introduction 5

2 Regulatory framework 7
2.1 Overview 7
2.2 Objectives 7

3 Environmental considerations 8
3.1 Location 8
3.2 Terrain 8
3.3 Meteorological conditions
3.3.1 Rainfall 8
3.3.2 Temperature 8
3.3.3 Winds 8

4 Technical considerations 12
4.1 Factors influencing odour impact 12
4.2 The odour pathway 12
4.3 Odour transport 12

5 Odour emissions 13
5.1 Summary of activities at the facility 13
5.2 Identification of odourous sources 18
5.3 Sensitive receptors 18
5.4 Odour assessment report 20
5.5 Minimisation of odours 21
5.5.1 Hierarchy of controls 21
5.5.2 Best practice Procedures and Controls 22

6 Management procedures 23
6.1 Monitoring of emissions 23
6.2 Performance indicators 23
6.3 Best Practice Odour Management Procedures 23
6.3.1 Management strategies for normal and upset conditions 23
6.3.2 Waste reception 25
6.3.3 Mixing area 25
6.3.4 Windrows 26
6.3.5 Compost screening 31
6.3.6 Compost stockpiling 31
6.3.7 Dams 1 and 2 31
6.4 Responsibilities 32
6.5 Complaints procedure 32
6.6 Training and awareness 33
6.7 Review of this OMP 33

Tables

1. OMP objectives 6
2. Proposed types, suppliers and quantities of materials to be composted 13
3. Continuous and transient odour sources 18
4. Best Practice Odour Management Controls proposed for the facility 29
5. Operating instructions for normal and upset rain conditions 34
6. Operating instructions for normal and upset temperature conditions 35
7. Operating instructions for normal and upset wind conditions 36
8. Operating instructions for fire danger ratings 37
9. Operating instructions for upset staff situations 38
10. Operating instructions for upset plant and equipment situations 38

Figures

1. Location of the proposed Compost Kings composting facility on Lovely Banks Road 5
2. Land use in the vicinity of the proposed composting facility 9
3. The proposed 6.5ha composting facility within the 23ha site on *Somerton* 10
4. Frequency of rain events at *Lovely Banks* on the Midlands Highway for 1908 – 2020 11
5. Predicted annual wind rose for the site 11
6. Process flow chart for the composting facility 15
7. Schematic layout of proposed operations, plant, equipment, materials and vehicles at the composting facility 16
8. Facility layout 17
9. Main sources of odour at the facility 19
10. The seven residences closest to the site 21
11. Predicted 1-hour 99.5th percentile ground level odour contours during Upset6 conditions for cumuilatiove activities 22
12. Schematic layout of the facility showing management strategies for odour control 27
13. Proposed activities in the mixing area before windrowing 28
14. Flowchart for managing upset (including unexpected) conditions at the facility. 30

1 Introduction

The purpose of this Odour Management Plan (OMP) is to outline the management of air quality controls relevant to the proposed Compost Kings composting facility (the 'facility') on Lovely Banks Road near Melton Mowbray in the Tasmanian Midlands (Figure 1).

The proponent of the facility is Mr. Seaton Waterfield, who is the sole owner and manager/operator of *Compost Kings Tasmania*.

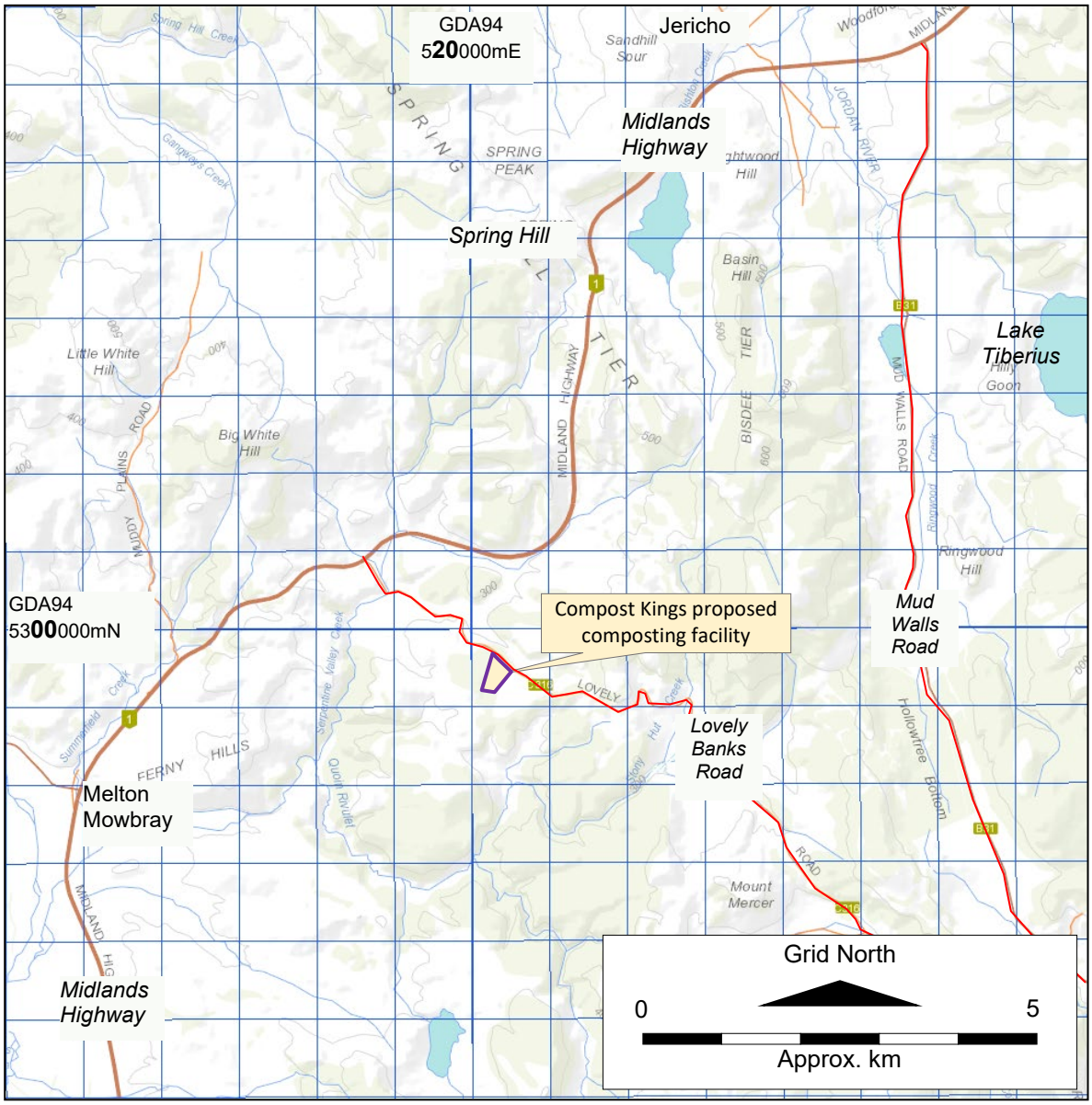

Figure 1. Location of the proposed Compost Kings composting facility on Lovely Banks Road.
Source of base map: www.thelist.tas.gov.au

The Facility will add 10,000tpa composting capability to the recycling and composting industry in Tasmania. The range of raw materials to be imported to and incorporated into the composting process will be restricted to Category 1 and 2 feedstock as defined in Table 4 of EPA Victoria (2017)[1]:

- Category 1 low-odour wastes – mostly municipal-sourced landscaping and garden supplies such as grasses, leaves, plants, tree trimmings, pine bark, sawdust, hay and harvesting residues – will make up at least 80% of the total feedstock, and
- Category 2 medium-odour wastes will consist of biosolids and aged manures, comprising up to about 20% of the total feedstock. Biosolids accepted at the facility will be sourced only from licenced producers and transporters, and will be rated as Class 1 and 2, contaminant grades A and B, and stabilisation grades A and B [Table 9.1 of EPA(2020)[2]]. Compost Kings will not accept sewage sludge.

The objectives of this OMP are set out in Table 1.

Table 1. OMP objectives

OMP Objectives	Section of this OPM
Objectives	2.2
Identification of odour sources	5.2
Minimisation of odour at source (includes management and control strategies)	5.5
Monitoring of odour emissions	6.1
Management strategies for the general approach to be taken to meet and maintain the objectives	6.3
Actions needed to implement the management strategies	6.3
Performance indicators against which the level of achievement of the objectives will be measured	6.2
Responsibilities of personnel	6.4
Reporting and review arrangements (including any auditing) for each action; how often; and to whom	6.7
Corrective actions to be undertaken if the objectives are not being met or maintained, including who is responsible for taking the required actions	6.4
In the event of an odour-related complaint from a sensitive receptor, undertake an investigation to identify the odour emission source responsible for the issue, and take reasonable actions to mitigate the emission	6.5

[1] EPA Victoria (2017). *Designing, constructing and operating composting facilities.* Publication 1588, Environment Protection Authority Victoria, 1 June 2017.
[2] EPA (2020). *Tasmanian Biosolids Reuse Guidelines.* Environment Protection Authority Tasmania, June 2020.

2 Regulatory framework

2.1 Overview

The manager/operator of the facility is committed to conducting composting operations in a manner that will protect the environment. The commitment extends to addressing all operations including air emissions and odour, soil and groundwater contamination, and general housekeeping.

The facility will minimise the risk of odour to the environment by complying with all aspects of this OMP. The OMP will assist management in complying with regulatory requirements of:

- The Southern Midlands Council Development Approval for the operations, and
- the *Environment Protection Policy (Air Quality) 2004*

2.2 Objectives

The objectives of this OMP are to detail how odour aspects and effects might arise from facility operations, how they are to be managed and monitored, how responsibilities are shared, and how any odour complaints are handled.

From this OMP Compost Kings will develop protocols for facility personnel to manage odour. The odour management protocols will be part of a Facility Operations Manual.

3 Environmental considerations

3.1 Location

The site on Lovely Banks Road near Melton Mowbray in the Tasmania Midlands is wholly contained within the rural property *Somerton*, on its western border with *Woodlands Run*, an adjoining rural property. These two and all other surrounding properties are broad-acre agricultural holdings, with grazing the principal land use (Figure 2).

Within *Somerton*, the proposed 6.5ha facility is included in a 23ha site with a 400m frontage on Lovely Banks Road (Figure 3).

3.2 Terrain

The district has a youthful topography dissected by many un-named watercourses draining to Quoin Rivulet and its tributary Serpentine Valley Creek, in the Quoin – Serpentine Valley subcatchment.

Relief in the district is about 400m, rising from 200 – 250m in the valley of Quoin Rivulet near Melton Mowbray, to 600 – 650m along the north-south trending Bisdee Tier, Green Timbers and Mt. Mercer several kilometres east of the proposed composting facility.

The facility is on a 400m wide west-facing "plateau" between about 320m and 330m elevation, on a hillside segment sloping gently west at an average gradient of 3^0. About 100m south of the site boundary, the hillsides steepen to angles of 10^0 – 15^0, falling south to an un-named tributary of Stony Hut Creek.

3.3 Meteorological conditions

3.3.1 Rainfall

Rainfall has been recorded since 1908 at *Lovely Banks* on the Midlands Highway, 2.8km north-northwest of the proposed compost facility. At *Lovely Banks*,

- mean annual rainfall is 501mm, and the 95%ile annual rainfall is 722mm.
- mean monthly rainfall in the 40 – 50mm range is fairly evenly distributed during the year, and 95%ile monthly rainfall is approximately twice mean monthly rainfall and more variable (70 – 100mm).

Since 1908, about 73% of days recorded no rain, and a further 12% of days recorded less than 2mm of rain. Less than 1% of days received 30mm or more of rain (Figure 4).

3.3.2 Temperature

Mean maximum temperature in the district[3] ranges from 10 – 11^0C in June – August, to 20 – 22^0C in January – February.

Mean minimum temperature ranges from 2 – 3^0C in June – July, to 8 – 9^0C in January – February.

3.3.3 Winds

Dominant winds (about 43% of the time) are from the west and northwest (Figure 5). Low (<2.8m/s) wind speeds occur approximately 30% of the time in summer, and up to 50% of the time in winter, indicating relatively poor atmospheric dispersion conditions for the site.

[3] Bureau of Meteorology data for Tunnack Fire Station.

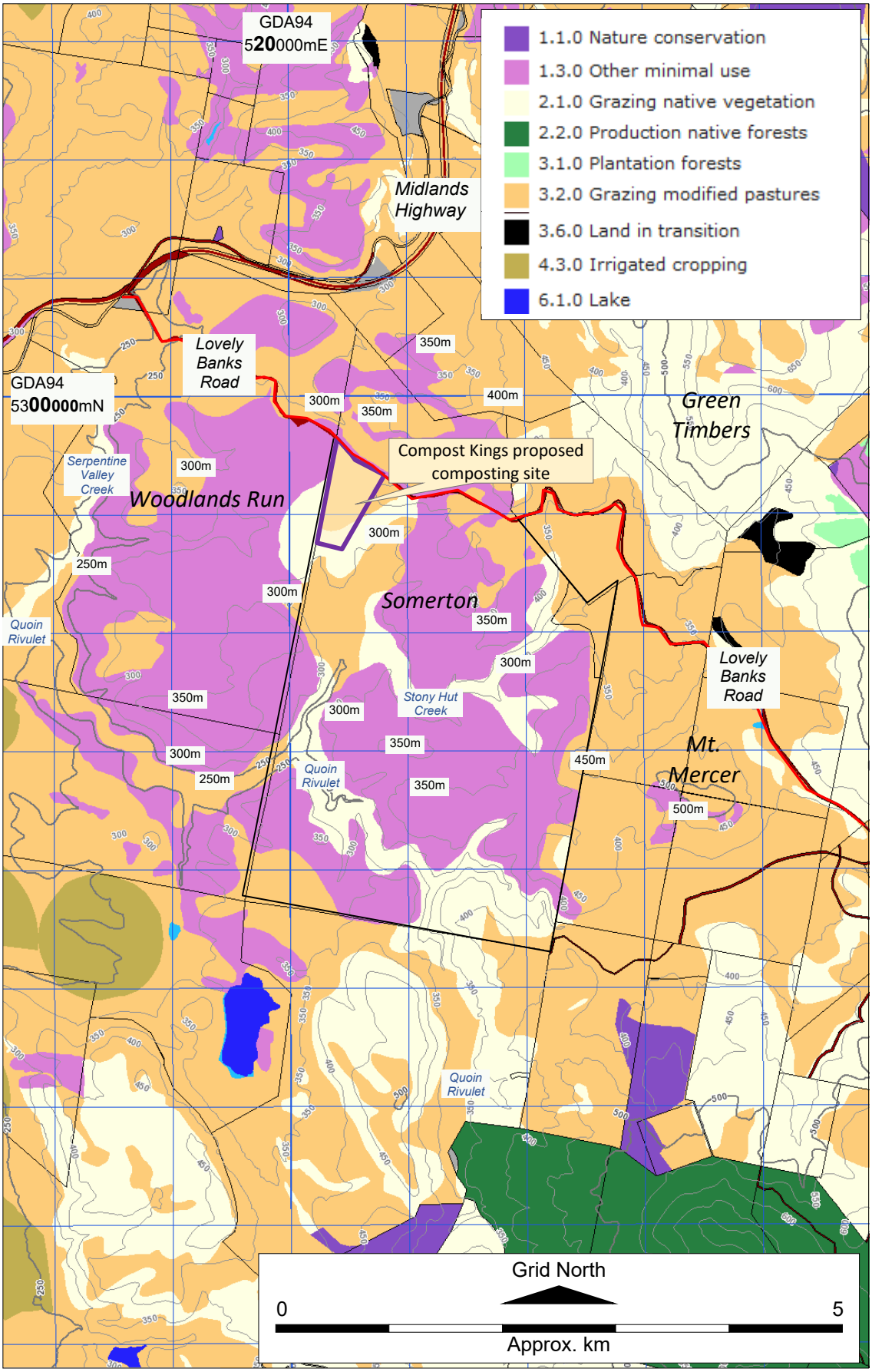

Figure 2. Land use (2019) in the vicinity of the proposed composting facility.
Source: www.thelist.tas.gov.au

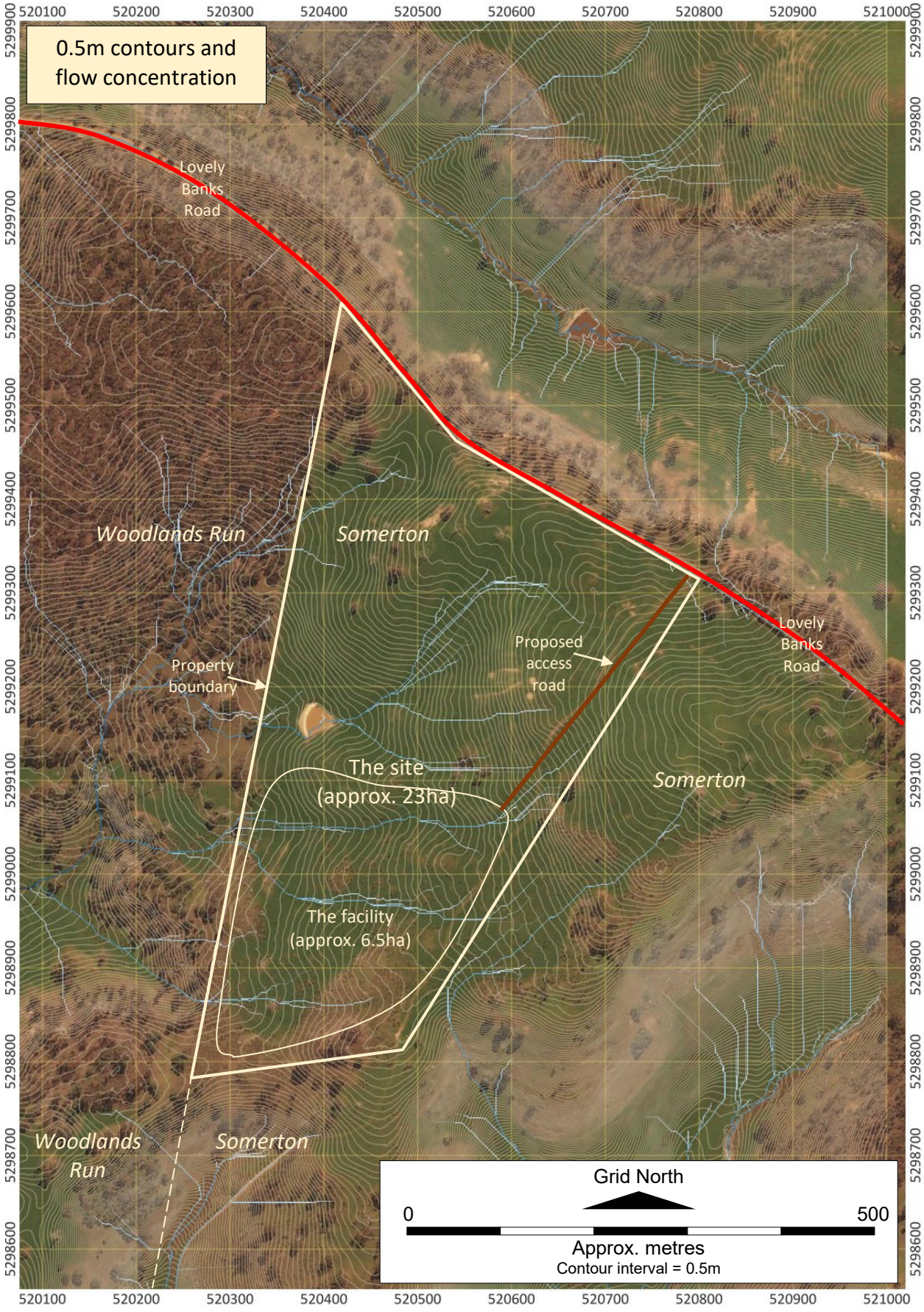

Figure 3. The proposed 6.5ha composting facility within the 23ha site on *Somerton*. (Blue lines on the site are computer-generated flow concentration lines after sufficient rain, not established watercourses.)
Source of base map: www.thelist.tas.gov.au

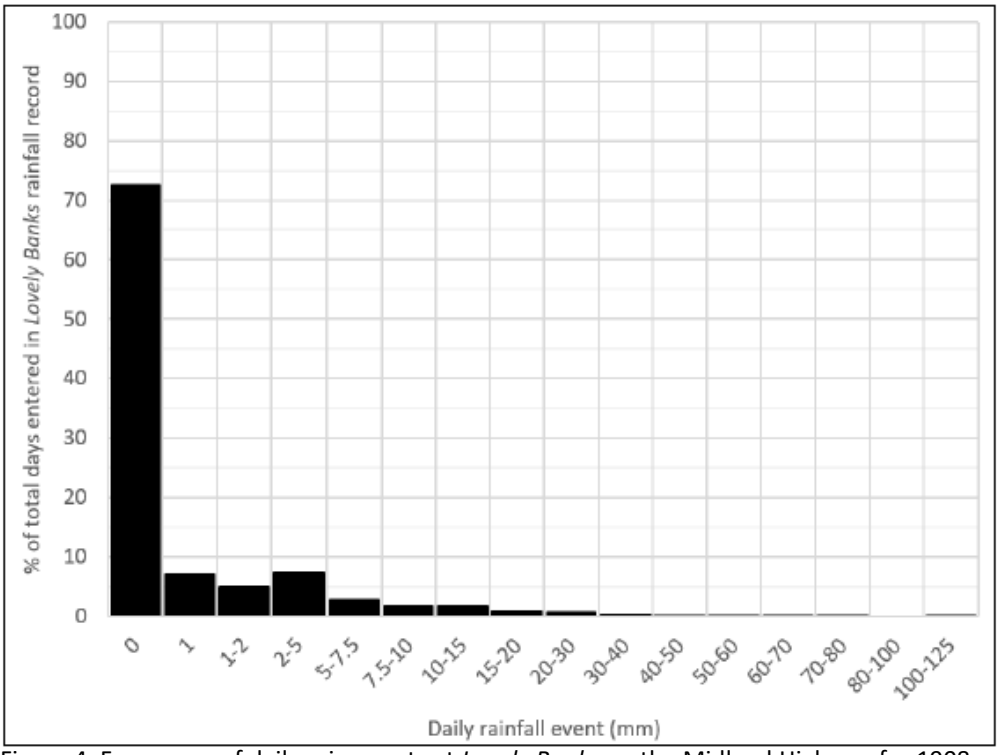

Figure 4. Frequency of daily rain events at *Lovely Banks* on the Midland Highway for 1908 – 2020. Source: Compiled from Bureau of Meteorology rain records for Station 94140 (Lovely Banks)

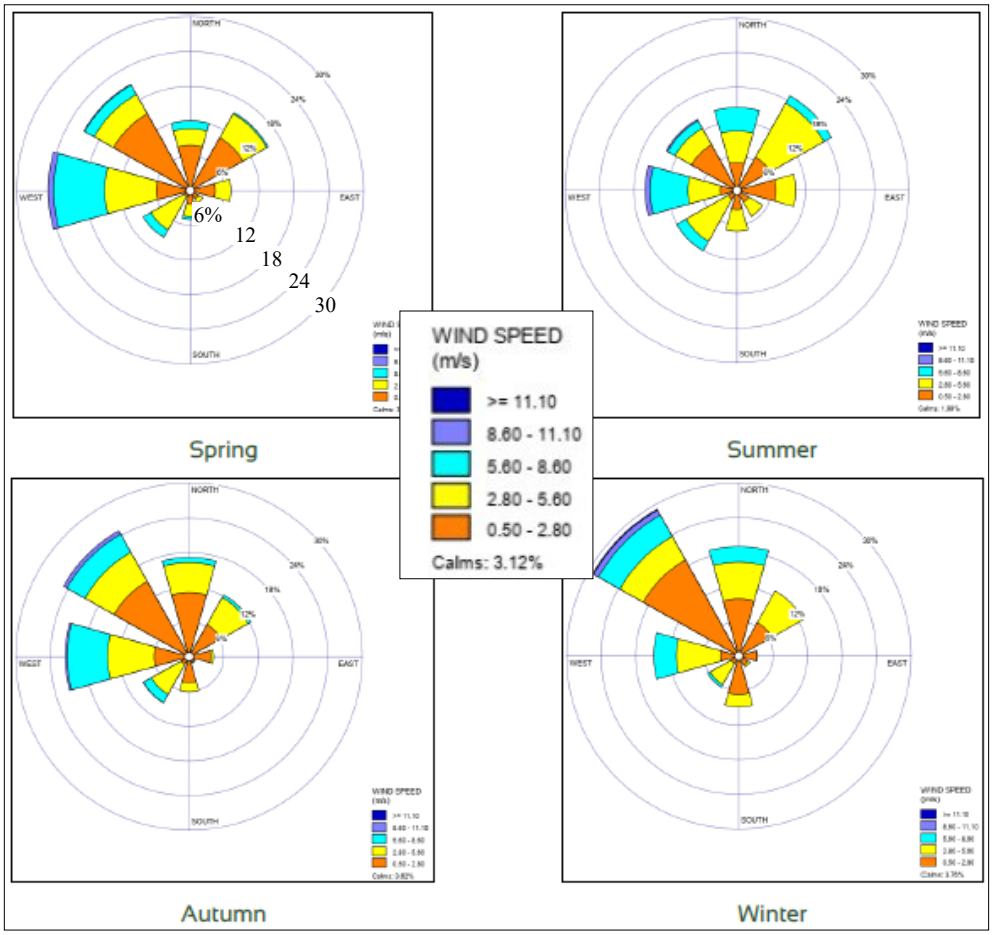

Figure 5. Predicted wind roses by season for the site. Low (<2.8m/s) wind speeds occur 30% of the time in summer, and up to 50% of the time in winter, indicating poor atmospheric dispersion conditions. Source: Adapted from Figure 29 of Appendix 8 of the Environmental Impact Statement.

4 Technical considerations

4.1 Factors influencing odour impact

The effect of an odour can be described by a combination of its Frequency, Intensity, Duration, Offensiveness and Location (FIDOL):

- Frequency: at low odour concentrations, high frequency is more noticeable,
- Intensity: the strength of the odour, proportional to the log10 of the concentration,
- Duration: the period of time the odour concentration remains above the odour threshold,
- Offensiveness: a combination of its character and how unpleasant (or pleasant) it is, and
- Location: describes the type of land use and human activities in the vicinity of the odour source, with emphasis on sensitive receptors (typically the closest to the odour source)

4.2 The odour pathway

Four factors need to be present for an odour to become a nuisance:

- an odour source,
- the release of the odour to the atmosphere – either by natural causes or mechanical introduction,
- its off-site transport – emissions which leave the facility (and are therefore outside the Operator's control) to nearby properties, and
- odour perception – off-site people judge the odours to be offensive and register a complaint.

If any one or more of these factors is absent, no odour problem exists.

4.3 Odour transport

Odours are low-density gasses transported by wind. Wind produces horizontal movement of humidity, warm air, pollutants and odours, and wind turbulence is responsible for vertical transport. Typically, the concentration of odours leaving a source decreases as distance from the source increases. However, pervasive odours can be detected at considerable distances from a source.

Odours emitted from a source at ground level remain most concentrated during periods of stable air, particularly at night and early morning. During the day, warming of air by the sun increases dispersion and decreases odour concentration.

Windy days disperse odour more rapidly than calm days, but also tend to carry odour further distances.

5 Odour emissions

5.1 Summary of activities at the facility

The facility will receive a range of Category 1 and 2 solid wastes (Table 2) delivered by covered trucks from different suppliers – mainly from southern Tasmania but also from other parts of the state.

Table 2. Proposed types, sources and quantities of materials to be composted

1	2	3	4	5	6	7	8	9	10	11	12	13
Waste Category	Risk level	Waste type	Examples	Potential sources	Est. annual feedstock weight by example t	Est. annual feedstock weight by type t	Est. annual feedstock weight by type %	Average bulk density t/m3	Est. moisture content %	Est. C:N ratio per example range	Est. C:N ratio per example average	Est. average C:N ratio per type
1	Lowest	Garden and landscaping organics	Grass	Local farms, landscapers, etc	250	1,050	8	0.3	80	10-25	17	40:1
			Leaves		400			0.3	40	40-80	50	
			Plants		200			0.3	15		50	
			Tree trimmings		200			0.8	70		15	
		Untreated timber	Sawdust	Local sawmills	250	500	4	0.25	40	200-750	450	450:1
			Woodchips, shavings		250			0.4	40	450-820		
			Pine bark	Norske Skog	200	200	1	0.4	25	130-1200	500	
		Natural fibrous organics	Hay and harvesting residues	Local farms incl. *The Follies*, *Redside*	2500	2,500	18	0.2	10	15-30		25:1
2	Medium	Municipal-sourced garden and landscaping supplies	Grass	Waste transfer stations at local councils including Kingborough, Hobart, Clarence, Glenorchy, Brighton, Southern Midlands	2500	7,250	52	0.3	80	10-25	17	40:1
			Leaves		2500			0.3	40	40-80	50	
			Plants		1500			0.3	15		50	
			Tree trimmings		750			0.8	70		15	
		Biosolids	Contaminant Grade A or B; Stabilisation Grade A or B	TasWater WWTPs	2000	2,000	14	0.8	70	10:1	10:1	10:1
		Aged manures (moisture <65%)	Cattle manure	Local feedlots	500	500	4	0.8	60	10-30	20:1	20:1
				Total feedstock weight (rounded)		**14,000**	**100**					
				Est. final compost weight (rounded)		**10,000**						

Notes to Columns

1 From Table 4 of EPA Victoria (2017). *Designing, constructing and operating composting facilities*. Publication 1588, EPA Victoria, 1 June 2017
2 Risk level from EPA Victoria (2017) Section 5.1 relates to "potential risk of harm to human health and the environment"
3 Adapted from Table 4 of EPA Victor4ia (2017)
4 Adapted from Table 4 of EPA Victor4ia (2017)
5 Potential sources may be amended from time to time.
6 Weights are rounded. Weight of feedstock by example may change from time to time
The facility is designed to operate without Category 2 biosolids, because their availability is uncertain.
7 Weights are rounded. Weight of feedstock by type may change from time to time. Average weight loss during composting assumed to be 30%.
8 Percentages are rounded.
9-13 Various sources, including:
Cornell Waste Management Institute (https://cwmi.css.cornell.edu/composting.htm)
C:N mix calculator (https://compost.css.cornell.edu/calc/2.html)
Composting Magazin e (https://www.compostmagazine.com/carbon-nitrogen-ratio-tables/)
On-Farm Composting Handbook Appendix A: Table A.1 (https://cwmi.css.cornell.edu/AppendixATable1OFCH.pdf)

All customers and cartage contractors will be required to phone ahead (ie to make verbal, not electronic, contact) before each delivery to make sure the waste is acceptable material, and the facility is capable of accepting the delivery.

At the facility,

- all vehicles transporting wastes to the facility will be required to stop at the office, so that their loads can be visually checked. Loads with anything other than minimal contamination (e.g., easily removable foreign matter like plastics) will be rejected.
- loads will be received in the mixing area where sufficient amounts of low-odour green wastes are stockpiled, awaiting mixing. Any medium-odour waste will immediately be mixed with high-carbon, low-odour Category 1 feedstock and on the same day moved to the windrows to commence pasteurisation.
- the progressive pasteurisation-to-maturation process (Section 6.3.4) is expected to require nominally 12 windrows (more is added as required), each turned at least three times to achieve internal temperatures of at least 55^0C for three consecutive days before each turn. Maturation is achieved when active composting is completed – indicated by low odour, moisture content typically about 25%, pH in the 5 – 8 range, and a declining trend of peak towards ambient temperature.
- the product is screened to remove oversize, and then stockpiled on site. Stockpiled volumes are kept to a minimum, but there is sufficient area on site for up to 5,000m^3.

These operations are depicted schematically in Figures 6 and 7. The proposed layout of the facility is shown in Figure 8.

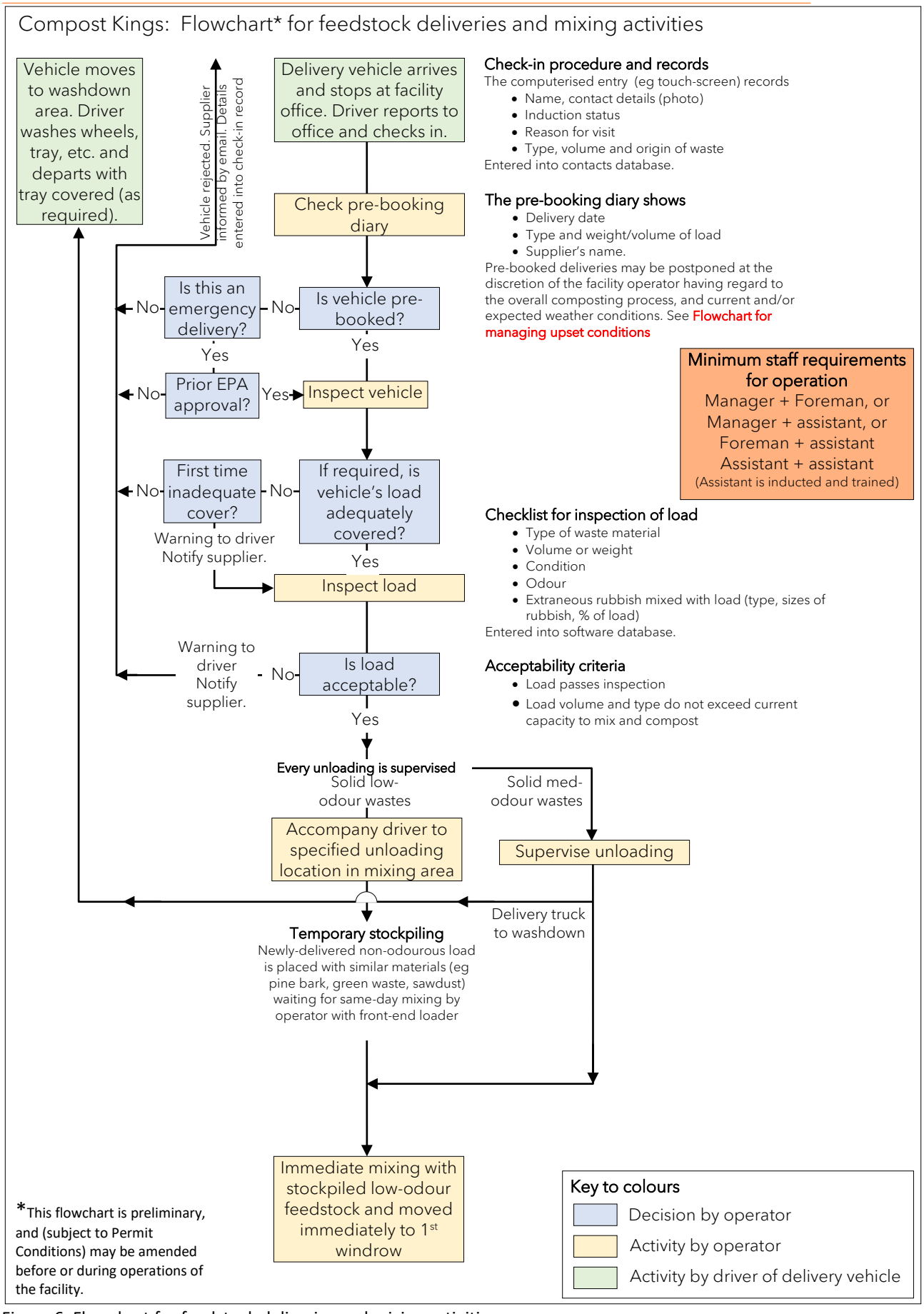

Figure 6. Flowchart for feedstock deliveries and mixing activities.

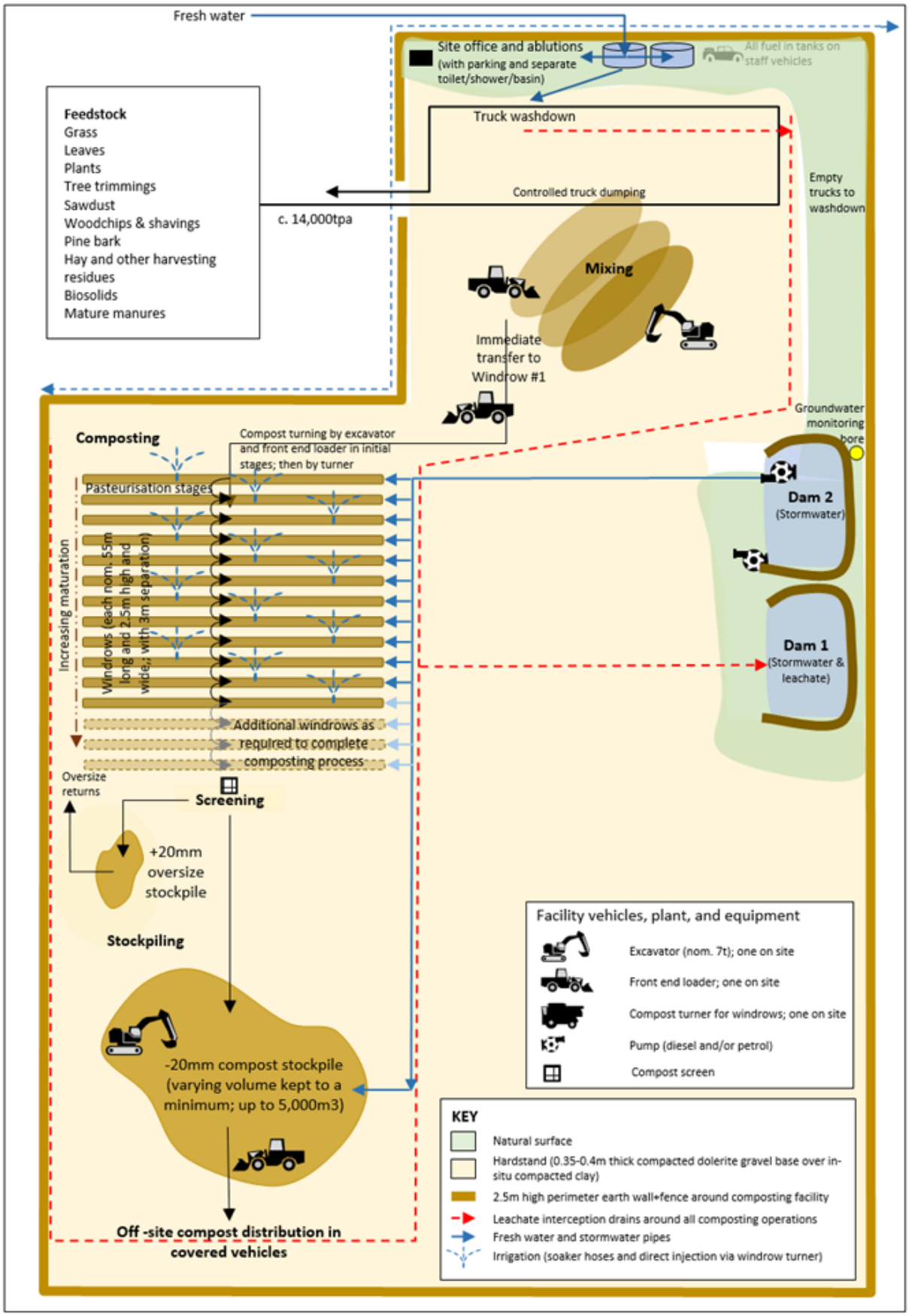

Figure 7. Schematic layout of proposed operations, plant, equipment, materials and vehicles at the composting facility.

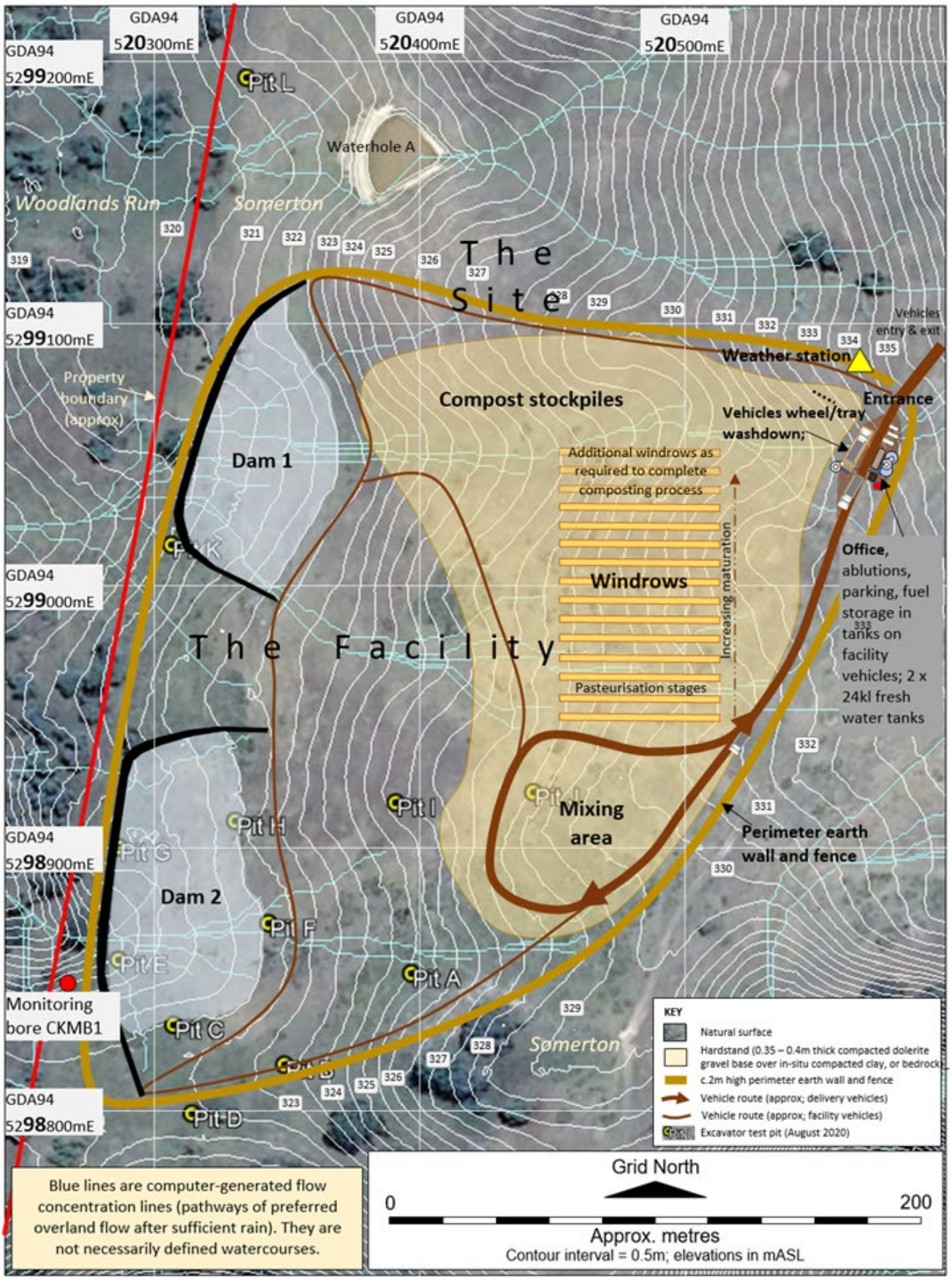

Figure 8. Facility layout.

5.2 Identification of odourous sources

The potential odour sources (Figure 9) are:

- Waste reception
- Waste mixing
- Vehicle washdown
- Windrows
- Screening of finished compost
- Finished stockpiled compost, and
- Dam 1 (leachate/stormwater), and to a lesser extent Dam 2 (stormwater only)

Some of these odours are continuous, and some are transient (Table 3). The most significant points of odour emissions are the mixing area (unloading and mixing), the moving (by front end loader) of material from the mixing area to the windrows, the vehicle washdown area, and the first few windrows. As composting continues to completion in the windrows, the potential for malevolent odours decreases.

All odour-generating sources are contained within the hardstand area in Figures 8 and 9.

Table 3. Continuous and transient odour sources

Odour source	Continuous or transient
Raw waste unloading	Transient
Raw material stockpiles	Continuous
Mixing area	Continuous
Truck movements (raw material delivery and product pickup)	Transient
Vehicle washdown	Transient
Windrows	Continuous
Windrows (formation and turning)	Transient
Screening and product stockpile	Continuous
Dam 1 (leachate/stormwater)	Continuous

Adapted from Table 5 of Clifton, M. (2024). Odour Impact Assessment: Compost Facility, Melton Mowbray. Project ID: 15578. Report prepared for Compost Kings Tasmania by Assured Environmental, 30 April 2024. Release R1.

5.3 Sensitive receptors

The sensitive receptors closest to the site are seven residences on broad-acre agricultural properties (Figure 10) at distances ranging from 1.27km (*Redside*, to the north) to 5.90km (*Stockman*, to the southwest).

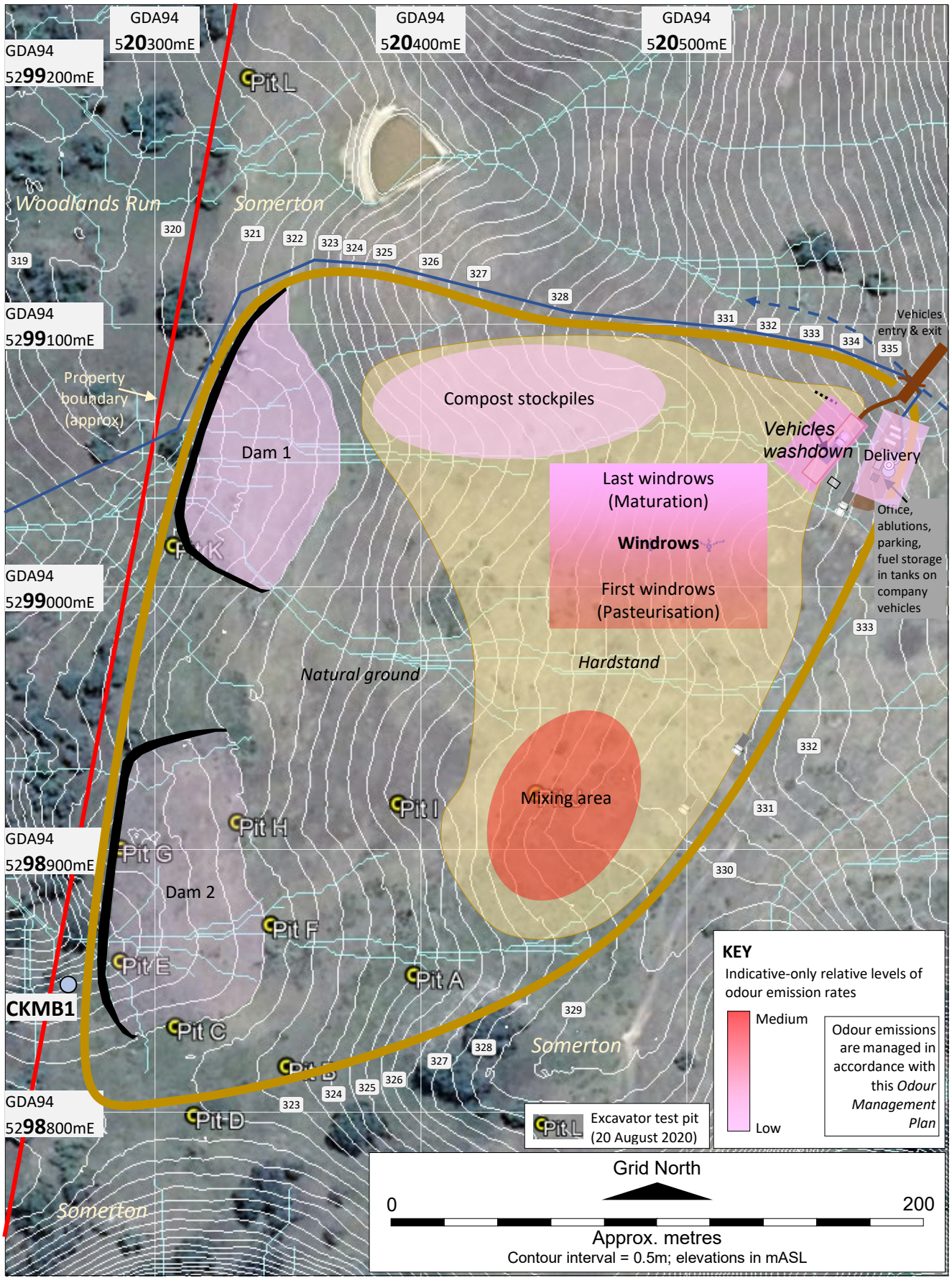

Figure 9. Main sources of odour at the facility.

5.4 Odour Assessment Report

Compost Kings commissioned Queensland consultants *Assured Environmental* (AE) to prepare an odour assessment report for the proposed facility.

An initial AE report was released on 1 April 2021. Revised versions were issued in September 2021, August 2022, May 2023 and 30 April 2024[4]. The second and third revisions were done to accommodate a proposed increase in area (almost a doubling) of the facility within the site (August 2022), and the fourth (May 2023).addressed EPA comments in relation to odour receptors. The latest revision (Revision R1) addressed a change of feedstock (no high-odour wastes) and is included as Appendix 8 of the Environmental Impact Statement. The reports were done in accordance with EPA (2019a) and EPA (2020), and Air Quality EPP[5].

Dispersion modelling was completed for all the activities identified in Section 5.2 above, for the proposed design in Figures 7 and 8. Conservative odour emission rates were first discussed with EPA.

Odour emissions were derived for normal and worst-case scenarios for 10,000tpa compost production. The modelling shows that:

- normal and upset operations generate odour concentrations which do not comply with the required maximum level of 2 OU at the boundary of the site: the highest predicted 1-hour 99.5th percentile normal and upset concentrations are 46 OU and 85 OU respectively,
- odour generated from normal operations is not expected to be detectable at any of the seven closest receptors: at *Redside*, the closest receptor, the highest predicted 1-hour 99.5th percentile odour level is 0.34 OU (1 OU is typically presumed to be the lower level of detectability),
- during worst-case conditions (Figure 11), the 1-hour 99.5th percentile odour level remains less than 1 OU at all closest receptors (at *Redside* it is predicted to be 0.66 OU.
- mixing (including truck unloading) and window turning are the main activities contributing to odour concentrations under normal and worst-case scenarios, and
- truck deliveries will not cause an odour nuisance because the movements are transient[6].

These modelling results indicate the need for an effective OMP with defined procedures for all activities and conditions.

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[4] Clifton, M. (2024). Odour Impact Assessment: Compost Facility, Melton Mowbray. Project ID: 15578. Report prepared for Compost Kings Tasmania by Assured Environmental, 30 April 2024. Release R1.

[5] EPA (2019). *Guidelines for Preparing an Environmental Impact Statement.* Environment Protection Authority, March 2019.
EPA (2020). *Environmental Impact Statement Project Specific Guidelines For Seaton Waterfield/Compost Kings Composting facility, Lovely Banks Road, Melton Mowbray, Tasmania.* Environment Protection Authority, December 2020.
Environment Protection Policy (Air Quality) 2004. Environment Division, Department of Tourism, Arts and the Environment, Tasmania.

[6] All delivery trucks will have covered trays on all roads and to the facility, and trays will be covered again for empty loads on and after departure.

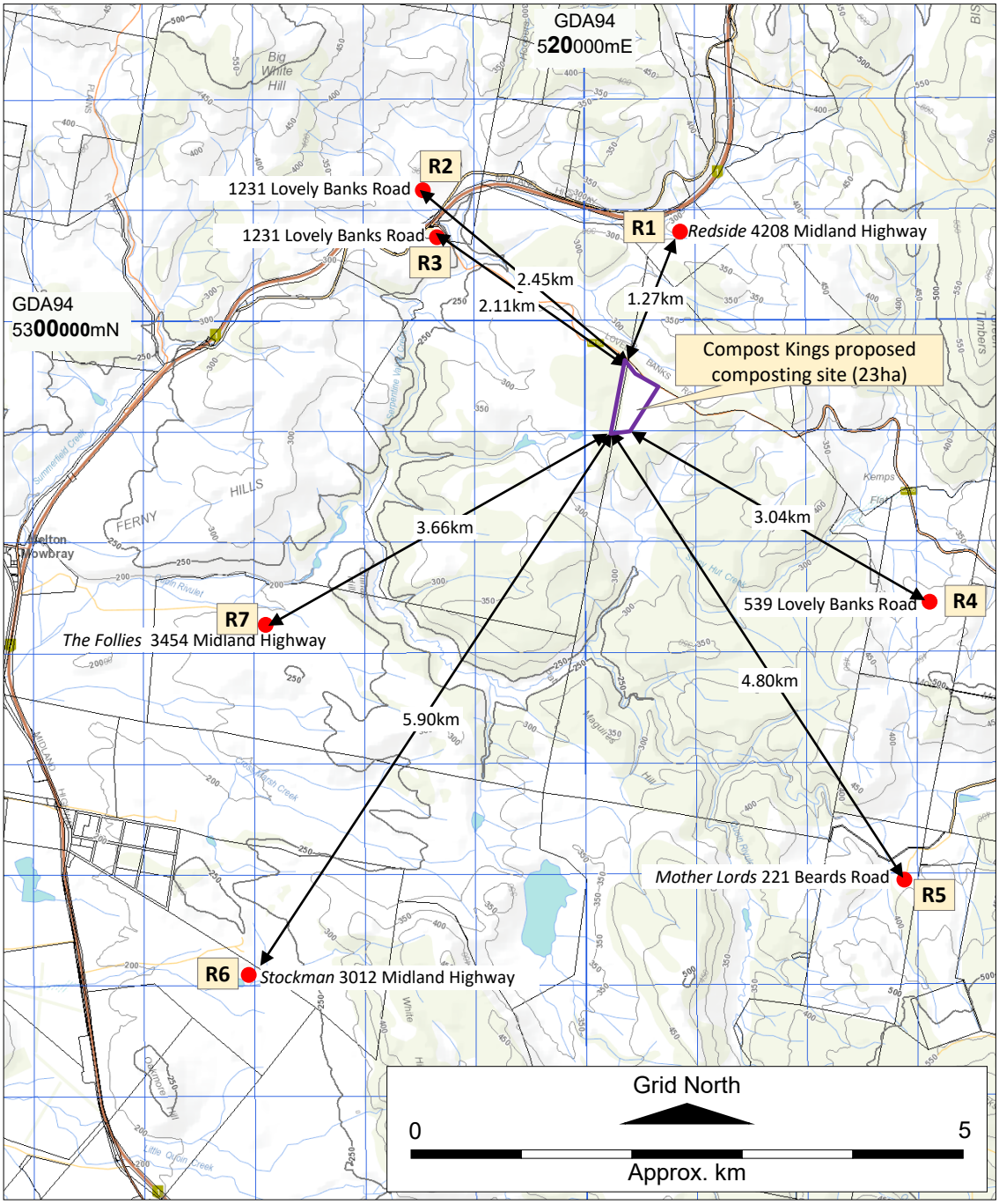

Figure 10. The seven residences closest to the site.
Source for base map: www.thelist.tas.gov.au

5.5 Minimisation of odours

5.5.1 Hierarchy of controls

In the management hierarchy of air emission controls *Avoid* (most effective) – *Recycle* – *Minimise* – *Manage* (least effective), the composting facility will have the following controls:

- Avoid and minimise
  - locked access gates when the facility is unattended, to prevent unwanted dumping of wastes;
  - no contractual obligation to accept any waste,
  - waste deliveries refused if they are unable to be satisfactorily treated at the facility,
  - unacceptable wastes (e.g., too contaminated) refused.
- Recycle The whole process of receiving and beneficially composting wastes is recycling.
- Manage This OMP and operating procedures are management controls used to ensure the facility operates efficiently as possible.

5.5.2 Best Practice Procedures and Controls

Best Practice procedures and controls are discussed in Section 6.3.

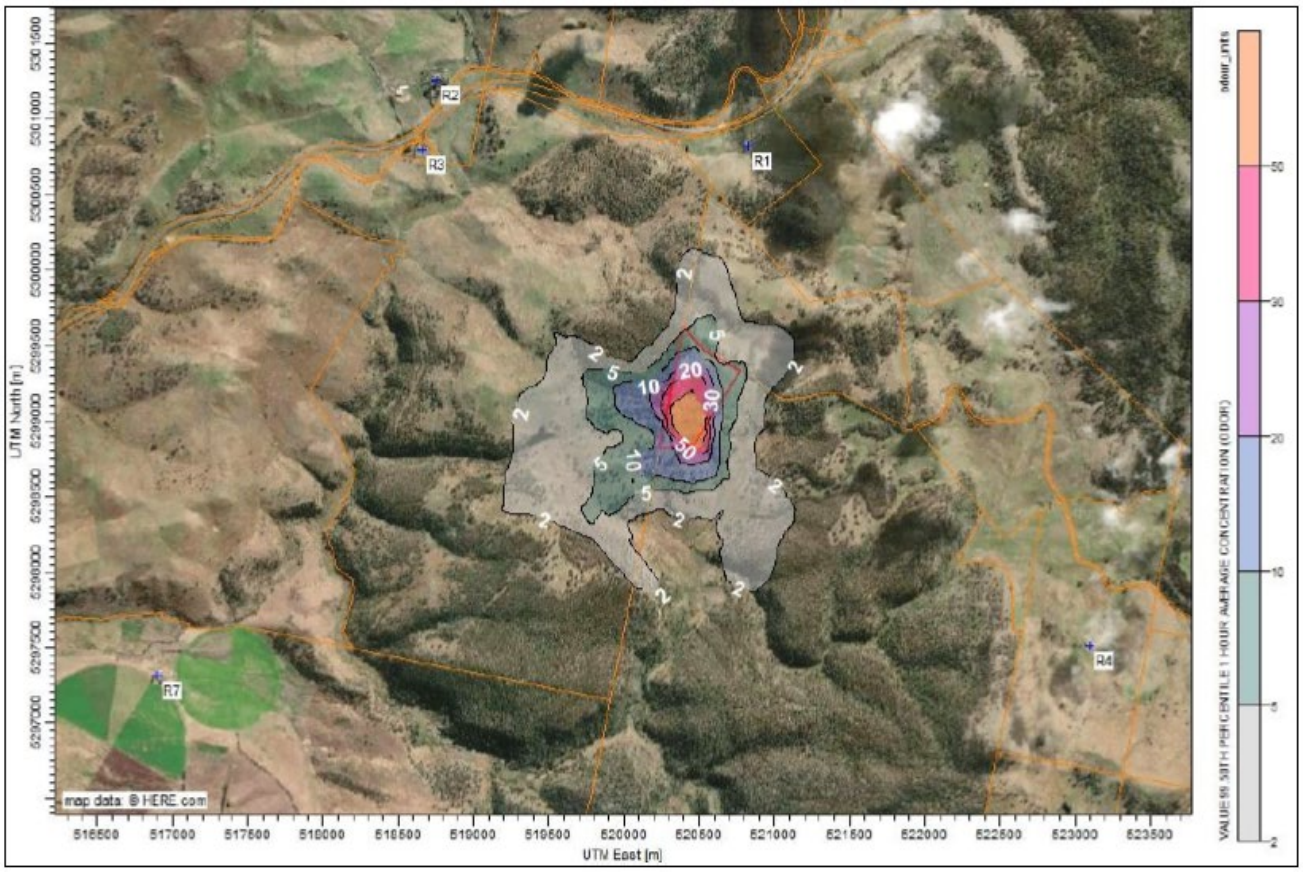

Figure 11. Predicted 1-hour 99.5th percentile ground level odour contours during upset conditions for cumulative activities. Source: Figure 20 of the Odour Assessment Report (Appendix 8).

6 Management Procedures

6.1 Monitoring of emissions

Daily visual and "sniff-test" inspections of the facility and its perimeter will be carried out using an Inspection Checklist, updated daily to record:

- any spills of waste or compost and their removal,
- any ponded leachate, directed to Dam 1,
- any instances of uncovered odourous waste in the mixing area, immediately covered with low-odour waste, and
- instrument monitoring recording temperatures and moisture contents of mixing stockpiles and windrows.

6.2 Performance indicators

Minimising odour generation is dependent on maintaining efficient operations at the facility. The performance indicators of unnecessary odour generation will be:

- identification by personnel of on-site odour, originating from non-compliant uncovered delivery trucks, the mixing area and windrows, vehicle washdown area, dams, and accidental spillages, and
- excessive temperatures and/or moisture contents which are too low or too high, of the mixing stockpiles or windrows.

6.3 Best Practice Odour Management Procedures

6.3.1 Management strategies for normal and upset conditions

Normal conditions are the day-to-day operations of receiving, mixing and composting wastes. Associated activities include monitoring and managing C:N ratios, moisture levels and temperatures in stockpiles and windrows, and dam water levels.

Upset (including unexpected) conditions prevail when normal activities are disrupted. They may be caused by:

- lack of water for composting,
- inadequate or no supply of low-odour wastes to mix with on-site medium-odour wastes,
- meteorological conditions (e.g., adverse winds, high rainfall events, high temperatures),
- bushfire risk,
- excessive water levels in dams,
- plant and equipment breakdown,
- downtime of computerised management system (eg Compost Manager or similar)
- staffing issues, and
- unforeseen circumstances.

Odour management procedures for the odour sources identified in Section 5.2 are schematically depicted in Figure 12, and are summarised in Table 4.

The flowchart in Figure 14 sets out operational procedures to manage odour generation and its off-site effects under normal and upset conditions..

Instructions for on-site personnel to manage normal and triggered upset events are listed in Tables 5 – 10. These instructions form part of the day-to-day operation manual for the facility.

During normal and upset conditions, in order to maintain efficient operation of the facility, (including the minimisation and control of odour), management will be assisted by:

- an on-site weather station recording wind speed and direction, rain, temperature, pressure, humidity, etc,
- continuous digital recording of water levels in Dams 1 and 2,
- flow meters on water lines to record pumped water flows from Dam 2 for irrigation of stockpiles and windrows, and
- the use of proprietary software (eg Compost Manager) which includes:
    - field measurement equipment of composting operations (pH, humidity, temperature, O_2 and CO_2),
    - computer (including cloud-based) storage of records, and
    - real-time guidance on optimum moisture and temperature of stockpiles, and as a result, better control of odours and their generation[7].

During upset conditions, when the facility may be closed for waste deliveries, the manager and/or the foreman will be present at all times, including weekends.

Off-site odour effects from normal and upset conditions

If during normal or upset conditions off-site odour impacts are suspected of occurring, or have been reported as occurring, facility personnel will do all or some of the following:

- determine the source and extent of the odour issue (one or more specific areas within the mixing area and windrows may be generating the most pronounced odour),
- if the odour is from spillages, immediately clean up and combine the spillage with low-odour material in the mixing area,
- if the odour source is medium-odour feedstock in the mixing area (combined or not with other feedstock), immediately cover and/or combine it with low-odour material,
- if the odour source is from one or more windrows or product stockpiles, carry out one or more of the activities in Section 6.3.4,
- contact neighbours potentially or actually affected by the odour, explain the management activities being done, and maintain open communication with them,
- ensure compliance with local regulations and permit requirements related to odour emissions from composting; liaise with and report incident(s) to regulators, and

[7] Weather station records and dam water levels will be stored on and available via a GIS-centric cloud-based platform to allow remote wireless review by permitted users. Decisions related to operation and/or weather-dependent closure of the facility will be able to be made on-site or off-site and in a timely fashion.

- be proactive in odour management: continuously evaluate and improve operational practices. Incorporate feedback from odour monitoring efforts and stakeholders to refine mitigation strategies

6.3.2 Waste reception

All vehicles transporting wastes to the facility will be required to stop at the office, so that their loads can be visually checked, and details entered into a Deliveries Inventory.

Waste delivery on roads is at low risk of odour generation because of its transient nature, and because all vehicles carrying waste will be required to have their loads covered from source to destination, and on the return journey when empty.

Based on visual inspection, loads may not meet waste acceptance criteria:

- loads arriving uncovered will be rejected, and
- anything other than minimal contamination (e.g., easily removable foreign matter like plastics) will be rejected as not meeting waste acceptance criteria.

From the facility office and load checking area, all loads are directed to the waste mixing area.

6.3.3 Mixing area

The facility Manager, Foreman or other responsible person will supervise the unloading of every waste delivery[8].

The mixing area (Figures 12 and 13) is at a relatively high risk of generating odour. It will:

- be kept supplied with sufficient feedstock of Category 1 low-odour, high-carbon waste to enable mixing to achieve suitable C:N ratios for composting, and
- maintain on site a reserve of high-carbon low odour feedstock of at least 10% of weekly intake by weight to enable sufficient material to be continuously available for mixing with or capping odorous windrows.

Mixing feedstock in the optimum weight proportions for composting will be the responsibility of and directed by the Manager or Foreman. On the mixing pad, the process will be volumetric, using the front end loader and/or excavator to combine different numbers of bucket loads of various feedstocks. The number of bucket loads required of each will be provided in real time from the operator's on-site laptop computer[9]. All mix details (feedstock type, amounts, and resulting ratios) will be entered into the laptop for future reference.

After calculating the number of bucket loads required for the target C:N ratio of a mix, the front end loader or excavator will be used to:

- Load the required number of buckets of each feedstock into the mixing area.
- Mix thoroughly by layering the materials and repeatedly turning them over.

[8] During all opening hours, the facility will be operated by at least two responsible people who have been inducted and trained in all operations: Manager + Foreman, or Manager + assistant, or Foreman + assistant, or (rarely) 2 x assistants.

[9] The information needed to achieve a target C:N ratio in the final mix includes the volume of the bucket, the bulk density of each feedstock, the C:N ratio of each feedstock, and the carbon and nitrogen content as a percentage by weight in each feedstock. All these will be obtained from the Compost Kings Inventory of feedstock properties, which will be continually upgraded as fresh data become available.

- Continue mixing for an even, consistent mix.

The operator will also visually inspect the mix for uniformity—no clumps of one material should dominate. Adjustments to the mix will be made as required: eg adding more nitrogen-rich feedstock like grass clippings or more carbon-rich feedstock like sawdust or wood chips.

These activities in the mixing area are conceptually shown in Figure 10. Incoming medium-odour biosolids will not be stockpiled, but will be immediately mixed with high-carbon, low-odour feedstock and on the same day moved to the windrows to commence pasteurisation.

6.3.4 Windrows

Windrows are at high risk of generating odour. The control of moisture content and temperature mitigates the risks, and these and other parameters will be monitored daily in each windrow.

Composting windrows will be aligned in parallel rows up-and-down the slope, each separated by several metres to allow access for plant and equipment (Figure 12). Rows are of increasing compost-age from the first (fresh from the mixing area, undergoing pasteurisation) to last (matured, and ready for screening and stockpiling).

Material at the end of the windrowing stage has completed active composting and is stable with a lower odour potential. Moisture levels decrease, and temperatures slowly decrease to ambient levels.

Timeframes and temperatures for pasteurisation and maturation

Compost Kings' experience of windrowing in Tasmanian conditions indicates that the timeframe for pasteurisation to maturation is typically about 12 weeks, but may vary depending mainly on feedstock composition and weather conditions. A general overview of the typical timeframes for these stages is:

- **Pasteurization stage**:
  - Duration: 1 to 2 weeks
  - Temperature range: 55°C to 65°C
  - Odour levels increasing
  - temperature and microbial activity increase; pathogens, weed seeds, etc. killed
- **Active Composting stage**:
  - Duration: 2 to 4 weeks
  - Temperature range: 55°C to 65°C
  - Odour levels potentially highest
  - continued microbial activity and decomposition of organic materials; temperatures remain elevated; regular turning and aeration required
- **Maturation (and curing[10]) stage**:
  - Duration: 6 to 10 weeks
  - Odour levels decreasing
  - Temperature range: Gradually decreases from 55°C to ambient temperature
  - Temperature and microbial activity gradually decrease; compost undergoes slowing decomposition and tends towards stability – shown by monitoring of temperature, moisture levels, pH, O_2, CO_2.

[10] Curing is the gradual and final stage of maturation, during which active composting has stopped but further stabilisation and decomposition continue with decreasing microbial activity.

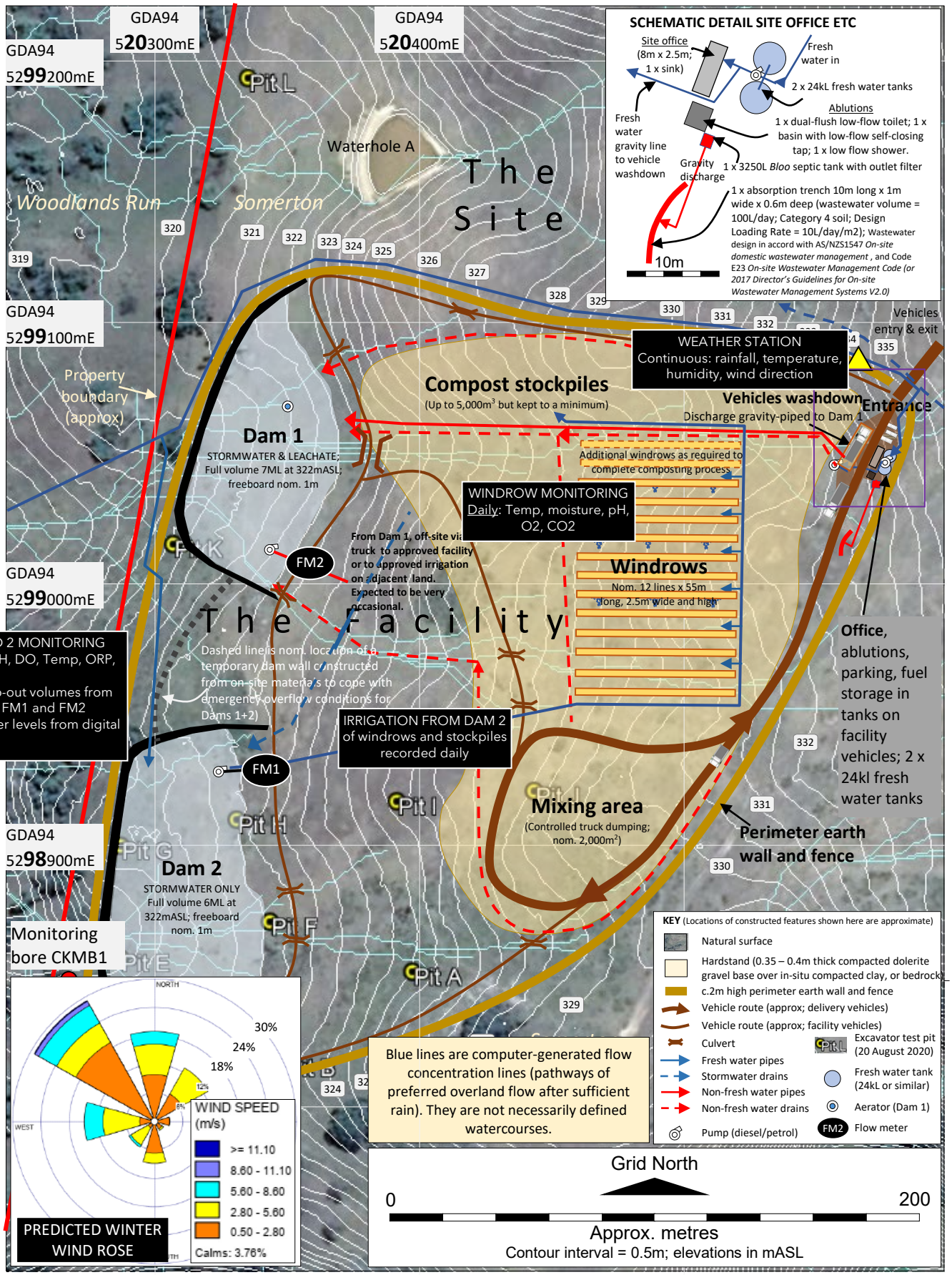

Figure 12. Schematic layout of the facility showing management strategies for odour control.
Source for base map: www.thelist.tas.gov.au

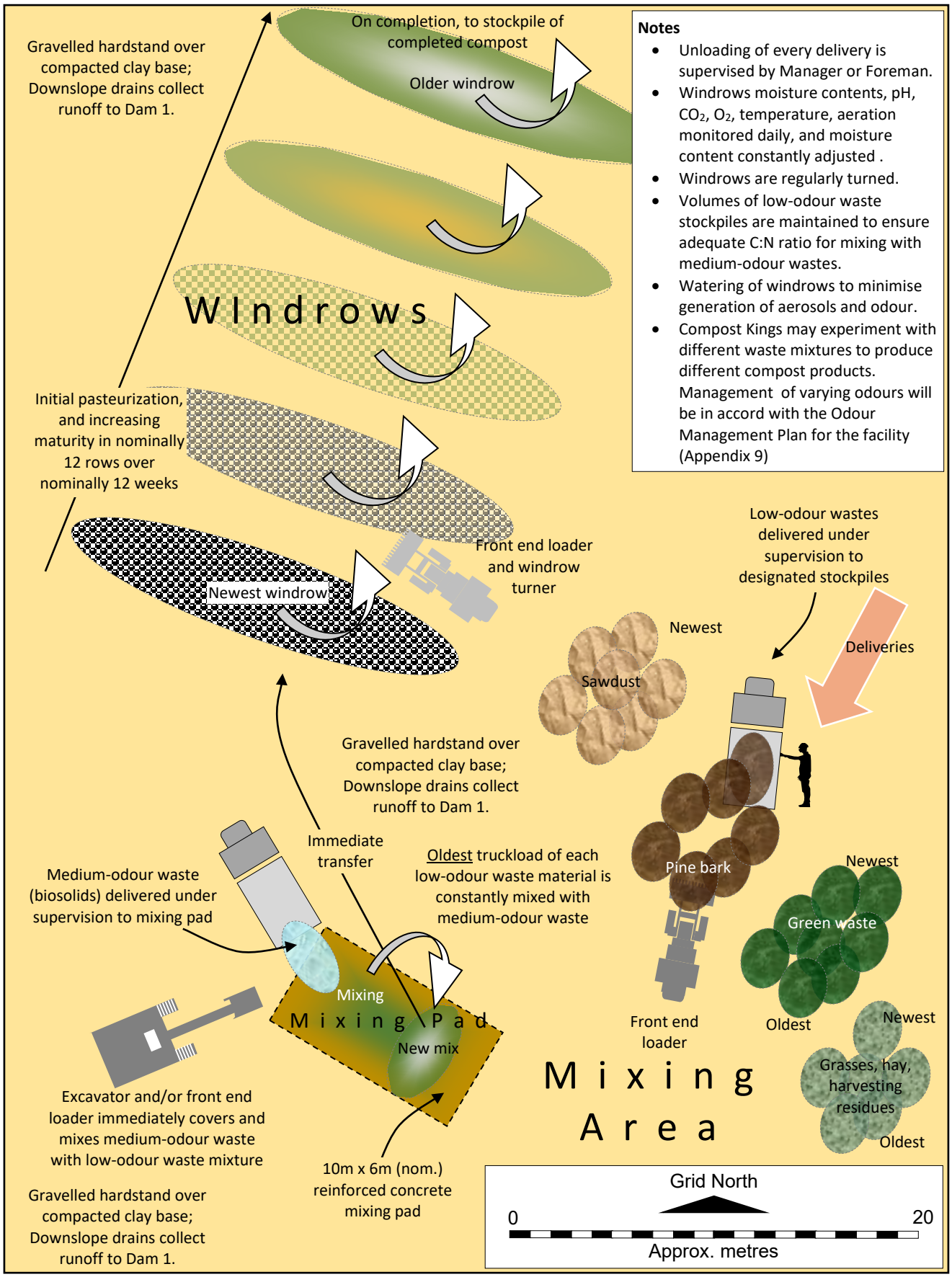

Figure 13. Proposed activities in the mixing area before windrowing.

Table 4. Best Practice Odour Management Controls proposed at the facility

Aspect		Hierarchy of Controls	Controls
Arrangements with suppliers, and access to facility	1a	Avoid, minimise	Only approved suppliers permitted to deliver wastes. No contractual arrangements for on-going acceptance of waste types or volumes. Approved suppliers have agreed in writing to (a) verbally pre-book and receive approval for each waste load before leaving source, (b) supply only weed- and FOGO-free waste, and deliver wastes only in appropriately covered vehicles.
	1b		At the verbal pre-booking stage, the site operator refuses delivery if the waste type or volume cannot be accepted at the facility and dealt with appropriately.
	1c		The main access gate on Lovely Banks Road, and the internal gate to the facility, will both be locked at all times (i.e., after hours, at weekends and public holidays) unless the site operator or other staff are in attendance to receive wastes. The gates will also be locked during upset conditions.
Waste reception	2a	Avoid	All incoming waste vehicles stopped at facility office; uncovered loads refused entry and suppliers notified. All loads checked for contamination status. Hand-picked contaminants separately stored in dedicated, enclosed container and removed as required off-site to approved facility. Loads with unacceptably high contamination levels refused entry.
	2b	Manage	All accepted loads entered into daily Wastes Received Record.
	2c		Wastes directed to mixing area.
Mixing	3a	Manage	Solid wastes segregated by type: low-odour high-carbon solid wastes to separate stockpiles (i.e., green waste, sawdust, bark to separate piles); medium-odour low-carbon putrescible solids to be immediately mixed and covered with low-odour wastes. Regular checks of low-odour stockpiles for temperature, moisture, pH, O2 and CO2 to optimise composting rates and reduce odour; regular turning as required.
	3b		Moving mixed wastes to the windrows is done via front end loader. Solid spillages will occur. The track of the loader shall be as constant as possible, to avoid spreading spillages over the hardstand; all spillages shall be removed to the windrows immediately the transfer of materials is complete.
Windrows	4	Manage	Regular checks of windrows for temperature, moisture, pH, O_2 and CO_2 to optimise composting rates and reduce odour; irrigation and turning is done as required.
Compost stockpile	5	Manage	Regular checks of stockpile for moisture, pH, O_2 and CO_2 to optimise composting rates and reduce odour; irrigation is done as required.
General	6a	Manage	Maintaining at the mixing area a reserve of high-carbon low odour feedstock (eg sawdust, woodchips, of appropriate particle size) of 10 – 20% of weekly intake by weight . This enables sufficient material to be continuously available for adjusting composting mixtures as required, or for mixing with or capping odorous windrows. The reserve weight will vary seasonally and with differing feedstocks: reserves closer to 20% will be maintained when feedstocks have low consistency in C:N ratios, and/or if biosolids are accepted.
	6b		Daily visual and sniff-testing of facility perimeter and internal areas; clean-up of any areas of spilt waste or compost; enter monitoring results into daily Inspection Checklist.
	6c		Continuous records from on-site weather station (rain, temperature, humidity, wind speed and direction), and dam water levels; record daily flow meter readings of water pumped from dams.

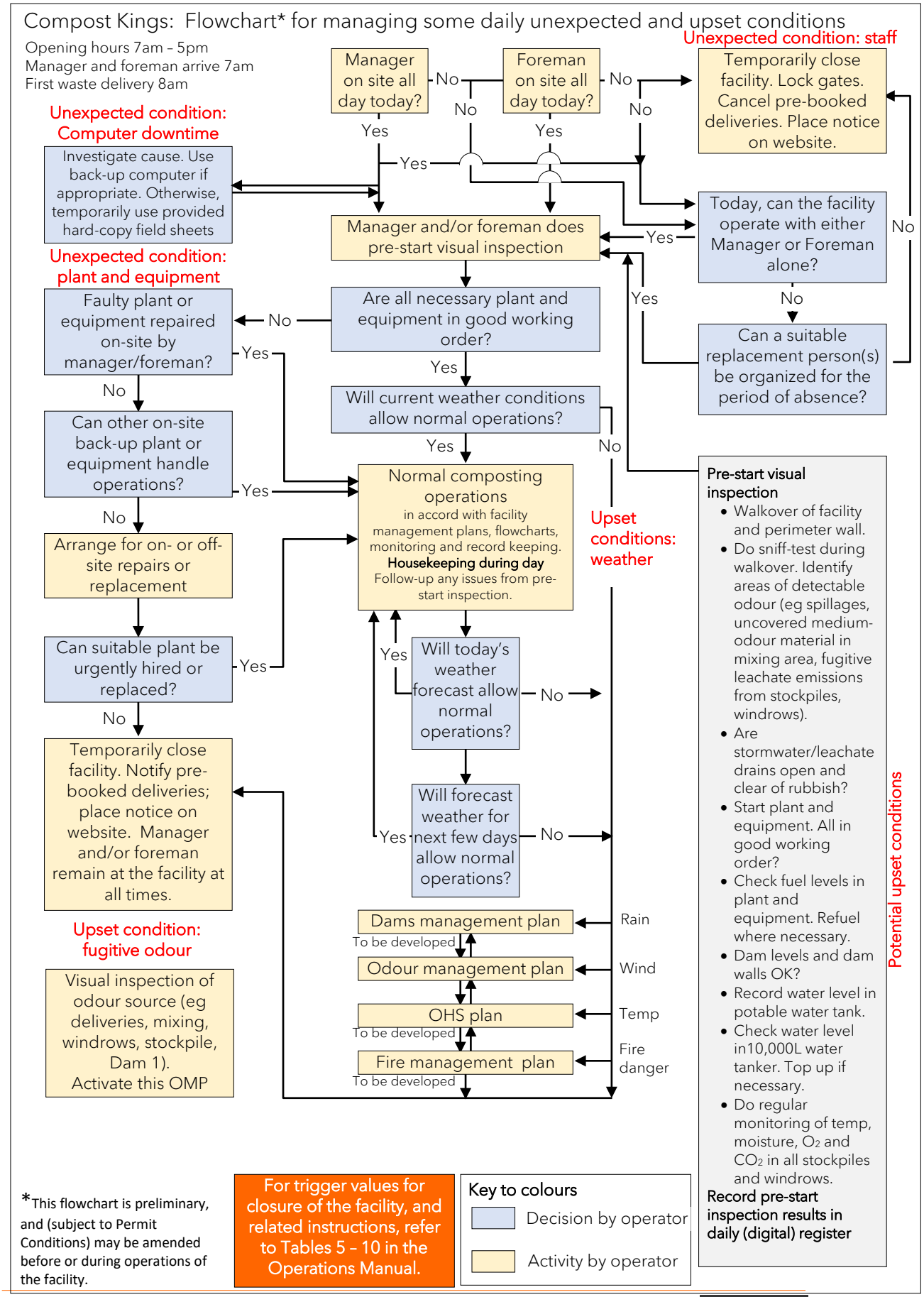

Figure 14. Flowchart for managing upset (including unexpected) conditions at the facility.

Anaerobic conditions in windrows

In the event that one or more windrows (or medium-odour waste deliveries in the mixing area) is generating odour and is suspected of being anaerobic (lack of microbial activity; excessive wetness), facility staff will do one or more of the following:

- aerate the windrow by turning, and if there is room available, consider dividing larger than average ones into smaller ones,
- check moisture levels, and if required, add dry bulking agents like woodchips, hay, etc from the stockpiles in the mixing area ,to assist in air circulation and help adjust C:N ratios,
- monitor the internal temperature of the windrows to ensure they remain within the optimal range for decomposition,
- add compost activators or inoculants containing aerobic bacteria and fungi, and
- continuously monitor the composting process.

6.3.5 Compost screening

This activity located after the windrow area is at relatively low risk of odour generation because the final windrow is matured product of low odour.

Oversize from screening is either returned to the mixing area, or into the first windrows.

6.3.6 Compost stockpiling

The volume and area of completed compost stockpiled on site will be kept to a minimum, but provision is made to store up to about 5,000m^3 waiting for off-site transport. This activity located after the screening area is also at low risk of odour generation because the finished product is of low odour.

6.3.7 Dams 1 and 2

In this low-rainfall district where annual evaporation exceeds annual rain, and daily evaporation[11] exceeds most recorded daily rain events, compost generation will operate under moisture deficits most of the time. Accordingly, moisture addition to stockpiles and windrows will be required most days, and it is not anticipated that normal operations will generate excess liquid waste which by itself would report to Dam 1 only (Figure 12). However, a small proportion of rain events will be of sufficient intensity and/or duration to produce runoff which has the potential to also mix with and transport liquids leached from stockpiles and windrows. At times, therefore, Dam 1(only) will receive potentially odiferous liquids. Left unmanaged, the organic content and odour risk of the dam will increase, and present an increasing risk of odour.

[11] Since 1904, about 72% of days have been rain-free, and another 12% received no more than 2mm of rain. Daily evaporation ranges from about 0.5mm in winter, up to about 8 – 10mm in summer. About 97% of days received less than 10mm rain.

Management of dam water odour, quality and levels will be a daily occurrence, including any combinations of:

- aeration of Dam 1 with a floating or submerged aerator,
- topping up low Dam 2 levels with fresh water[12], and
- off-site removal of Dam 1 water to irrigation on adjacent land under an approved management plan.

As a contingency plan, Compost Kings will also explore the feasibility of using proprietary odour neutralisers to manage dam odour.

6.4 Responsibilities

Responsibility for all operations at the facility and site rests with Compost Kings as facility Operator.

Mr. Seaton Waterfield will be Compost Kings' Facility Manager.

A Facility Foreman will be appointed.

The Manager will ensure that the Foreman and any other staff are aware of this OMP, and are able at all times to fulfil their obligations to it. The obligations include taking any necessary corrective measures to ensure the Best Practice Odour Management procedures set out in Section 6.3 are being observed at all times.

The Facility Manager is responsible for investigating any odour complaints and incidents, and to work with the Facility Foreman to ensure any necessary corrective actions are taken.

6.5 Complaints procedures

If a complaint is received from a sensitive receptor whose residence is affected by odour originating from the facility[13], the Facility Manager will ensure:

- the complaint details are recorded in an Odour Complaint Form,
- the complaint is investigated, and excessive off-site effects are verified (this would include a visit to the complainant's residence to assess the odour level),
- corrective measures, including modifications of any operational methods, are implemented to avoid recurrence and/or minimise ongoing odour effects,
- monitoring and other investigations are completed to assess the effectiveness of the corrective measures,
- the complainant is notified of the actions taken,
- operations are continued to be monitored for the specific odour incident, and

[12] Fresh water is pumped to the facility from off-site sources for use for vehicle washdown, dam top up, staff ablutions and drinking, and irrigation of stockpiles, windrows and pasture.

[13] The residence at *Redside* is the closest to the facility, and according to the Assured Environmental odour report it will not be affected by detectable odour during normal and upset conditions. The occupant at the residence, and owner of *Redside* and *Somerton*, is Mr. R. Jones. In November 2022, Mr. Jones stated in writing to Compost Kings that (a) he supports the proposed composting operations, (b) is aware that the house at *Redside* probably won't but might sometimes be affected by odour, and (c) if this happens, he will contact Compost Kings directly for a response to the issue.

- the need to modify this OMP is reviewed.

6.6 Training and awareness

Training and awareness of staff, and visitors to the facility, is an important part of this OMP. Visitors include drivers of vehicles delivering wastes, and subcontractors.

All these people have environmental management responsibilities. Their awareness of this will be done by inductions, each valid for 12 months (or less if operations change) and each recorded. The inductions will cover:

- the general operations of the facility,
- the significance of potential environmental impacts (including off-site odour),
- the importance of conforming with environmental policy and procedures to mitigate potential off-site environmental effects,
- the role and environmental responsibilities of the inductee to help achieve conformance with environmental policy, and
- the consequences of departure from specified operation procedures.

6.7 Review of this OMP

The Facility Manager will ensure this OMP is reviewed and if necessary revised annually, or more frequently whenever:

- there is a significant change to operations at the facility,
- there is a significant incident or breach,
- there is a change in applicable regulatory requirements or
- otherwise requested

Table 5. Operating instructions for normal and upset rain conditions. Rain is recorded directly from the on-site weather station.

This Table will form part of the daily operations manual for all personnel at the facility.

RAIN

	1	2	3	4
	Normal	Caution	Alert	High alert
Today	Forecast rain up to 20mm (average occurrence 3-4 days per year)	Forecast rain up to 30mm (average occurrence once a year)	Forecast rain up to 50mm (average occurrence once every five years)	Forecast rain >50mm
Action today	NORMAL OPERATIONS Compare current Dam 1 and 2 levels (ie volumes) to those predicted by WBM-V6[1] for this rain event. If new levels exceed trigger levels set in *Water balance input table* in WBM-V6, pump out dams1 and/or 2[2] as required (eg bring forward planned windrow irrigation with soaker hose or windrow turner, and consider irrigating (after approval) on adjacent land. . Operate facility in accord with OMP[3] and all other procedures.		UPSET CONDITION As for Columns 1 and 2. Cancel pre-booked deliveries of all medium-odour wastes. Consider closing facility and site.	UPSET CONDITION As for columns 1 and 2. Close facility and site. Insert closure time and expected re-opening time on website; notify today's pre-booked suppliers by email and/or text. Min. responsible staff[4] remain at facility.
Next few days including today	Forecast rain up to 50mm	Forecast rain up to 75mm	Forecast rain up to 100mm	Forecast rain >=100mm
Action today and next few days	NORMAL OPERATIONS Compare current Dam 1 and 2 levels (ie volumes) to those predicted by WBM-V6 for this rain event. If new levels exceed trigger levels set in ***Water balance input table*** in WBM-V6, instigate off-site water disposal plan (as above) and pump out dams as required.	NORMAL OPERATIONS As for Column 1. Cancel all pre-booked deliveries of medium-odour waste. Limit machine movements.	UPSET CONDITION As for Columns 1 and 2. Cancel all pre-booked deliveries of medium-odour waste. Minimise machine movement. Consider closing facility and site.	UPSET CONDITION As for columns 1 and 2. Close facility and site. Insert closure date and expected re-opening date on website; notify all suppliers pre-booked for closure period. Min. responsible staff[4] remain at facility.

1 WBM-V6 = Water Balance Model (Interactive spreadsheet V6 dated 24 February 2024)

2 Dams 1 and 2 have been sized to accept at least several 5%AEP rain events when water levels are maintained (after daily inspection) less than the trigger level. Pump-out ought not be normally required.

3 OMP = Odour Management Plan

4 Min. responsible staff = Manager + Foreman, or Manager + assistant, or Foreman+ assistant, or Assistant + assistant. All assistants are inducted and sufficiently trained in operations.

Table 6. Operating instructions for normal and upset temperature conditions. Temperature is recorded directly from the on-site weather station.
This Table will form part of the daily operations manual for all personnel at the facility.

TEMPERATURE (https://www.safeworkaustralia.gov.au/resource/managing-risks-working-hot-conditions-guide-employers)

	1	2	3	4
	Normal	Caution	Alert	High alert
Today	WBGT[1]<22^{0}C (nom. air temp <c. 24 – 27^{0}C)	WBGT<25^{0}C (nom. air temp 27 – 30^{0}C)	WBGT<28^{0}C (nom. air temp 32 – 35^{0}C)	WBGT>=28^{0}C (nom. air temp >=35^{0}C)
Action today	NORMAL OPERATIONS Monitor temperatures of mixing stockpiles, windrows and finished stockpiles. Adjust if necessary. Operate in accord with OMP, OHS[2] management plan, and all other procedures.		UPSET CONDITION Instigate heat management plan for facility personnel. As for Columns 1 and 2. Cancel pre-booked deliveries of all medium-odour wastes. Consider closing facility and site.	UPSET CONDITION As for columns 1 and 2. Instigate heat management plan for facility personnel. Stop all non-essential machine use. Close facility and site but consider accepting emergency deliveries which require no machine use. Insert closure time and expected re-opening time on website; notify all suppliers pre-booked for closure period by email and/or text. Min. responsible staff[3] remain at facility.
Next few days including today	WBGT[1]<22^{0}C (nom. air temp <c. 24 – 27^{0}C)	WBGT<25^{0}C (nom. air temp 27 – 30^{0}C)	WBGT<28^{0}C (nom. air temp 32 – 35^{0}C)	WBGT>=28^{0}C (nom. air temp >=35^{0}C)
Action today and next few days	NORMAL OPERATIONS Monitor temperatures of mixing stockpiles, windrows and finished stockpiles. Adjust if necessary. Operate in accord with OMP, OHS management plan, and all other procedures.	UPSET CONDITION Instigate heat management plan for facility personnel. As for Column 1. Cancel pre-booked deliveries of all medium-odour wastes. Consider closing facility and site.	UPSET CONDITION Instigate heat management plan for facility personnel. As for columns 1 and 2. Stop all non-essential machine use. Close facility and site but consider accepting emergency deliveries which require no machine use. Insert closure date and expected re-opening date on website; notify all suppliers pre-booked for closure period by email and/or text. Min. responsible staff[3] remain at facility.	

1 WBGT = wet bulb globe temperature (combines temperature, humidity and radiant heat); measured on site by portable meter. Digital alarm set to WBGT>=28^{0}C.

2 OHS = Occupational Health and Safety

3 Min. responsible staff = Manager + Foreman, or Manager + assistant, or Foreman+ assistant, or Assistant + assistant. All assistants are inducted and sufficiently trained in operations.

Table 7. Operating instructions for normal and upset wind conditions. Temperature is recorded directly from the on-site weather station.
This Table will form part of the daily operations manual for all personnel at the facility.

WIND [Low wind trigger of 2m/s from Odour Assessment Report (Appendix 8) amended to 3m/s]

	1	2	3	4
	Normal	Caution	Alert	High alert
Today	Up to 11m/s (40km/h) from any direction	Up to 14m/s (50km/h) from any direction	Up to 17m/s (60km/h) from any direction, or 3 – 6m/s from SSE – SSW quadrant	<3m/s from SSE – SSW quadrant, or >17m/s (60 km/h)[2] from any direction
Action today	NORMAL OPERATIONS Ensure OMP[1] (including appropriate housekeeping) is operating, and check that all medium-odour wastes (eg mixtures on mixing pad) are covered with low-odour material.			UPSET CONDITION As for Columns 1, 2 and 3. Close facility and site. Notify all pre-booked suppliers. Insert closure time and expected re-opening time on website. Visit or contact closest receptors to assess odour detectability. Min. responsible staff[3] remain at facility.
Next few days including today	>9m/s from any direction	>6m/s from any direction	3 – 6m/s from SSE – SSW quadrant	<3m/s from SSE – SSW quadrant, or >17m/s (60 km/h) from any direction
Action today and next few days	NORMAL OPERATIONS Ensure OMP (including appropriate housekeeping) is operating, and check that all medium-odour mixtures on mixing pad are covered with low-odour material.		UPSET CONDITION As for Columns 1 and 2. Consider cancelling all deliveries of pre-booked medium-odour wastes. Visit or contact closest receptors to assess odour detectability.	UPSET CONDITION As for Columns 1 and 2. Close facility and site. Insert closure date and expected re-opening date on website; notify all suppliers pre-booked for closure period. Min. responsible staff[3] remain at facility. Visit or contact closest receptors to assess odour detectability.

1 OMP = Odour Management Plan

2 McRobies Gully tip is required to stop operations and close to the public if wind speeds reach or exceed 60km/h. *McRobies Gully Waste Management Centre Environmental Management Plan (EMP) 2020-2030*. The weather station wind speed and direction alarm will be set to >17m/s for all winds, and <3m/s from SSW – SSE quadrant.

3 Min. responsible staff = Manager + Foreman, or Manager + assistant, or Foreman+ assistant, or Assistant + assistant. All assistants are inducted and sufficiently trained in operations.

Table 8. Operating instructions for fire danger ratings
This Table will form part of the daily operations manual for all personnel at the facility.

FIRE DANGER RATING (Midlands District; at https://www.fire.tas.gov.au/fire-danger-rating/summary/)

	1	2	3	4
	Normal	Caution	Alert	High alert
Today	NO RATING	MODERATE	HIGH	EXTREME to CATASTROPHIC
Action today	NORMAL OPERATIONS Monitor temperatures of mixing stockpiles, windrows and finished stockpiles. Adjust if necessary. Operate in accord with OMP and all other procedures. Ensure 10,000L water tanker is full and fuelled, and pumps on dams are fuelled and operate.		UPSET CONDITION As for Columns 1 and 2. Monitor fire danger ratings. Liaise with local fire service. Activate Bushfire Management Plan. Obey fire restrictions. If fire rating is increasing, consider closure of facility and site. Manager and/or foreman remain at facility.	UPSET CONDITION As for columns 1 and 2. Close facility and site. Insert closure date and expected re-opening date on website; notify all suppliers pre-booked for closure period by email and/or text. Min. responsible staff[1] remain at facility.
Next few days including today	NO RATING	MODERATE	HIGH	EXTREME to CATASTROPHIC
Action today and next few days	NORMAL OPERATIONS Monitor temperatures of mixing stockpiles, windrows and finished stockpiles. Adjust if necessary. Operate in accord with OMP and all other procedures. Ensure 10,000L water tanker is full and fuelled, and pumps on dams are fuelled and operate.	UPSET CONDITION As for Column 1. Monitor fire danger ratings at https://www.fire.tas.gov.au/fire-danger-rating/summary/ Liaise with local fire service. Activate Bushfire Management Plan. Obey fire restrictions. If fire rating is increasing, consider closure of facility and site. Min. responsible staff[1] remain at facility.		UPSET CONDITION As for columns 2 and 3. Close facility and site. Insert closure date and expected re-opening date on website; notify all suppliers pre-booked for closure period by email and/or text. Min. responsible staff[1] remain at facility.

1 Min. responsible staff = Manager + Foreman, or Manager + assistant, or Foreman+ assistant, or Assistant + assistant. All assistants are inducted and sufficiently trained in operations.

Table 9. Operating instructions for upset staff situations
This Table will form part of the daily operations manual for all personnel at the facility.

STAFF

	1	2	3	4
	Normal	Caution	Alert	High alert
Today	Manager and foreman present	Manager or foreman + at least one responsible staff present		Manager and foreman absent
Action today	NORMAL OPERATIONS Operate in accord with usual protocols and procedures	UPSET CONDITION Back-up inducted and trained personnel available and attend facility. Facility otherwise operates in accord with usual protocols and procedures		UPSET CONDITION Close facility and site. Insert closure date and expected re-opening date on website; notify all suppliers pre-booked for closure period. Organise emergency personnel to manage facility and site.
Next few days including today	Manager and foreman present	Manager or foreman + at least one responsible staff present		Manager and foreman absent
Action today and next few days	NORMAL OPERATIONS As above	UPSET CONDITION As above		UPSET CONDITION As above

Table 10. Operating instructions for upset plant and equipment situations
This Table will form part of the daily operations manual for all personnel at the facility.

PLANT & EQUIPMENT

	1	2	3	4
	Normal	Caution	Alert	High alert
Today	All essential plant & equipment operating	Faulty essential plant and/or equipment replaced or repaired same day on site	Faulty essential plant and/or equipment cannot be replaced or repaired same day	Faulty essential plant and/or equipment cannot be replaced or repaired
Action today	NORMAL OPERATIONS Operate in accord with usual protocols and procedures		UPSET CONDITION Consider closing facility and site. Otherwise, limit volumes and types of waste deliveries depending on capability of equipment.	UPSET CONDITION Close facility and site. Insert closure date and expected re-opening date on website; notify all suppliers pre-booked for closure period. Min. responsible staff[1] remain at facility.
Next few days including today	All essential plant & equipment operating	Faulty essential plant and/or equipment replaced or repaired same day on site	Faulty essential plant and/or equipment cannot be replaced or repaired same day	Faulty essential plant and/or equipment cannot be replaced or repaired
Action today and next few days	NORMAL OPERATIONS As above		UPSET CONDITION As above	

1 Min. responsible staff = Manager + Foreman, or Manager + assistant, or Foreman+ assistant, or Assistant + assistant. All assistants are inducted and sufficiently trained in operations.