

Our ref: 12626213

17 July 2025

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Office of the Coordinator-General: Information Request – MCU for Special Industry (Reference: OUT24/5995) – Response Letter

Dear Dave,

SOILCO Developments Pty Ltd (SOILCO) submitted a Material Change of Use (MCU) Development Application (DA) (Reference: OUT24/5995) in October 2024. An additional Information Request letter was issued from the Office of the Coordinator-General (OCG) in June 2025.

OCG has advised that additional information is required in order for an assessment of the application proposal to be completed and have provided items for clarification. Responses to OCG's information request have been provided below. Responses to the request for information items 3, 4, 6, 7, 9 and 17 are presented in the sections below.

OCG Information Request

Item 3: Receival Building Odour Mitigation

Request:

Please provide:

- best practice odour mitigation measures for the receival building; or
- update the sensitivity analysis to include the receival building to demonstrate that best practice odour mitigation (including fully enclosing the facility) is not required.

Response

Additional sensitivity analysis has been undertaken which includes the receival building.

This analysis has been undertaken using the conservative odour data previously referenced in the Bromelton Compost Manufacturing Facility Air Quality Assessment (GHD, 2025) and also measured Odour Emission Rate (OER) data from Wogamia Composting and Manufacturing Facility Odour and Dust Assessment (SOILCO Wogamia Composting and Manufacturing Facility (CMF) Odour and Dust Assessment (ERM, 2020)), included as Attachment 1 to demonstrate sufficient conservatism in assessment and results.

Results of the sensitivity analysis are provided in Table 1. Predicted odour concentrations at the most impacted sensitive receptor R6 (refer to the Air Quality Impact Assessment report) are still below the criteria of 2.5 OU assuming an additional 300% increase in odour emissions from the Aerated Static Pad (ASP) and emissions from the receival building (called the decontamination/material processing area in the GHD

air quality impact assessment report), including shredding and screening of organic material. The predicted odour concentration is even lower if SOILCO were to use the lower, less conservative odour data from the SOILCO Wogamia site.

Modelling odour levels from active composting up to 300% higher than the measured data is not considered to be representative of operations at any SOILCO site, as they do not experience any ongoing odour issues or offsite impacts. SOILCO encourages DETSI to undertake a site visit to the Wogamia or Stotts Creek facilities to observe SOILCO's operations and how controlled these sites are.

Results of the sensitivity analysis demonstrate the low odour risk of the proposed CMF facility and therefore no additional odour mitigation such as fully enclosing the facility is required or recommended.

Table 1 Sensitivity analysis results

Receptor ID	Receptor sensitive?	Predicted odour concentration (OU)					
	y/n	Conservative reference site emission rate			Wogamia Emission Rate		
		Base case	200% increase in ASP and receival building emissions	300% increase in ASP and receival building emissions	Base case	200% increase in ASP and receival building emissions	300% increase in ASP and receival building emissions
R1	n	3.9	5.3	6.7	3.6	4.5	5.4
R2	n	2.4	3.1	3.8	2.2	2.6	3.2
R3	n	2.3	3.1	3.9	2.1	2.6	3.2
R4	n	1.3	1.8	2.2	1.2	1.5	1.8
R5	y	0.4	0.5	0.6	0.4	0.4	0.5
R6	y	1.3	1.8	2.3	1.2	1.5	1.9
R7	n	0.7	0.9	1.2	0.6	0.8	0.9
R8	n	0.6	0.9	1.1	0.6	0.7	0.9
R9	n	1	1.3	1.6	0.9	1.1	1.3
R10	y	1.2	1.6	2.1	1.0	1.3	1.7

Item 4: Estimation of Surface Areas (windrows)

Request:

Please confirm the length and number of proposed windrows.

Response

The exact length and number of windrows will be determined by SOILCO. Rather than calculating the exact length and number in this assessment, GHD have calculated the total windrow surface area based on provided material throughput and the shape of the windrows.

Total windrow surface area was calculated by assuming trapezoidal geometry, with the assumed dimensions and formula shown below in Figure 1. Using these dimensions and provided throughput, the windrow surface area was calculated as seen in Table 2.

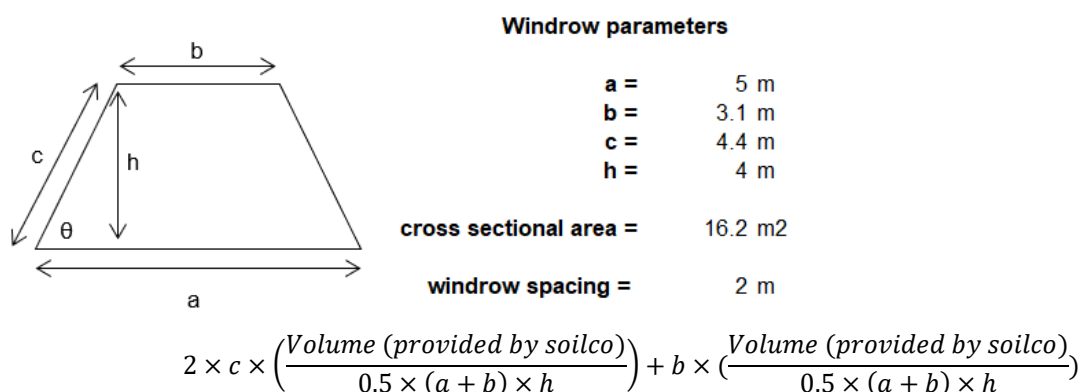


Figure 1 Assumed windrow dimensions and surface area formula

Table 2 Windrow surface areas

Area	Calculated surface area of material
Aerated Static Pad – FOGO (Area B)	8,374 m ²
Composting facility – GO (Area D)	18,181 m ²

Based on the assumptions above, the total length of windrows in each area are estimated to be:

- Aerated Static Pad – FOGO (Area B) - 704 m
- Composting facility – GO (Area D) – 1,528 m

Estimated number of windrows per area are as follows:

- Aerated Static Pad – FOGO (Area B) – 13 windrows (based on an area width of 90 m)
- Composting facility – GO (Area D) – 19 windrows (based on an area width of 135 m)

Item 6: Odour Monitoring Period

Request:

Please provide:

- odour monitoring data for the summer period if available; and
- complaints logs for the facilities from which specific odour emissions rates (SOERs) were derived.

Response

Odour monitoring data from Wogamia (SOILCO Wogamia Composting and Manufacturing Facility (CMF) Odour and Dust Assessment (ERM, 2020)) has been reviewed as part of the odour assessment and is provided in Attachment 1. During the Wogamia study odour samples were taken of FOGO on the following dates:

- 14/02/2020 (Summer); and
- 17/04/2019 (Autumn).

GHD reviewed this data from Wogamia, and in order to be conservative GHD adopted even more conservative data in the assessment accounting for a total site OER being about 43% higher than if the Wogamia data had been used.

SOILCO have recently undertaken an odour validation audit of the Wogamia site (Soilco Wogamia Composting and Manufacturing Facility Odour Validation Audit, Zephyr Environmental (2025)) which is provided as an attachment to this letter (Attachment 2). The report was developed as part of this audit odour complaints were reviewed. The report details a total of four odour complaints over the previous two

years, with none occurring in 2024 and one in 2025 to date. As detailed above, the odour emission rates used in the Bromelton CMF assessment are higher than the measured source odour data at Wogamia, adding to the conservatism.

Item 7: Odour Emission Rate Calculations

Request:

Please review the information in Table C.3 and clarify:

- how “passive” is defined in the context of aerated static pad emissions; and
- any discrepancies in estimated OERs.

Response:

Passive denotes a windrow is not being actively turned. It is assumed in the assessment that these passive sources are being aerated.

Please see the following clarifications and corrections for discrepancies in reported OER's:

- The SOER for maturation and storage was 0.572 and rounded to 0.6 in report. Area was also rounded from 16,430.3 m². to 16,430 m². 0.572 OU x 16,430.3 m² equals the reported OER of 9,398 OU.
- The SOER for Passive Aerated Static Pad (ASP) emissions was also rounded to 1.5 from 1.54615 the source area was rounded from 8374.07407 m² to 8374 m². This results in an OER of 12,948 OU/s.
- The Decontamination/Material Processing (Area C) was first modelled as an area source, but has since been updated to a volume source to reflect that these activities are being undertaken in a building and would be more appropriately modelled as a volume source. The previously reported odour emission rate of 7,137 OU/s applied to a larger area source of 4,198 m². After SOILCO provided updated project footprints during project development this area was reduced to 2,400 m² of odorous material within the decontamination/material processing building. The corrected OER is 4,080 OU/s. This value is consistent with the modelled results presented to date.

Item 9: Odour Emissions During Windrow Turning

Request:

Please provide:

- clarification of how the OER presented in tables 7.1 and C.3 was calculated for windrows turning; and
- OER during windrows turning for the maturation and storage area (Area A).

Response:

It was assumed that 25% of the windrows would be turned at any one time. For the 25% that is turned the SOER has been doubled to account for additional odour from this activity. Averaged out over the whole source area this accounts for an additional OER of 3,531 OU/s for the ASP (Area B) and an additional 7,272 OU/s for the open windrows (Area D) during windrow turning activities.

In the initial report, OER values for windrow turning activities were incorrectly presented however have been updated and presented in Table 3. It should be stressed that SOER values were correctly reported as rounded values in Table 7.1 of the GHD Air Quality impact assessment, and these values are what was used in in the modelling of area sources. As such, modelling results are accurate, and only the reporting of OER's was incorrect. SOER's presented in Table 3 are presented as unrounded and are representative of the model inputs.

Maturation and storage windrows were assumed to be mature and as such do not require turning.

Table 3 Updated odour emission rates

Source	Source type	Surface area of modelled source (m ²)	Modelled SOER (OUV/m ² /s)		OER's (OU/s)		Hours per day source is active
Maturation and Storage - Open Windrows (Food and Garden Organics) (Area A)	Area	16,430.30	0.572		9,398		24
Aerated static pad emissions (Area B)	Area	8,374.0744	Passive:	1.546154022	Passive:	12,948	18
			Windrow turning:	1.967820689	Windrow turning:	16,479	6
Decontamination/ material processing (Area C)	Volume	N/A	N/A		4,080		24
Shredding and screening of organic material (Area C)*	Volume	N/A	N/A		5,740		6
Composting Facility - Open Windrows - Garden Organics (Area D)	Area	18,180.556	Passive:	1.1903333	Passive:	21,641	18
			Windrow turning:	1.5903332	Windrow turning:	28,913	6
Leachate pond GO	Area	5,983.1	Quiescent:	0.15	Quiescent:	897	20
			Aerated:	1.15	Aerated:	6,881	4
Leachate pond FOGO	Area	3,430.5	Quiescent:	0.15	Quiescent:	515	20
			Aerated:	1.15	Aerated:	3,945	4
Leachate pond manufacturing	Area	6,703.600	Quiescent:	0.15	Quiescent:	1,006	20
			Aerated:	1.15	Aerated:	7,709	4
Manure stockpile	Area	203.562	2.109		429		24

Item 17: Cumulative Odour Assessment

Request:

Please confirm:

- survey duration at each receptor and justify why the methodology in the relevant European standard (VDI3940) was not used; and
- whether the odour survey was carried out by an experienced odour assessor with an accredited n-butanol threshold within the acceptance criteria of 20ppb to 80ppb (as per AS4323.3).

Response:

The odour survey was undertaken to get an understanding of the existing odour environment and odour intensity was defined following requirements as per VDI3882 Olfactometry Determination of Odour Intensity. Based on the intent of the survey an odour survey covering all requirements of VDI3940 was not considered the best approach given the large area of the site and surrounds to be covered and the location of odour sources. The odour survey was conducted at a time considered to be worst case for receptors to the Bromelton CMF site. This was light constant south-easterly winds in the late afternoon, blowing towards receptors R6 and R10. This is considered to be consistent with worst case meteorological conditions for the project. During the survey, the assessor was able to define the downwind odour plume from Bush's Proteins, confirm the presence and character of odours on and around the SOILCO proposed CMF site and also confirm conditions upwind of odour sources in the area. The assessor was at location clusters for more

than 10 minutes where odour from Bush's Proteins was confirmed and then it was decided to undertake 360-degree surveys (1 minute) to assist in assessing the potential spread of the odour plume which also included existing residential receptors, and helping to determine the extent of the odour plume downwind.

The concentration of odour surveys may be better seen in Figure 2.

Evan Smith of GHD performed the odour survey, his recent accreditation is provided in Attachment 3.

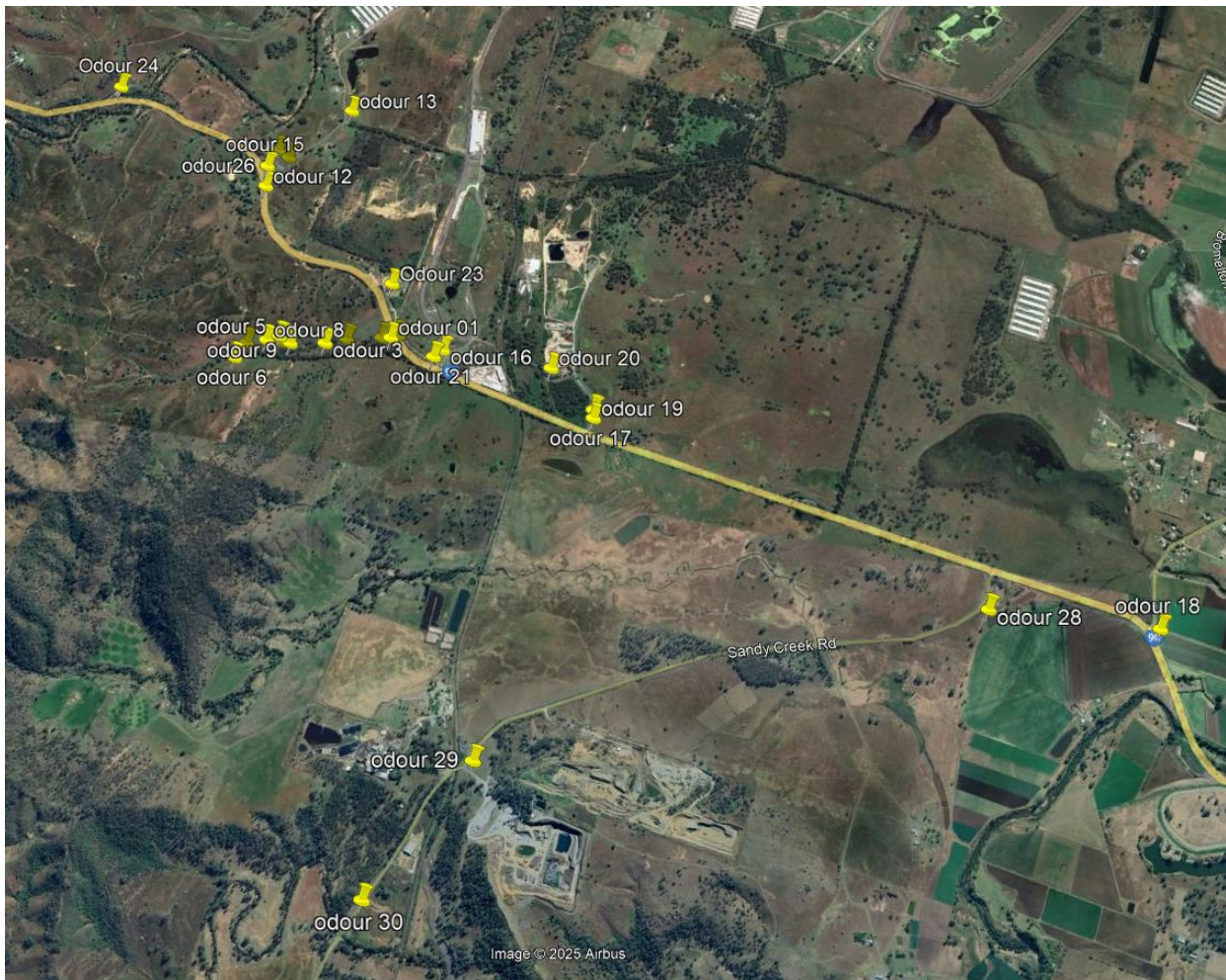


Figure 2 **Location of odour surveys**

Closing

The additional information provided above further demonstrates that the proposal is predicted to comply with the odour criteria.

I trust that the above information addresses all the required information outlined in the OCG's information request, is to the OCG's satisfaction, and sufficient to allow assessment of the development application to proceed to the next phase. Should you have any queries relating to this response, please do not hesitate to contact the undersigned.

Regards,

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Attachments

Attachment 1

**Wogamia Composting and
Manufacturing Facility (CMF) Odour
and Dust Assessment**



Wogamia Composting and Manufacturing Facility (CMF)

Odour and Dust Assessment

29 October 2020

Project No.: 0503963

Document details	
Document title	Wogamia Composting and Manufacturing Facility (CMF)
Document subtitle	Odour and Dust Assessment
Project No.	0503963
Date	29 October 2020
Version	R2
Author	Angel Sanz, Russ Francis
Client Name	SOILCO

Document history

Version	Revision	Author	Reviewed by	ERM approval to issue		Comments
				Name	Date	
V01	00	Angel Sanz	Russ Francis	Jane Barnett	01.04.2020	Draft report
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V03	R1	Angel Sanz Russ Francis	Russ Francis	Jane Barnett	24.06.2020	Final
V04	R2	Angel Sanz Russ Francis	Russ Francis	Jane Barnett	15.10.2020	Updated for EPA comments
V05	R3	Angel Sanz Russ Francis	Russ Francis	Jane Barnett	26.10.2020	Updated for EPA comments
V06	R4	Angel Sanz Russ Francis	Russ Francis	Jane Barnett	29.10.2020	Final

Signature Page

29 October 2020

Wogamia Composting and Manufacturing Facility (CMF)

Odour and Dust Assessment



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Acronyms and Abbreviations

Name	Description
CMF	Composting and Manufacturing Facility
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act
FOGO	Food Organics and Garden Organics
NSW	New South Wales
NSW EPA	(NSW) Environment Protection Authority
OEH	(NSW) Office of Environmental Heritage
OU	Odour Units
PM	(airborne) particulate matter
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of less than 10 µm
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of less than 2.5 µm
Sqm	Square metres
TSP	Total Suspended Particulate (matter)
Tpa	Tonnes per annum
µg/m ³	Micrograms per cubic metre

1. INTRODUCTION

SOILCO commissioned ERM to conduct an odour and dust assessment, as part of an Environmental Impact Statement (EIS), for the Composting and Manufacturing Facility (CMF) in Longreach near Nowra, NSW.

The purpose of this assessment is to quantitatively assess potential odour impacts that may arise due to operations at SOILCO CMF and dust impacts from the on-site quarry. Odour modelling has been conducted for two scenarios; a normal operations scenario and a worst-case scenario. The normal operations scenario is representative of general day to day operations while the worst-case looks at potential impacts when maximum odour emissions may occur (such as during turning of windrows). Modelling of dust emissions from the on-site quarry has been conducted for a single scenario.

The assessment is based on the use of the computer-based dispersion model (CALPUFF) to predict off site odour and dust concentrations. To assess the effect that potential emissions could have on existing air quality, the dispersion model predictions are compared to relevant regulatory air quality criteria. The assessment follows a conventional approach using the procedures outlined in the NSW Environment Protection Authority's (EPA) document titled "*Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW*" (Approved Methods) (EPA, 2017).

In summary, the report comprises the following components:

- Local setting and a description of the project;
- Discussion of odour and dust issues and criteria;
- The approach to the assessment;
- Meteorological conditions in the area;
- Dust and odour emissions sources and estimates of these emissions;
- Assessment and discussion of impacts.

2. PROJECT DESCRIPTION

SOILCO's CMF is located at 135 Wogamia Road, Longreach, NSW and encompasses Lot 2 DP 865094. The site is currently approved to receive 35,000 tonnes per annum (tpa) of organic waste for composting consisting of 30,000 tpa garden waste (including 12,500 tpa "Pasteurised Organics") and 5,000 tpa wood waste and natural organic fibrous materials.

The Proposal seeks approval to intensify SOILCO's operations at its existing CMF. This would provide for importation of up to 98,000 tpa of material to undertake the following activities:

- Receipt, processing, composting and storage of up to 78,000 tpa of the following materials:
 - Garden, wood, food and general solid (non-putrescible) wastes;
 - Processed fibrous organics;
 - Natural organic fibrous materials;
 - Manure and biosolids (up to a maximum of 5,000 tpa combined).
- Receipt, processing, storage and blending of up to 20,000 tpa of Virgin Excavated Natural Material (VENM). The combined total of imported VENM and Drilling Muds would not exceed 20,000 tpa.
- Receipt and processing of Drilling Mud (15,000 tpa). The combined total of imported VENM and Drilling Muds would not exceed 20,000 tpa.

Proposed waste types and limits at the facility are listed in Table 2-1.

Table 2-1: Proposed waste types and limits at the facility

Waste type	Description	Activity	Other limits
Food Waste	As defined in Schedule 1 of the POEO Act	Composting Waste storage Resource Recovery	The total quantity received at the premises must not exceed 78,000 tonnes in any twelve month period.
Processed Fibrous Organics	As defined in Table 3 of "Environmental Guidelines: Composting and related organics processing facilities"	Composting Waste storage Resource Recovery	The total quantity received at the premises must not exceed 78,000 tonnes in any twelve month period.
Natural organic fibrous materials	As defined in Schedule 1 of the POEO Act	Composting Waste storage Resource Recovery	The total quantity received at the premises must not exceed 78,000 tonnes in any twelve month period.
Manure	As defined in Schedule 1 of the POEO Act	Waste storage Resource Recovery	The total quantity received at the premises must not exceed 5,000 tonnes in any twelve month period.
Wood Waste	As defined in Schedule 1 of the POEO Act	Composting Waste storage Resource Recovery	The total quantity received at the premises must not exceed 78,000 tonnes in any twelve month period.
Garden Waste	As defined in Schedule 1 of the POEO Act	Composting Waste storage Resource Recovery	The total quantity received at the premises must not exceed 78,000 tonnes in any twelve month period.
Biosolids	As defined in Schedule 1 of the POEO Act	Composting Waste storage Resource Recovery	The total quantity received at the premises must not exceed 5,000 tonnes in any twelve month period.
General solid waste (non-putrescible)	This waste type is limited to only compostable packaging as defined in AS4736-2006.	Composting Waste storage Resource Recovery	The total quantity received at the premises must not exceed 78,000 tonnes in any twelve month period.
Virgin Excavated Natural Material (VENM)	As defined in Schedule 1 of the POEO Act	Waste processing (non-thermal treatment) Waste storage Resource Recovery	The total combined quantity VENM and drilling mud received at the premises must not exceed 20,000 tonnes in any twelve month period.
Drilling mud and/or muddy waters from drilling and pot holing operations		Waste processing (non-thermal treatment) Waste storage Resource Recovery	The total combined quantity VENM and drilling mud received at the premises must not exceed 20,000 tonnes in any twelve month period.

The two main processing areas include the aerated pads and the windrows.

■ Aerated Static Pads

- process up to 35,000 tpa of material which includes blends of:
 - Food waste
 - Garden Waste
 - Biosolids
 - General solid waste (non-putrescible)
- Biosolids are mixed and composted with the food organics and garden organics (FOGO)
- Oversize material is used as biocover and placed on top of the material to reduce odour
- In any week, 2 bays will be filled, 4 bays will be turned, 2 bays will be taken to the product storage area
- Each bay is turned, on average, every 1-2 weeks and covered again with biocover

■ Windrows

- process up to 43,000 tpa of material which includes:
 - Garden and wood waste
 - Processed fibrous organics
 - Natural organic fibrous materials
- turned twice per week and the process takes about 4 hours to complete
- no FOGO or biosolid material is included on the windrows

Once each of these processes is complete the composted material is moved to the manufacturing and storage area on the northern boundary of the site, to await distribution. The composted greenwaste material is blended with manure, as required, in the manufacturing and storage area.

The Proposal also seeks to continue the extraction of up to 15,000 tpa of sand and soil from the Site, consistent with that provided for by Development Consent DA95/3205 and its subsequent modifications.

The Proposal includes the construction of a new hardstand area for the manufacturing and processing of sand and soil blends for distribution from the Facility. This area would be located to the north of the existing aerated composting area, and to the west of the weighbridge and have an area of approximately 9,000 m². The development of this area would include construction of associated internal roads and new ponds designed to capture all stormwater runoff from the existing and proposed areas.

Figure 2-1 presents the proposed operational layout.

Figure 2-2 presents the location of the site and nearby sensitive receptors. It is noted that R2 is owned by Mr and Mrs Emery, Directors of SOILCO, and could therefore be considered project related.

Figure 2-3 shows a schematic of the proposed process.



Figure 2-1: Proposed operational layout

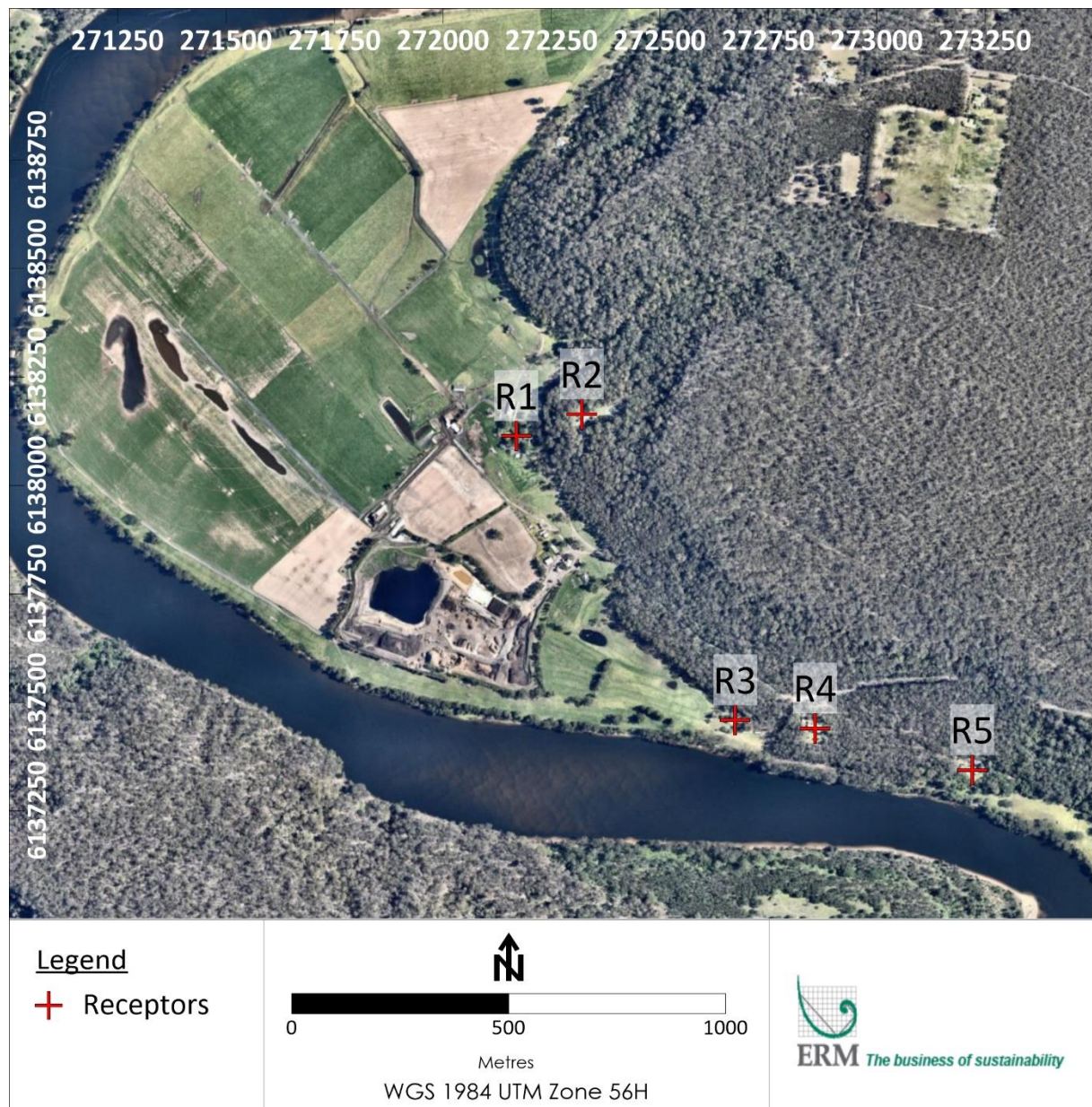


Figure 2-2: SOILCO CMF site layout and discrete receptor locations



Figure 2-3: Proposed composting process

3. DISCUSSION OF DUST AND ODOUR ISSUES

3.1 Odour

3.1.1 Measuring Odour Concentration

There are no instrument-based methods that can measure an odour response in the same way as the human nose. Therefore, “dynamic olfactometry” is typically used as the basis of odour management by regulatory authorities.

Dynamic olfactometry is the measurement of odour by presenting a sample of odorous air to a panel of people with decreasing quantities of clean odour-free air. The panellists then note when the smell becomes detectable. The correlations between the known dilution ratios and the panellists’ responses are then used to calculate the number of dilutions of the original sample required to achieve the odour detection threshold. The units for odour measurement using dynamic olfactometry are “odour units” (OU) which are dimensionless and are effectively “dilutions to threshold”.

As with all sensory methods of identification there is variability between individuals. Consequently the results of odour measurements depend on the way in which the panel is selected and the way in which the panel responses are interpreted.

3.1.2 Odour Performance Criteria

The determination of air quality goals for odour and their use in the assessment of odour impacts is recognised as a difficult topic in air pollution science. The topic has received considerable attention in recent years and the procedures for assessing odour impacts using dispersion models have been refined considerably. There is still considerable debate in the scientific community about appropriate odour goals as determined by dispersion modelling.

The EPA has developed odour goals and the way in which they should be applied with dispersion models to assess the likelihood of nuisance impact arising from the emission of odour.

There are two factors that need to be considered:

1. what "level of exposure" to odour is considered acceptable to meet current community standards in NSW, and
2. how can dispersion models be used to determine if a source of odour meets the goals which are based on this acceptable level of exposure.

The term "level of exposure" has been used to reflect the fact that odour impacts are determined by several factors the most important of which are the so-called FIDOL factors:

- the Frequency of the exposure;
- the Intensity of the odour;
- the Duration of the odour episodes;
- the Offensiveness of the odour; and
- the Location of the source.

In determining the offensiveness of an odour it needs to be recognised that for most odours the context in which an odour is perceived is also relevant. Some odours, for example the smell of sewage, hydrogen sulfide, butyric acid, landfill gas etc., are likely to be judged offensive regardless of the context in which they occur. Other odours such as the smell of jet fuel may be acceptable at an airport, but not in a house, and diesel exhaust may be acceptable near a busy road, but not in a restaurant.

In summary, whether or not an individual considers an odour to be a nuisance will depend on the FIDOL factors outlined above and although it is possible to derive formulae for assessing odour annoyance in

a community, the response of any individual to an odour is still unpredictable. Odour goals need to take account of these factors.

The EPA Approved Methods include ground-level concentration criteria for complex mixtures of odorous air pollutants. They have been refined by the EPA to take account of population density in the area. Table 3-1 lists the odour thresholds, to be exceeded not more than 1% of the time, for different population densities.

Table 3-1: Odour performance criteria for the assessment of odour

Population of affected community	Odour performance criteria (nose response odour units at the 99 th percentile)
Single rural residence ($\leq \sim 2$)	7
~10	6
~ 30	5
~ 125	4
~ 500	3
Urban (~ 2000) and/or schools and hospitals	2

The difference between odour goals is based on considerations of risk of odour impact and not differences in odour acceptability between urban and rural areas. For a given odour level there will be a wide range of responses in the population exposed to the odour. In a densely populated area there will therefore be a greater risk that some individuals within the community will find the odour unacceptable than in a sparsely populated area. An important point to note is that the odour assessment criteria are not intended to achieve 'no odour'. They are concerned with controlling odours to ensure offensive odour impacts will be effectively managed.

The 7 ou criterion has been adopted to assess the odour impact for this assessment.

3.1.3 Peak to Mean Ratios

It is a common practice to use dispersion models to determine compliance with odour goals. This introduces a complication because dispersion models are only able to directly predict concentrations over an averaging period of 3-minutes or greater. The human nose, however, can respond to odours over periods of the order of one second. During a 3-minute period, odour levels can fluctuate significantly above and below the mean depending on the nature of the source.

To determine the ratio between the one-second peak concentrations and three minute and longer period average concentrations (referred to as the peak to mean ratio) that might be predicted by a dispersion model, the EPA commissioned studies by Katestone Scientific Pty Ltd (Katestone Scientific, 1995; Katestone Scientific, 1998). The ratio is also dependent on atmospheric stability and the distance from the source. For area sources, as applies predominantly in this case, the peak to mean ratio is 2.5 for stability classes A to D, and 2.3 for E and F class stability. For volume sources the factor is 2.3 and is not dependent on stability class.

The EPA Approved Methods take account of this peak to mean factor and the goals shown in Table 3-1 are based on nose-response time.

3.2 Particulate matter

3.2.1 Overview

Particulate matter has the capacity to affect health and to cause nuisance effects, and is categorised by size and/or by chemical composition. The potential for harmful effects depends on both. The particulate size ranges are commonly described as:

- Total Suspended Particulates (TSP) – refers to all suspended particles in the air. In practice, the upper size range is typically 30 μm .
- PM_{10} – refers to all particles with equivalent aerodynamic diameters of less than 10 μm , that is, all particles that behave aerodynamically in the same way as spherical particles with diameters less than 10 μm and with a unit density. PM_{10} are a sub-component of TSP.
- $\text{PM}_{2.5}$ – refers to all particles with equivalent aerodynamic diameters of less than 2.5 μm diameter (a subset of PM_{10}). These are often referred to as the fine particles and are a sub-component of PM_{10} .
- $\text{PM}_{2.5-10}$ – defined as the difference between PM_{10} and $\text{PM}_{2.5}$ mass concentrations. These are often referred to as coarse particles.

Evidence suggests that health effects from exposure to airborne particulate matter are predominantly related to the respiratory and cardiovascular systems (WHO, 2011). The human respiratory system has in-built defensive systems that prevent larger particles from reaching the more sensitive parts of the respiratory system. Particles larger than 10 μm , while not able to affect health, can soil materials and generally degrade aesthetic elements of the environment. For this reason, air quality goals make reference to measures of the total mass of all particles suspended in the air, referred to as TSP. In practice particles larger than 30 to 50 μm settle out of the atmosphere too quickly to be regarded as air pollutants. The upper size range for TSP is usually taken to be 30 μm .

Both natural and anthropogenic processes contribute to the atmospheric load of particulate matter. Coarse particles ($\text{PM}_{2.5-10}$) are derived primarily from mechanical processes resulting in the suspension of dust, soil, or other crustal materials from roads, farming, mining and dust storms.

Fine particles or $\text{PM}_{2.5}$ are derived primarily from combustion processes, such as vehicle emissions, wood burning and natural processes such as bush fires. Fine particles also consist of transformation products, including sulphate and nitrate particles, and secondary organic aerosol from volatile organic compound emissions. $\text{PM}_{2.5}$ may penetrate beyond the larynx and into the thoracic respiratory tract and evidence suggests that particles in this size range are more harmful than the coarser component of PM_{10} .

The size of particles determine their behaviour in the respiratory system, including how far the particles are able to penetrate, where they deposit, and how effective the body's clearance mechanisms are in removing them.

3.2.2 Impact assessment criteria

The Approved Methods specify air quality impact assessment criteria relevant for assessing impacts from air pollution (NSW EPA, 2016). The impact assessment criteria for pollutants relevant to this assessment refer to the total pollutant load in the environment and impacts from new sources of these pollutants must be added to existing background levels for compliance assessment. In other words, consideration of background dust levels needs to be made when using the goals outlined in the Approved Methods to assess potential impacts.

These criteria are health-based (i.e. they are set at levels to protect against health effects) and for PM_{10} and $\text{PM}_{2.5}$ are consistent with Amended National Environment Protection Measure for Ambient Air Quality (Ambient Air-NEPM) (NEPC, 2016). In addition, the Approved Methods include other measures

of air quality, namely dust deposition and Total Suspended Particulates (TSP), which are not stated in the Ambient Air-NEPM.

Table 3-2 summarises the air quality criteria for concentrations of particulate matter that are relevant to this study. It is important to note that these criteria are applied to the cumulative impacts due to the Project and other sources.

Table 3-2: NSW EPA impact assessment criteria for particulate matter concentrations

Pollutant	Criteria	Averaging period
TSP	90 µg/m ³	Annual
PM ₁₀	50 µg/m ³	24-Hour
	25 µg/m ³	Annual
PM _{2.5}	25 µg/m ³	24-Hour
	8 µg/m ³	Annual

Airborne dust also has the potential to cause nuisance dust effects by depositing on surfaces, including vegetation. Larger particles do not tend to remain suspended in the atmosphere for long periods of time and will fallout relatively close to source. Dust fallout can soil materials and generally degrade aesthetic elements of the environment, and are assessed for nuisance amenity impacts.

Table 3-3 shows the maximum acceptable increase in dust deposition over the existing dust levels from an amenity perspective. These criteria for dust fallout levels are set to protect against nuisance impacts.

Table 3-3: NSW EPA impact assessment criteria for deposited dust

Pollutant	Averaging period	Maximum increase (due to Project)	Maximum total level
Deposited dust (insoluble solids)	Annual average	2 g/m ² /month	4 g/m ² /month

4. MODELLING METHODOLOGY

The local meteorology has been modelled for the year 2017 using observations from the Nowra Bureau of Meteorology (BoM) weather station in conjunction with the TAPM and CALMET models as described in Sections 4.1 and Section 4.2, respectively. Output from TAPM, plus local and regional observational weather station data were entered into CALMET, a meteorological pre-processor recommended for use in non-steady state conditions. From this, a 1-year representative meteorological dataset was compiled, suitable for use in the 3-dimensional plume dispersion model CALPUFF as described in Section 4.3. Details on the model configuration and data inputs are provided in the following sections.

4.1 TAPM

The Air Pollution Model (TAPM) is a three dimensional meteorological and air pollution model developed by the CSIRO Division of Atmospheric Research. Detailed description of the TAPM model and its performance is provided in *The Air Pollution Model (TAPM) Version 4. Part 1: Technical Description* (Hurley, P, 2008) and *The Air Pollution Model (TAPM) Version 4. Part 2: Summary of Some Verification Studies* (Hurley, Physick, Luhar, & Edwards, 2008).

TAPM solves the fundamental fluid dynamics and scalar transport equations to predict meteorology and pollutant concentrations. It consists of coupled prognostic meteorological and air pollution concentration components. The model predicts airflow important to local scale air pollution, such as sea breezes and terrain induced flows, against a background of larger scale meteorology provided by synoptic analyses.

For this project, TAPM was set up with 5 domains, composed of 25 grid points along both the X and the Y axes, centred on 272.000 km Easting and 6137.700 km northing (UTM Zone 56 S). Each nested domain had a grid spacing of 30 km, 10 km, 3 km, 1 km and 300 m, respectively.

CALTAPM was developed to provide users of the TAPM model the ability to create an hourly, 3 dimensional data file of gridded meteorological parameters, for direct use in the CALMET diagnostic meteorological model. When used in this way the TAPM data can be used in CALMET to determine the initial guess wind field, prior to the weighting of true observations or even to run CALMET in no-observation mode. The TAPM output file (3D.DAT) was used as an initial guess wind field.

4.2 CALMET

CALMET is a meteorological pre-processor that includes a wind field generator containing objective analysis and parameterised treatments of slope flows, terrain effects and terrain blocking effects. The pre-processor produces fields of wind components, air temperature, relative humidity, mixing height and other micro-meteorological variables to produce the three-dimensional meteorological fields that are utilised in the CALPUFF dispersion model (i.e. the CALPUFF dispersion model requires meteorological data in three dimensions). CALMET uses the meteorological inputs in combination with land use and geophysical information for the modelling domain to predict gridded meteorological fields for the region.

CALMET was run with a grid domain of 12 km x 18 km, with a 200 m grid resolution. Gridded wind fields generated by TAPM in the form of a three dimensional data file (the 3D.DAT file referred to above) were used as the initial guess field for CALMET. Details on the CALMET settings are provided in Table 4-1 below.

Table 4-1: CALMET meteorological model settings

CALMET	
South west corner of CALMET domain	X: 266.000 km Y: 6,125.700 km
Meteorological grid domain	12 km x 18 km (60 x 90 grid points)
Meteorological grid resolution	0.2 km
TERRAD	1 km
Surface stations	Nowra BoM station
NOOBS	1 (Use surface and overwater stations (no upper air observations), use MM4/MM5/3D.DAT for upper air data).

4.3 CALPUFF

CALPUFF is the dispersion module of the CALMET/CALPUFF suite of models. It is a multi-layer, multi-species, non-steady-state puff dispersion model that can simulate the effects of time-varying and space-varying meteorological conditions on pollutant transport, transformation and removal. The model contains algorithms for near-source effects such as building downwash, partial plume penetration, sub-grid scale interactions as well as longer range effects such as pollutant removal, chemical transformation, vertical wind shear and coastal interaction effects. The model employs dispersion equations based on a Gaussian distribution of pollutants across released puffs and takes into account the complex arrangement of emissions from point, area, volume and line sources (Scire, Strimaitis, & Yamartino, 2005).

Each odour generating source was represented by a series of area and volume sources situated according to their location. Model predictions were made across the domain at gridded receptors at a spacing of 200 m x 200 m.

The local area is rural with scattered residences. Sensitive receptors locations were included in the dispersion modelling for the nearest residential receptor locations and are provided in Figure 2-2.

5. EXISTING ENVIRONMENT

5.1 Dispersion meteorology

The primary meteorological parameters influencing plume dispersion modelling are wind direction, wind speed, turbulence (atmospheric stability), and mixing height (depth of turbulent layer).

The closest available meteorological station located to the site is the Bureau of Meteorology's (BoM) weather station at Nowra, approximately 8 km southeast of the site. A five year review of the meteorological data has been conducted and is shown in Appendix A. Modelling has been conducted for 2017.

5.1.1 Wind Speed and Direction

Wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points – N, NNE, NE, etc. The bar at the top of each wind rose diagram represents winds blowing from the north (i.e. northerly winds), and so on. The length of the bar represents the frequency of occurrence of winds from that direction, and the bar sections correspond to wind speed categories, the nearest to the centre representing the lightest winds. Thus, it is possible to visualise how often winds of a certain direction and strength occur over any given period of time.

Annual, seasonal and time of day wind roses for the SOILCO CMF site location are presented in Figure 5-1 to Figure 5-3. The SOILCO CMF site is located in a valley along the Shoalhaven River. The site is dominated by north westerly winds throughout the year. As expected, highest wind speeds occurred in the early afternoon with weaker winds at night-time. The stronger afternoon winds are also aligned with a westerly wind direction.

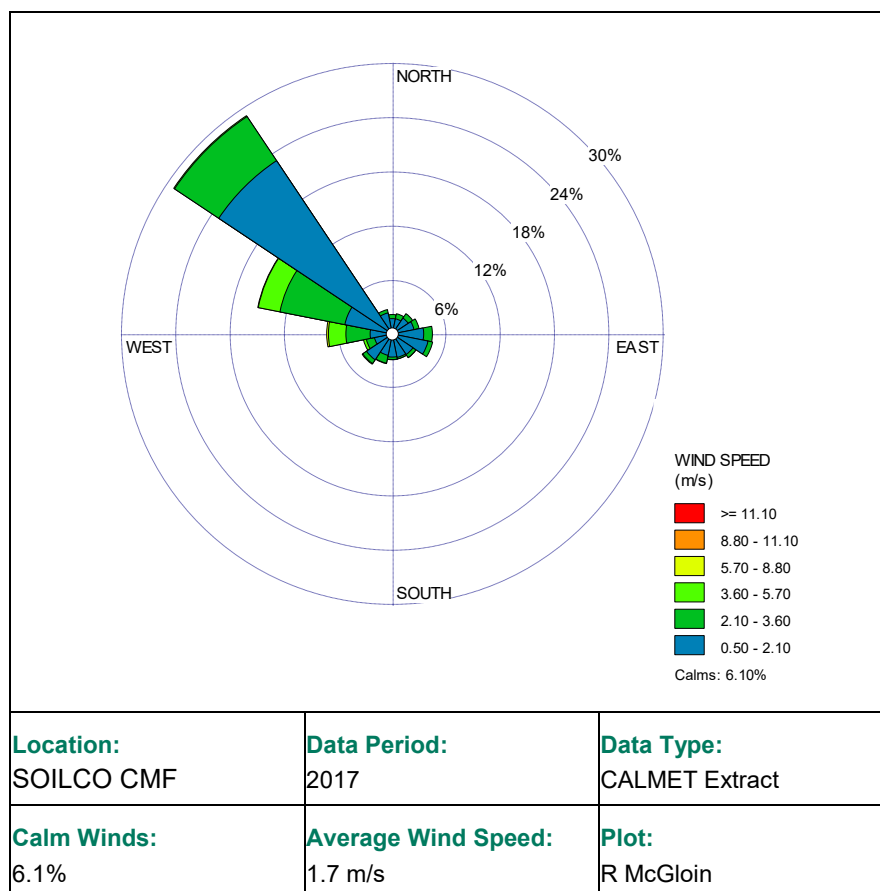


Figure 5-1: Annual wind rose for SOILCO CMF site for 2017

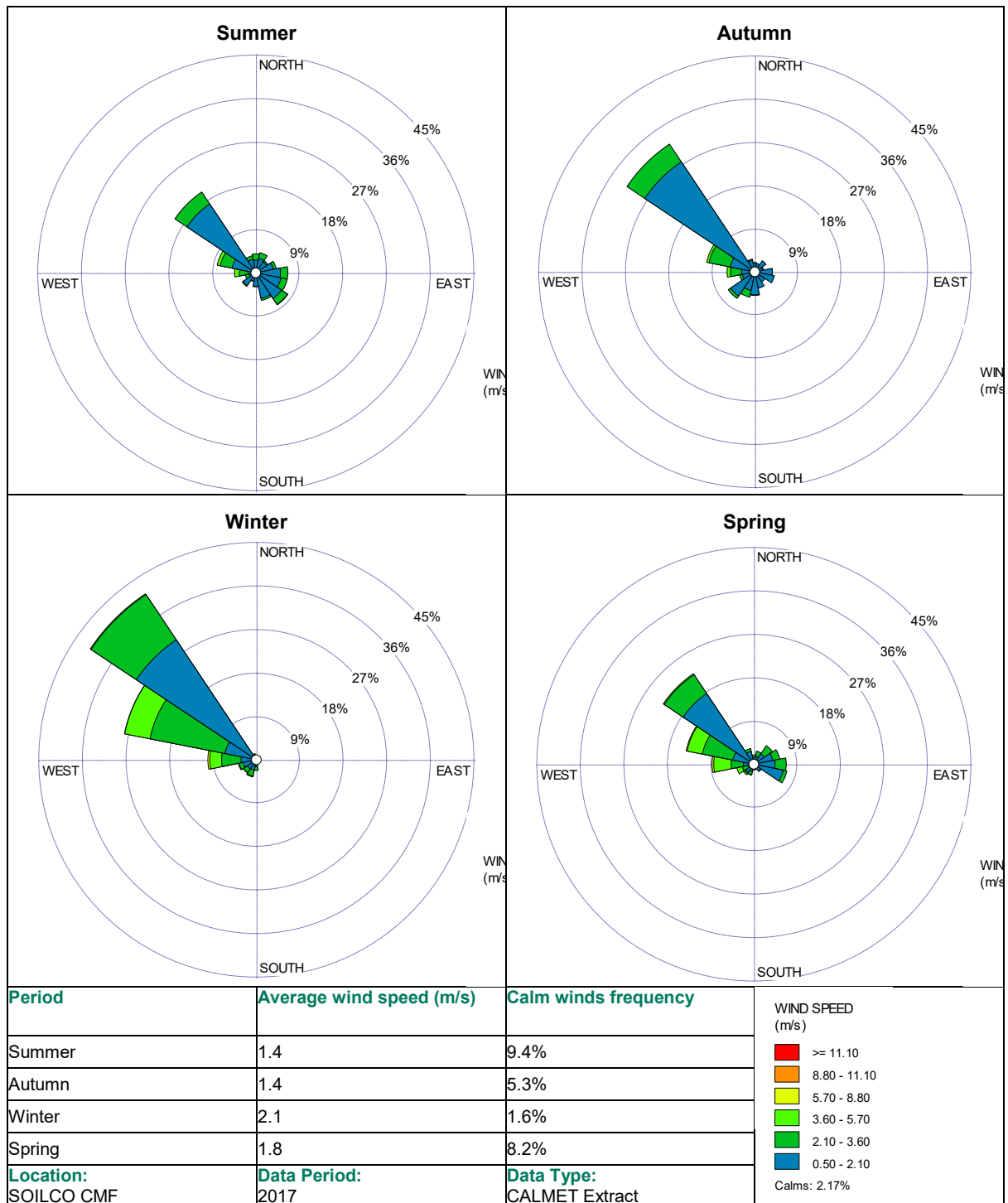


Figure 5-2: Seasonal wind rose for the SOILCO CMF site for 2017

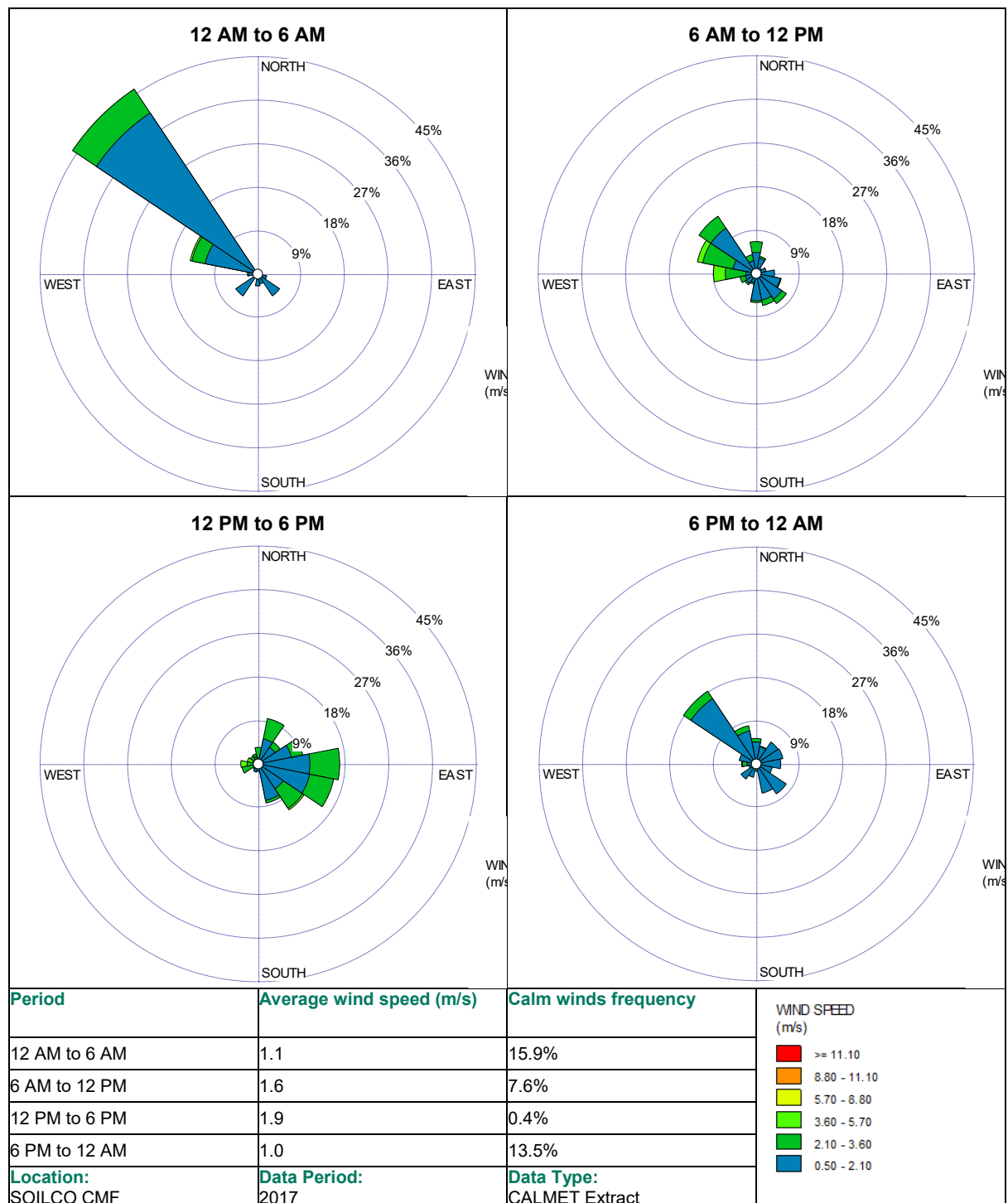


Figure 5-3: Time of day wind rose for SOILCO CMF site for 2017

5.1.2 Stability

Atmospheric turbulence is an important factor in plume dispersion. Turbulence acts to increase the cross-sectional area of the plume due to random motions, thus diluting or diffusing a plume. As turbulence increases, the rate of plume dilution or diffusion increases. Weak turbulence limits plume diffusion and is a critical factor in causing high plume concentrations downwind of a source, particularly when combined with very low wind speeds.

Turbulence is related to the vertical temperature gradient, the condition of which determines what is known as stability, or thermal stability. For traditional dispersion modelling using Gaussian plume models, categories of atmospheric stability are used in conjunction with other meteorological data to describe atmospheric conditions and thus dispersion.

The most well-known stability classification is the Pasquill-Gifford scheme, which denotes stability classes from A to F. Class A is described as highly unstable and occurs in association with strong surface heating and light winds, leading to intense convective turbulence and much enhanced plume dilution. At the other extreme, class F denotes very stable conditions associated with strong temperature inversions and light winds, which commonly occur under clear skies at night and in early mornings. Under these conditions plumes can remain relatively undiluted for considerable distances downwind.

Intermediate stability classes grade from moderately unstable (B), through neutral (D) to slightly stable (E). Whilst classes A and F are strongly associated with clear skies, class D is linked to windy and/or cloudy weather, and short periods around sunset and sunrise when surface heating or cooling is small. As a general rule, unstable (or convective) conditions dominate during the daytime and stable flows are dominant at night. This diurnal pattern is most pronounced when there is relatively little cloud cover and light to moderate winds.

The frequency distributions of stability classes for the CALMET SOILCO CMF site for 2017 are presented in Figure 5-4. The data show a total of approximately 47% of hours in the F stability class and a low frequency of class D conditions, this is a result of the high frequency of very light wind speeds and low frequency of moderate to strong winds at the site. The generated meteorology is therefore conservative as odour impacts are typically expected to be higher during very stable conditions (class E or F).

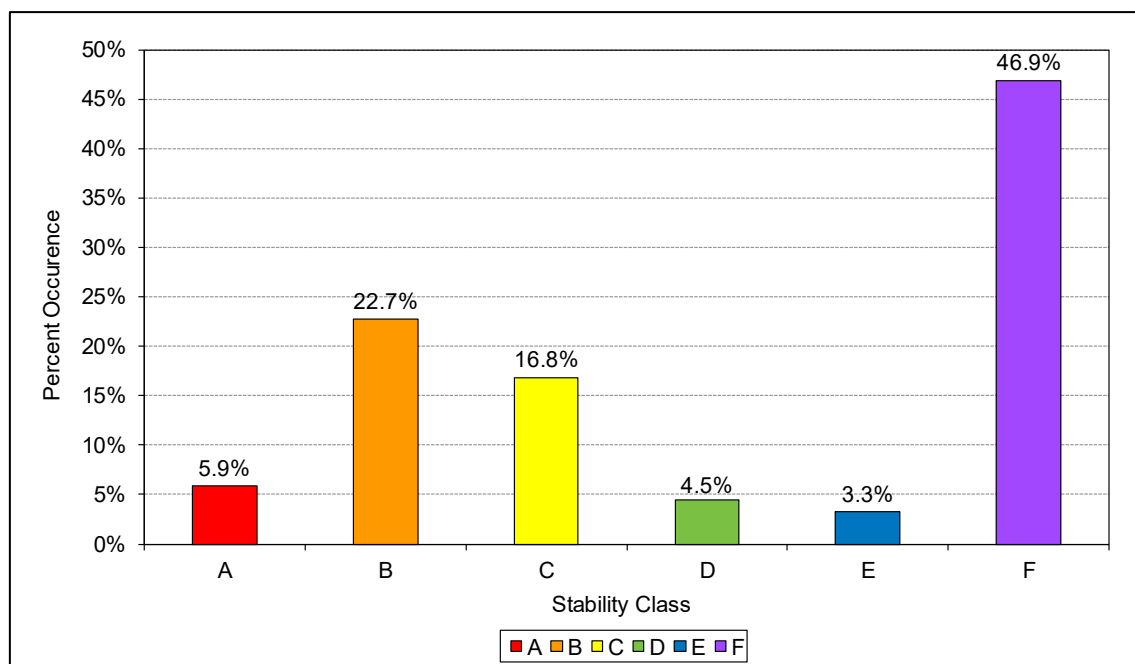


Figure 5-4: Stability class frequency distribution for SOILCO CMF

5.1.3 Mixing Height

Mixing height is the depth of the atmospheric mixing layer beneath an elevated temperature inversion. It is an important parameter in air pollution meteorology as vertical diffusion or mixing of a plume is generally considered to be limited by the mixing height. This is because the air above this layer tends to be stable, with restricted vertical motions.

The diurnal variation of mixing heights at the site location for the 2017 data set is summarised and presented in Figure 5-5. The diurnal cycles are typical with mixing height growth during daytime hours (in response to convective mixing which results from solar heating of the earth's surface) until late afternoon followed by a decline around early evening and sunset with lower mixing heights throughout the night and minimum mixing heights just before dawn.

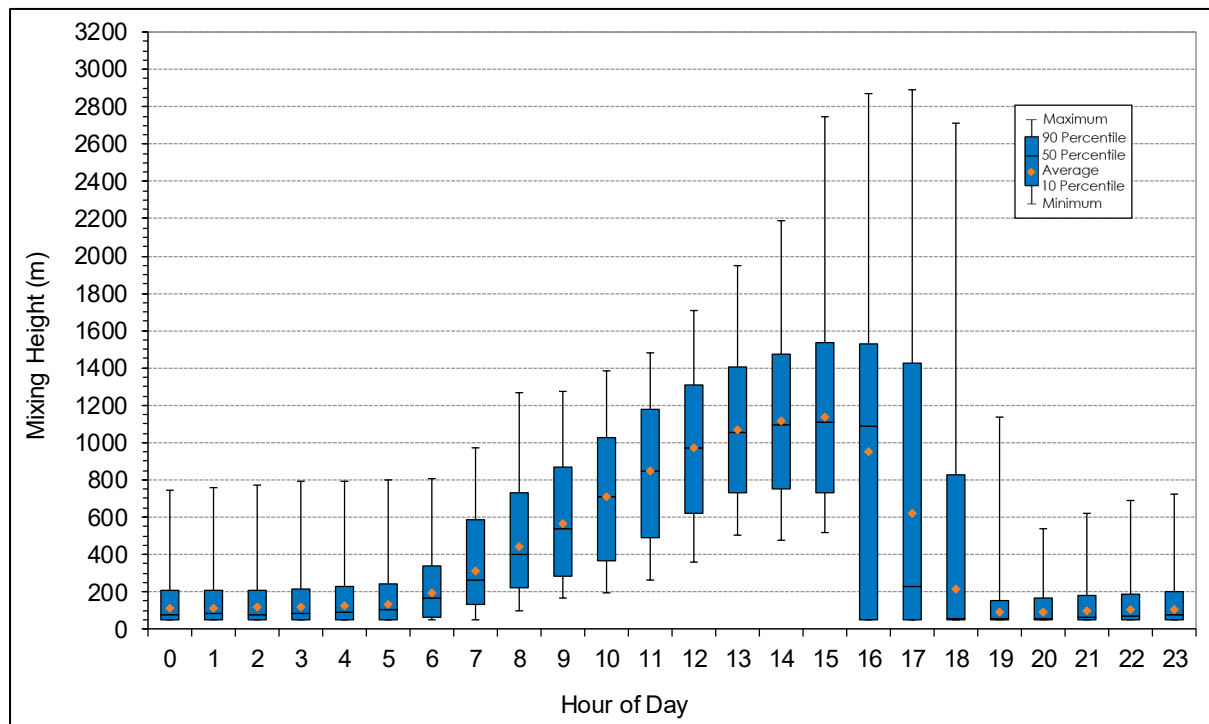


Figure 5-5: Mixing height for SOILCO CMF

5.2 Existing air quality

5.2.1 Particulate matter

There are no air quality monitoring stations located near to the Project, with the closest monitoring station located approximately 40 km northeast at Albion Park South. The monitoring station is located in a reserve in a semi-rural area in the south of the Illawarra. The Project is located in a rural area and the background concentrations likely to be experienced at the Project will be lower than those recorded at Albion Park South. On that basis, taking background values from this station is conservative.

Table 5-1 presents the annual average PM₁₀ and PM_{2.5} concentrations at Albion Park South. The tables shows that PM₁₀ concentrations have been increasing year on year since 2015. For PM_{2.5}, concentrations have been increasing year on year since 2017.

Table 5-1: Annual average PM₁₀ and PM_{2.5} concentrations at Albion Park South

Year	PM ₁₀	Criteria	PM _{2.5}	Criteria
2015	14.0	25	6.4	8
2016	14.9		7.2	
2017	15.3		6.6	
2018	17.8		6.8	
2019	19.5		8.6	
Average	16.3		7.1	

The chosen meteorological year for the assessment is 2017. When viewing the concentrations in Table 5-1, the annual average PM₁₀ and PM_{2.5} concentrations for 2017 (15.3 µg/m³ for PM₁₀ and 6.6 µg/m³ for PM_{2.5}) are lower than the five-year averages of 16.3 µg/m³ for PM₁₀ and 7.1 µg/m³ for PM_{2.5}. On that basis, the five-year annual averages have been chosen for the background values. When considering the 24-hour average concentrations, the daily values from 2017 have been used to correspond with the 2017 meteorological data.

No TSP concentration data are available in the vicinity of the site. Estimates of annual average TSP concentrations can be made from the PM₁₀ measurements by assuming that 40% of the TSP is PM₁₀. This relationship was obtained from data collected by co-located TSP and PM₁₀ monitors operated for long periods of time in the Hunter Valley (NSW Minerals Council, 2000). Whilst it is noted that this site is not in the Hunter Valley, in the absence of other information this ratio has been applied for this assessment.

In the absence of site-specific dust deposition data it is assumed existing annual dust deposition background levels are 2 g/m²/month, which is typical of arid rural areas.

5.2.2 Summary of background data

In summary the background values adopted for this assessment are:

- Annual average TSP = 40.8 µg/m³
- Annual average PM₁₀ = 16.3 µg/m³
- 24-hour PM₁₀ = daily varying
- Annual average PM_{2.5} = 7.1 µg/m³
- 24-hour PM_{2.5} = daily varying
- Dust deposition = 2 g/m²/month

5.2.3 Odour

ERM recently completed an odour assessment for the current operations at SOILCO's CMF (ERM, 2019). For that assessment, the CMF was approved to receive 35,000 tpa of organic waste for composting consisting of 25,000 tpa green waste and 10,000 tpa FOGO.

The assessment identified that the 6 OU criterion has been adopted to assess the odour impacts. The 6 OU contour extends into the neighbouring property (R1) which currently operates as a dairy. No other surrounding sensitive receptors fall within the 6 OU criterion. Figure 5-6 presents the contour for the existing approved operations. The risk of odour impact to sensitive receptor locations from the CMF site was predicted to be low.

It should be noted that at the aerated pads assessed at this time did not include the mitigation measure of over-size biocover. Odour measurements that were made on the aerated pad prior to this measure being implemented were significantly higher. The modelling results presented in Section 8.1 do incorporate this feature and as such the results are comparable, even with additional sources added.

The term biocover is used here to describe a layer of coarse composted material. This layer is placed on top of the pile at depth approximately 250 mm to 300 mm and provides the following benefits during the active phase of pasteurisation:

- It acts as a layer of thermal insulation to ensure that the entire stockpile maintains a temperature above 55°C;
- It acts as a form of odour control. Odour sampling undertaken by Ektimo (see Appendix B) has shown that odour is significantly reduced when a biocover layer is present on SOILCO's existing aerated pad;
- Nutrient retention;
- Reduction in bird and insect activity as the external, post-composted, layer, is not attractive to pests;
- It assists with moisture retention within the compost; and
- It is less visually obtrusive than the composting material.

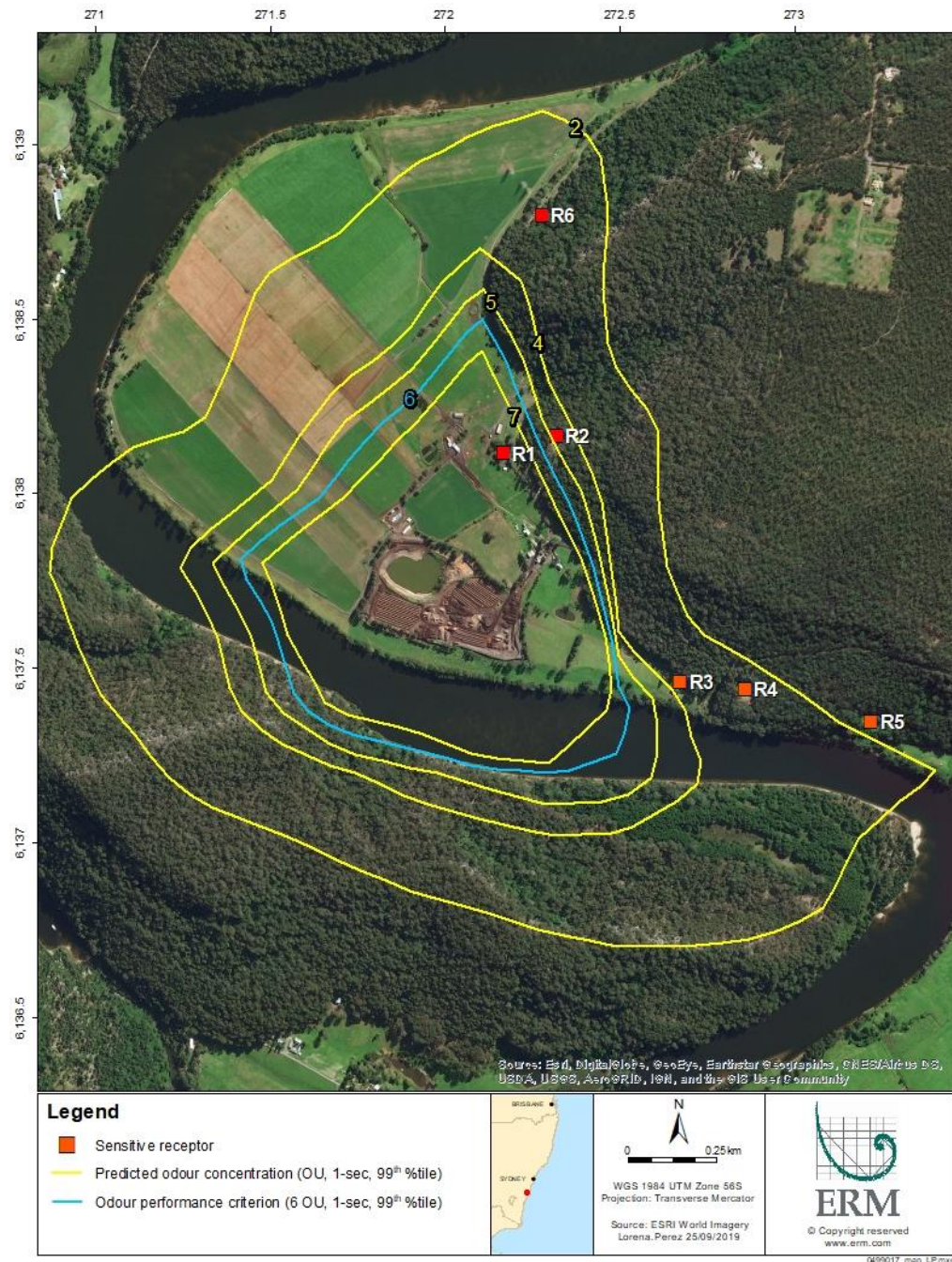


Figure 5-6: Predicted 99th percentile ground level odour concentration (ou) for existing approved operations

6. ODOUR EMISSION RATES

6.1 Odour Sampling

Odour sampling was carried out for at the facility by Ektimo on 3 April 2019 (report number R007301) and 2 February 2020 (report number R008735). Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Measurements were made in accordance with the relevant Australian and New Zealand standards and the results were used to determine specific odour emission rates for modelling. The odour reports provided by Ektimo for both rounds of testing have been provided in Appendix B for reference.

6.2 Odour Scenarios

Odour modelling has been conducted for two scenarios:

1. A normal operations scenario
 - turning of 2/7 of the windrows (to represent turning twice per week)
2. A worst-case scenario
 - turning of entire windrow area every day

In the normal operations scenario, the emissions have tried to represent a typical day. However, it is still a conservative scenario as it assumes at least some of the windrows will be turned or disturbed at any hour (between 7am and 4pm) every day of the year. This will not be the case as this would only occur twice per week.

For the worst-case scenario, it must be remembered that this is a 'theoretical' worst case modelled at the request of the EPA and would not occur in practice. Compost will only be turned, at most, twice per week.

6.3 Emission Rates Used for Modelling

The specific odour emission rates for area sources (OU per unit time per unit area) were determined using the analysis results from Ektimo, combined with flux hood specifications and the aeration rate through the collection hood. For the manure stockpile (source 14), the odour emissions rates were measured at a composting site in Camden which included stockpiles of manure from ducks, horses and cattle (TOU, 2012). The highest sample was from duck manure and used in this assessment.

Table 6-1 provides a summary of the odour emissions inventory adopted for this modelling exercise and how this applies to the sources modelled.

The emission rates outlined in Table 6-1 apply to the normal operations scenario. For the worst-case scenario, the emission rate for source 9 (turned garden organics) applies to source 8 (fresh garden organics) and source 10 (final stage garden organics). By changing these emissions rates, the worst-case scenario assumes that all of the garden organics are being turned, which uses the highest odour emission rate for the garden organics.

Note that emissions from drilling mud or biosolids have not been included individually as they are likely to be a relatively low compared to the material they are mixed with. Odour emission rates measured from dredged material from Sydney Harbour (ERM, 2020) have shown that these emissions are likely to be very low. The maximum value measured over a number of tests was 0.028 ou.m³/m²/s, an order of magnitude lower than the lowest measured value for all sources at the site. When blended with more odorous material prior to distribution, this would not be significant. Similarly with biosolids, conservative measurements indicate levels may be of the order of 0.8 ou.m³/m²/s (Macquarie Franklin, 2020). When blended with more odorous raw FOGO material the FOGO odour will dominate.

Table 6-1: Odour emission rates used for modelling

Odour source	Source on Figure 6-1	Measured odour concentration (OU)	Specific odour emission rate for area sources (ou.m ³ /m ² /s)	Odour emission rate (ou.m ³ /s)	Comment
FOGO - Pasteurised but pre-maturation	1 and 5	990	0.6	-	Measured by Ektimo (14/02/2020)
FOGO - Aeration Pads including biocover mitigation - Airflow ON	2 and 6	825	-	1,017	Calculated according to the reduction due to biocover undertaken in the FOGO from round 1 (17/04/2019) to round 2 (14/02/2020)
FOGO - Unpasteurised (untreated)	3, 4 5 and 7	1,800	1.1	-	Measured by Ektimo (14/02/2020)
Fresh garden organics	8	520	0.3	-	Measured by Ektimo (17/04/2019)
Turned garden organics	9	2,000	1.1	-	Measured by Ektimo (17/04/2019)
Final stage garden organics	10	1,100	0.6	-	Measured by Ektimo (17/04/2019)
Main leachate pond	11	5,600	3.2	-	Measured by Ektimo (14/02/2020)
Smaller leachate ponds *	12 and 13	99	0.11	-	Measured from compost product leachate Spring Farm
Manure stockpile	14	-	0.36	-	Measured by The Odour Unit at Camden Organics

* This is a lower value used to reflect the reality that these ponds will be run dry for the majority of the time.

Figure 6-1 presents the odour source locations. Figure 2-1 presents the detailed proposed operational layout.

The sources presented in Table 6-1 have been grouped for further analysis and to identify if any of the odour concentrations are being dominated by a single source group (SG). The source groups are as follows:

- SG 1 = Source 1, 3, 4, 5 and 7
- SG 2 = Source 2 and 6
- SG 3 = Source 8, 9 and 10
- SG 4 = Source 11, 12 and 13
- SG 5 = Source 14

The only source group that differs between the normal operations and the regulatory worst case is source group 3. Details of which are provided earlier in this section.

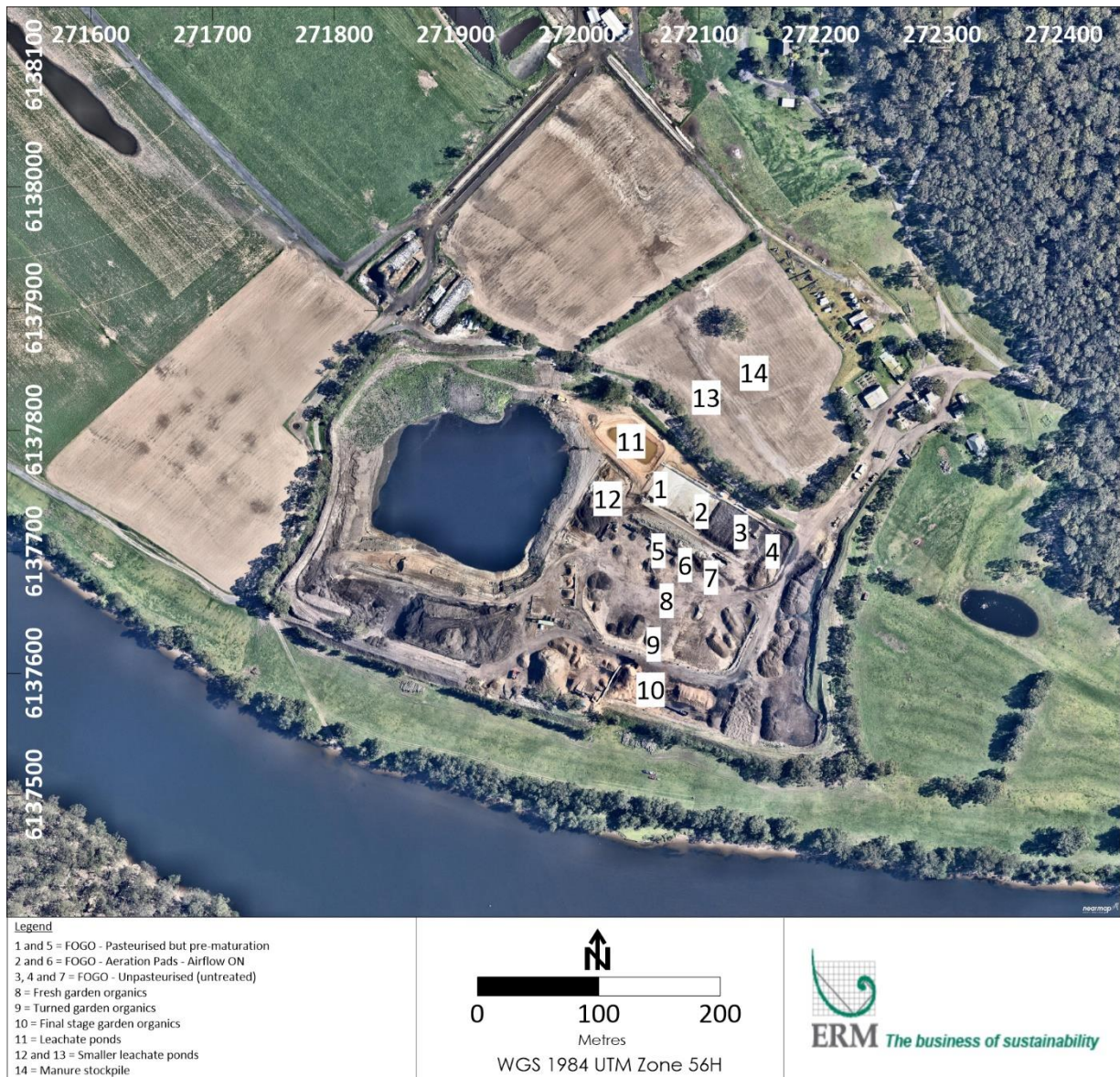


Figure 6-1: Modelled odour source locations

7. PARTICLE MATTER EMISSIONS ESTIMATION

There are potential sources of dust emissions from the proposed quarrying activities which have been analysed and estimates of dust emissions for the key dust generating activities have been made.

7.1 Particle size categories

Emission rates of TSP, PM₁₀ and PM_{2.5} have been calculated using emission factors developed both within NSW and by the US EPA. Modelling of TSP, PM₁₀ and PM_{2.5} was undertaken using the particle size specific inventories and was assumed to emit and deposit from the plume in accordance with the deposition rate appropriate for particles with an aerodynamic diameter equal to the geometric mass of the particle size range.

Modelling was completed for three particle size categories; Total Suspended Particulates (TSP), PM₁₀ and PM_{2.5}. The particle mass mean diameters were determined from particle size distribution data for various coal mining activities (presented in SPCC, 1986).

7.2 Emissions estimates from the Project

Estimates of emissions for each source were developed on an hourly time step taking into account the activities that would take place at that location. Thus, for each source and for each hour, an emission rate was determined which depended on the level of activity and the wind speed. Dust generating activities were represented by a series of volume sources situated according to the location of activities for the modelled scenarios. Figure 7-1 shows the locations of the volume sources used to represent the quarry activity and Table 7-1 shows the allocation of sources for each activity.

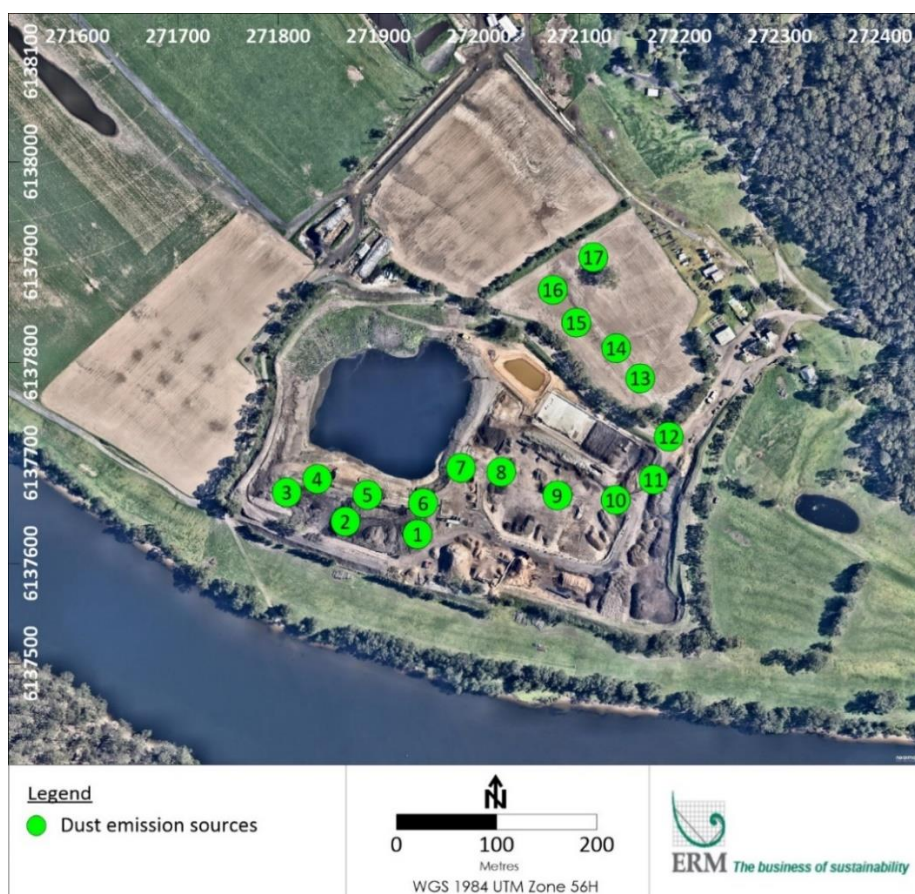


Figure 7-1: Location of dust sources

Table 7-1: Inventory activity and allocated source number

Activity	Source number
Loading material with excavator	1,2,3,4,5
Hauling of material (unsealed roads)	6,7,8,9,10,11,12,13,14
Unloading material with excavator	15,16,17
Wind erosion - Exposed excavation and stockpile areas	1,2,3,4,5,15,16,17

The information used for developing the inventories is based on the operational descriptions and plans provided by SOILCO. This information is used to determine haul road distances and routes, stockpile and pit areas, activity operating hours, truck sizes and other details that are necessary to estimate dust emissions.

Table 7-2 summarises the quantities of TSP, PM₁₀ and PM_{2.5} estimated to be released by each activity of the Project.

Table 7-2: Estimated TSP, PM₁₀ and PM_{2.5}

Activity	TSP emissions (kg/y)	PM ₁₀ emissions (kg/y)	PM _{2.5} emissions (kg/y)
Loading material with excavator	25	16	2
Hauling of material (unsealed roads)	363	145	14
Unloading material with excavator	25	16	2
Wind erosion - Exposed construction area	425	213	32
Total estimated emissions	839	389	51

7.3 Overview of dust control

Dust control measures to be employed for the Project include the following:

- Use of additional water application, if required, on active haul roads (75% control applied)

8. ASSESSMENT OF IMPACTS

8.1 Odour

Modelled results have been presented for the normal operations scenario and the worst-case scenario in the following sections.

8.1.1 Normal operations

The modelling results for normal operations are presented as a contour figure for the odour performance criterion of 6 OU (see Figure 8-1). The contour extends into the neighbouring property (R1) which currently operates as a dairy farm. No other surrounding discrete or sensitive receptors fall within the odour performance criterion of 6 OU criterion.



Figure 8-1: Predicted 99th percentile ground level odour concentration (OU) for normal operations

At the request of the EPA, results have also been analysed for the following percentiles:

- Maximum/100th percentile
- 99.9th percentile
- 99.5th percentile
- 99th percentile (used for comparison against the assessment criterion)
- 98th percentile

The modelling results for these percentiles are presented in Figure 8-2 and show that the predictions need to reach the 99.9th and 100th percentiles before impacting on receptors R3, R4 and R5.

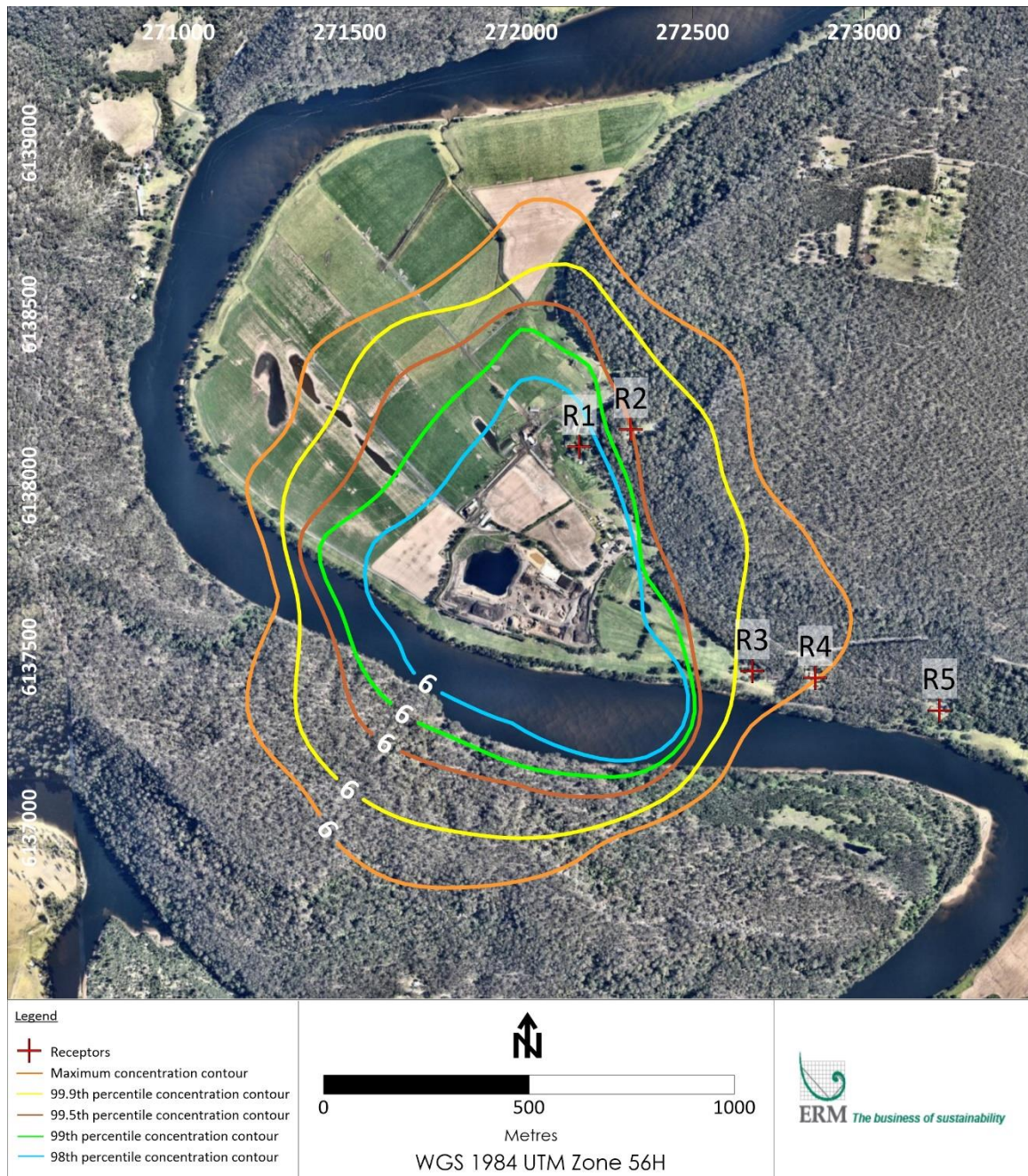


Figure 8-2: Predicted 100th, 99.9th, 99.5th, 99th and 98th for the 6 OU contour for normal operations

Concentration predictions for each individual hour have also been extracted for the five receptors included in this assessment. Figure 8-3 presents odour concentrations for receptors 1-5 for different hours of the day for normal operations. It can be seen that there are no predicted odour concentrations above 6 OU between 7 am and 3 pm. Activities which generate more odour, in particular turning of garden organics windrows, will be restricted to these hours to mitigate against peak odour impacts.

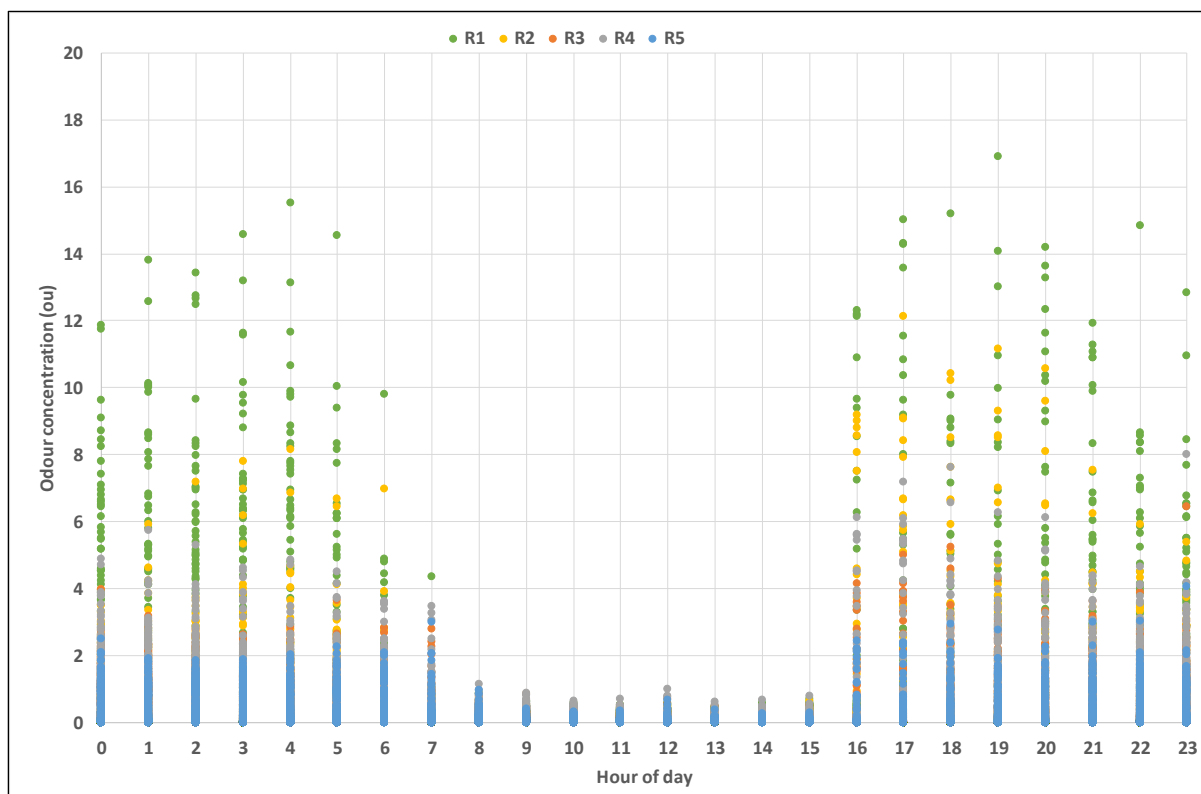


Figure 8-3: Odour concentrations for Receptors 1-5 for every hour of the day for normal operations

The source group with the largest impact is the windrows (SG3), which is not unexpected as this is a relatively large area and the assumptions made are conservative (that is, at least some of the windrows being turned every day). Table 8-1 shows the modelled source groups ranked from highest impact to lowest impacts on the nearest receptor (R1). This order remains relatively constant for all five receptors, but the contribution to the odour impact lessens with distance for the smaller sources such as the leachate ponds and the aerated pads.

Table 8-1: Modelled source groups ranked

Rank	Source group	Sources included in group	Percentage of total impact at R1 (%)
1 (highest impact)	SG 3	Garden organics windrows	39
2	SG 1	FOGO on pads but not aerated and raw material waiting to be loaded to pads	22
3	SG 4	Leachate ponds	20
4	SG 2	FOGO pads being actively aerated	19
5 (lowest impact)	SG 5	Manure stockpile	< 0.5

8.1.2 Worst-case

The modelling results for worst case are presented as a contour figure for the odour performance criterion of 6 OU (see Figure 8-4). The contour extends into the neighbouring property (R1) which currently operates as a dairy. No other surrounding discrete or sensitive receptors fall within the odour performance criterion of 6 OU criterion.

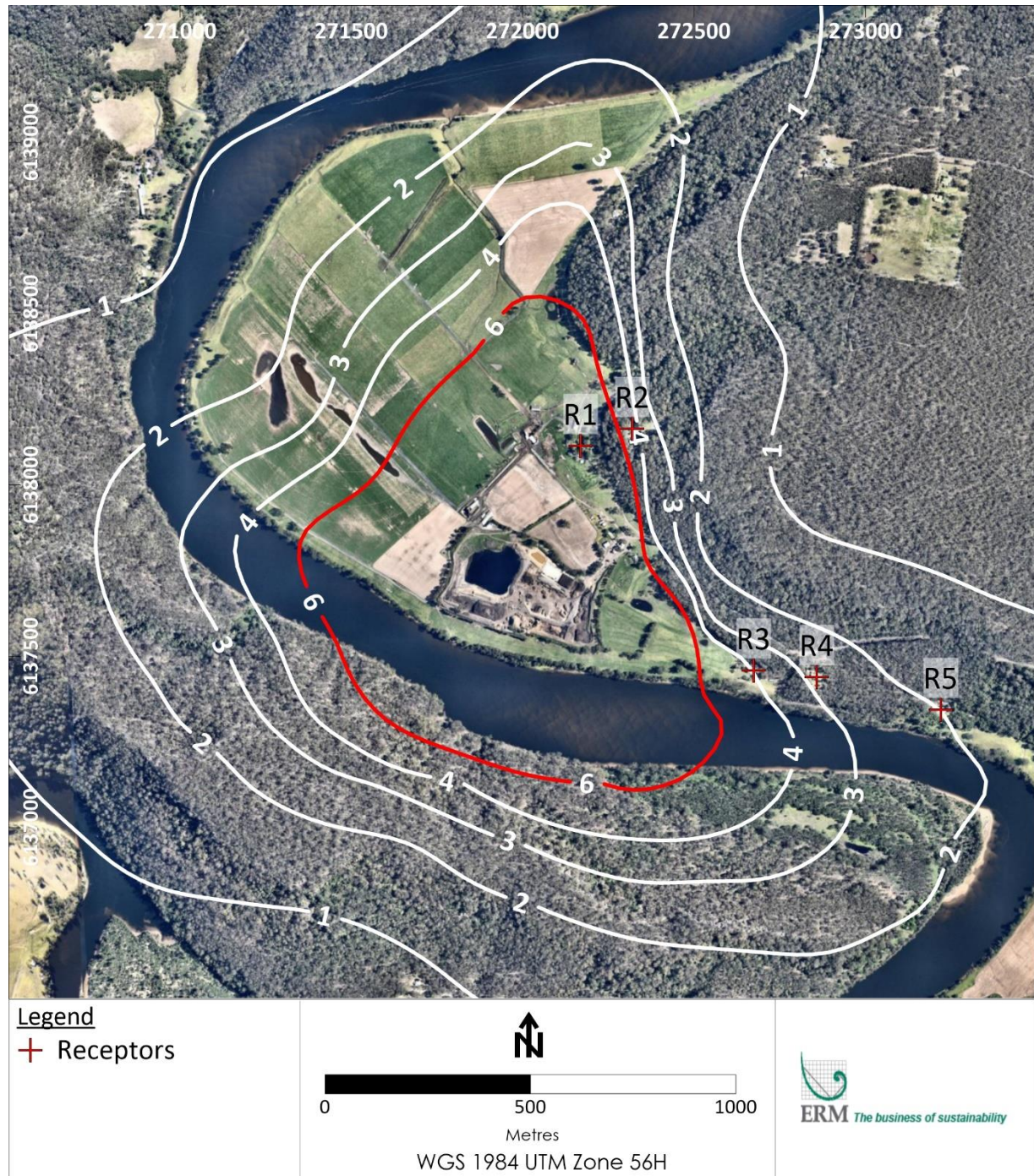


Figure 8-4: Predicted 99th percentile ground level odour concentration (OU) for the worst-case scenario

The modelling results for the 100th, 99.9th, 99.5th, 99th and 98th percentiles for the worst case scenario are presented in Figure 8-5. Again, these results show that the predictions need to reach the 99.9th and 100th percentiles before impacting on receptors R3, R4 and R5.

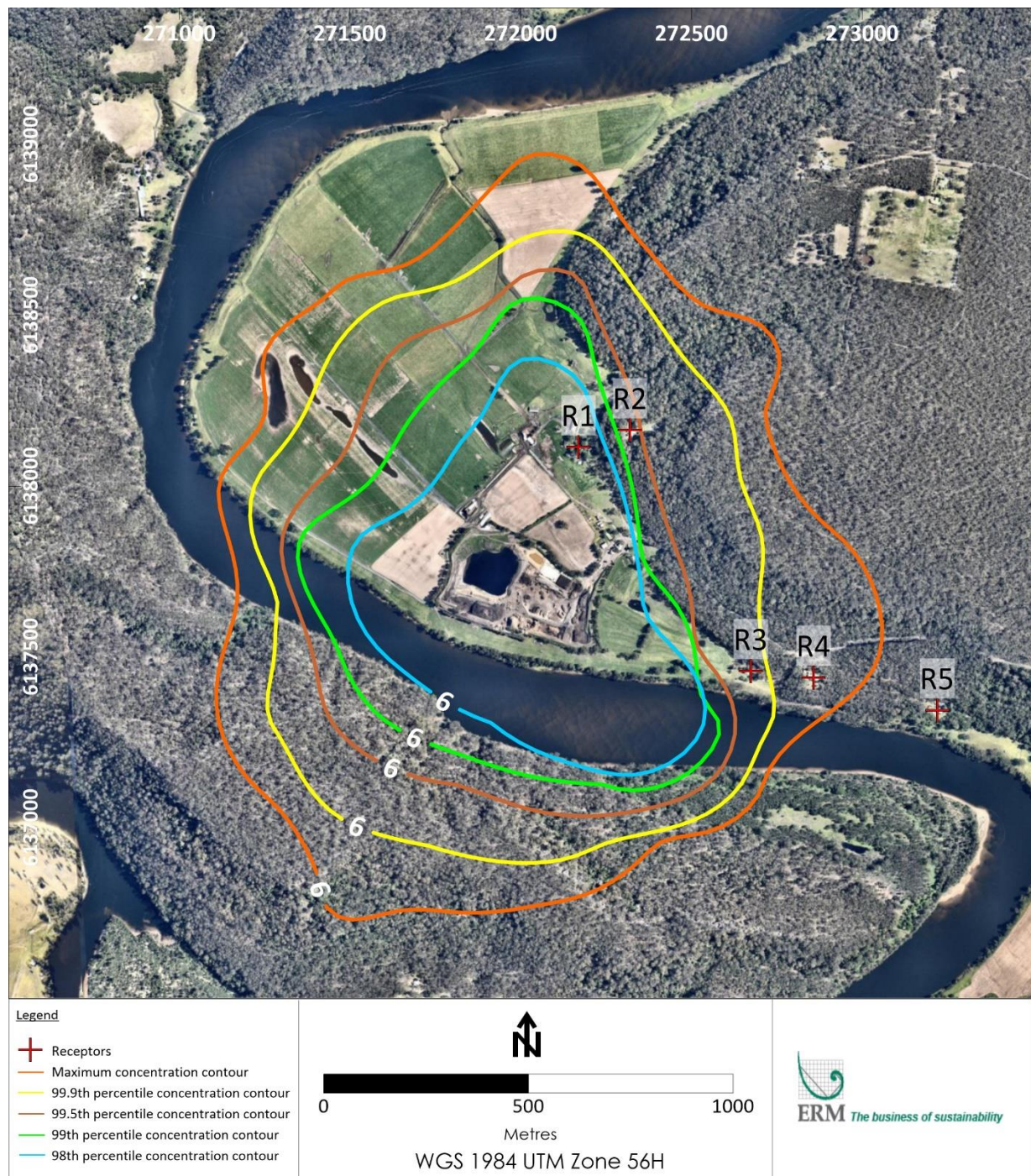


Figure 8-5: Predicted 100th, 99.9th, 99.5th, 99th and 98th for the 6 OU contour for the worst case scenario

Figure 8-6 presents odour concentrations for receptors 1-5 for the different hours of the day for the worst case scenario. It can be seen that there are no predicted odour concentrations above 6 OU between 8 am and 3 pm. For receptor R3 there are very few predicted concentrations above 6 OU and none for R4 or R5.

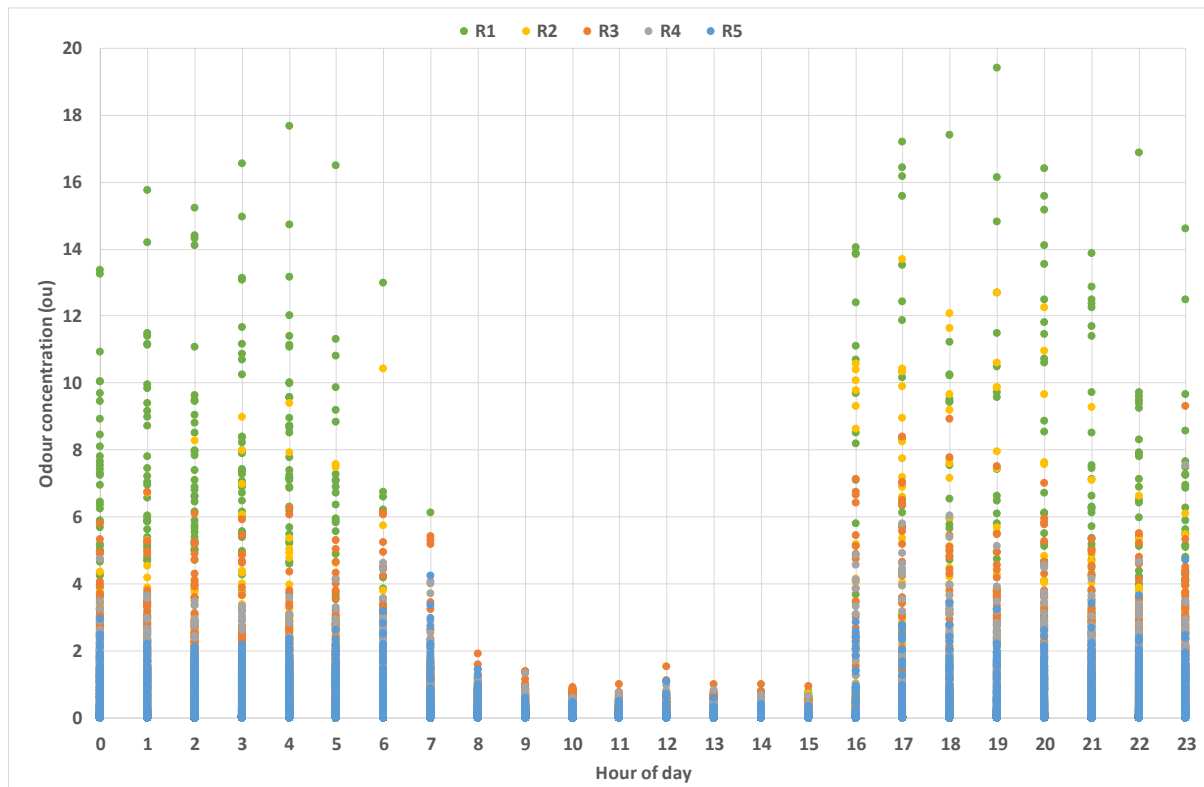


Figure 8-6: Odour concentrations for Receptors 1-5 for every hour of the day for the worst case scenario

8.2 Dust

Dust concentrations and deposition levels are presented as contours plots in this section showing the following:

- Predicted annual average TSP concentration from the Project alone
- Predicted annual average PM₁₀ concentration from the Project alone
- Predicted annual average PM_{2.5} concentration from the Project alone
- Predicted annual average dust deposition from the Project alone
- Predicted maximum 24-hour average PM₁₀ concentration from the Project alone
- Predicted maximum 24-hour average PM_{2.5} concentration from the Project alone
- Cumulative predicted annual average TSP concentration
- Cumulative predicted annual average PM₁₀ concentration
- Cumulative predicted annual average PM_{2.5} concentration
- Cumulative predicted annual average dust deposition

Dispersion model predictions have been made for the quarry. Contour plots of particulate concentrations and deposition levels show the areas that are predicted to be affected by dust at different levels. It is important to note that the isopleth figures are presented to provide a visual representation of the predicted impacts. To produce the isopleths it is necessary to make interpolations, and as a result the isopleths will not always match exactly with predicted impacts at any specific location.

There are no exceedances of the NSW EPA impact assessment criteria for TSP, PM₁₀, PM_{2.5} or dust deposition either from the project alone or cumulatively at nearby sensitive receptors.

A cumulative 24-hour assessment has been undertaken for PM₁₀ and PM_{2.5}. The results indicate that when contemporaneous assessments of maximum cumulative 24-hour average PM₁₀ and PM_{2.5} are considered, there are no exceedances of the relevant air quality criteria. Figure 8-17 presents a time series of predicted cumulative 24-hour average PM₁₀ concentrations at Receptor 5.

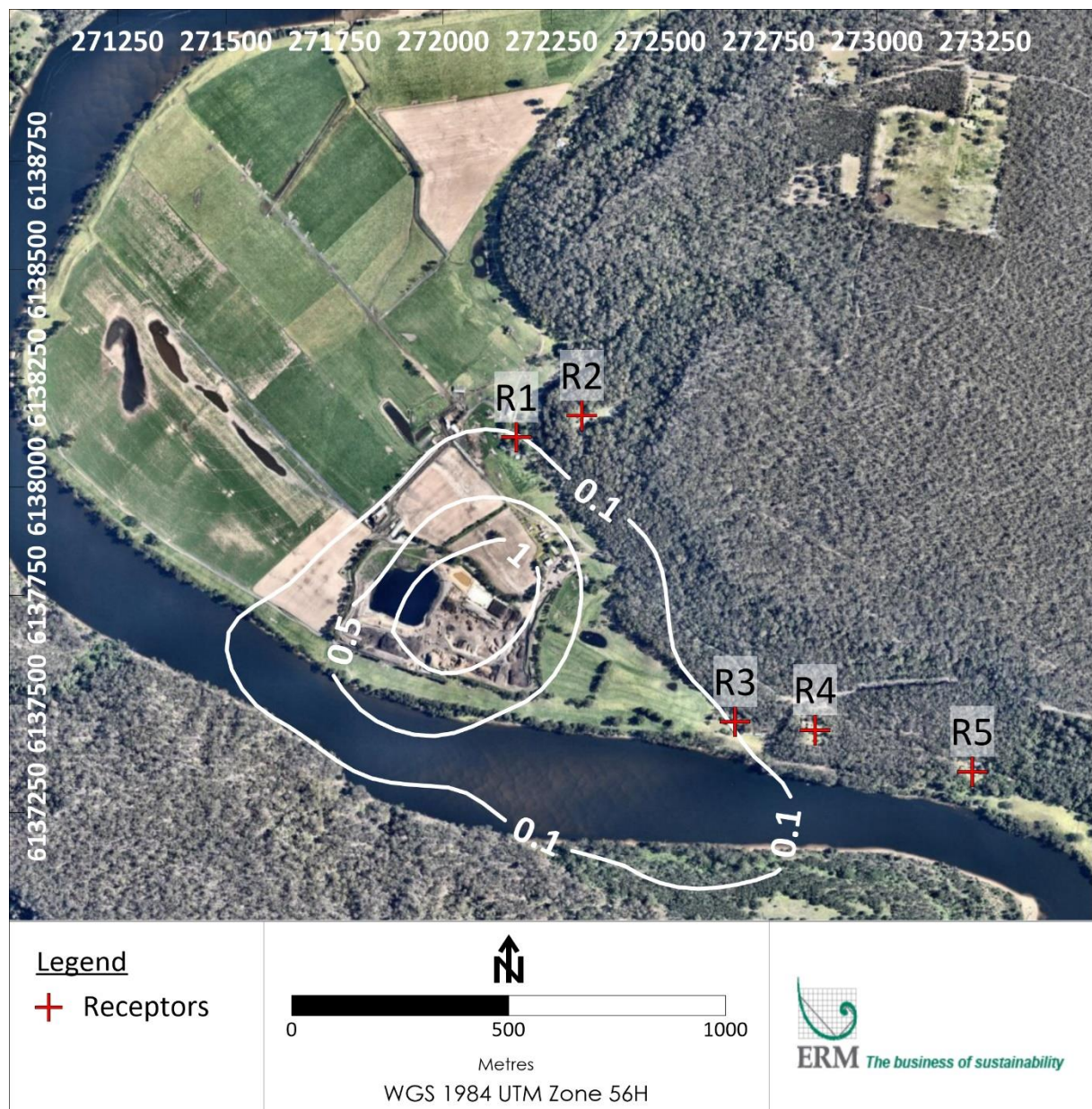


Figure 8-7: Predicted annual average TSP concentrations (µg/m³) due to emissions from the Project alone

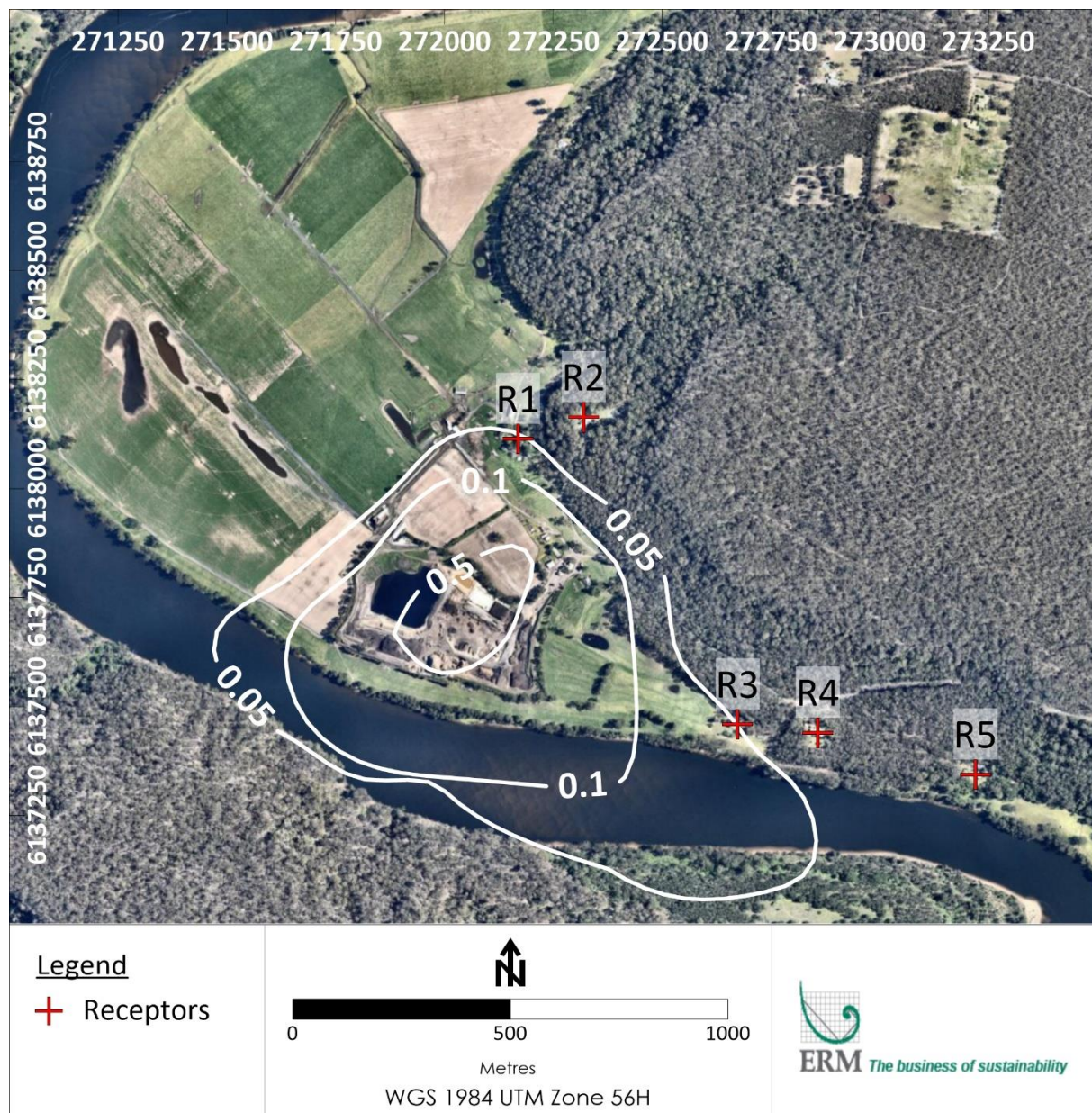


Figure 8-8: Predicted annual average PM₁₀ concentrations (µg/m³) due to emissions from the Project alone

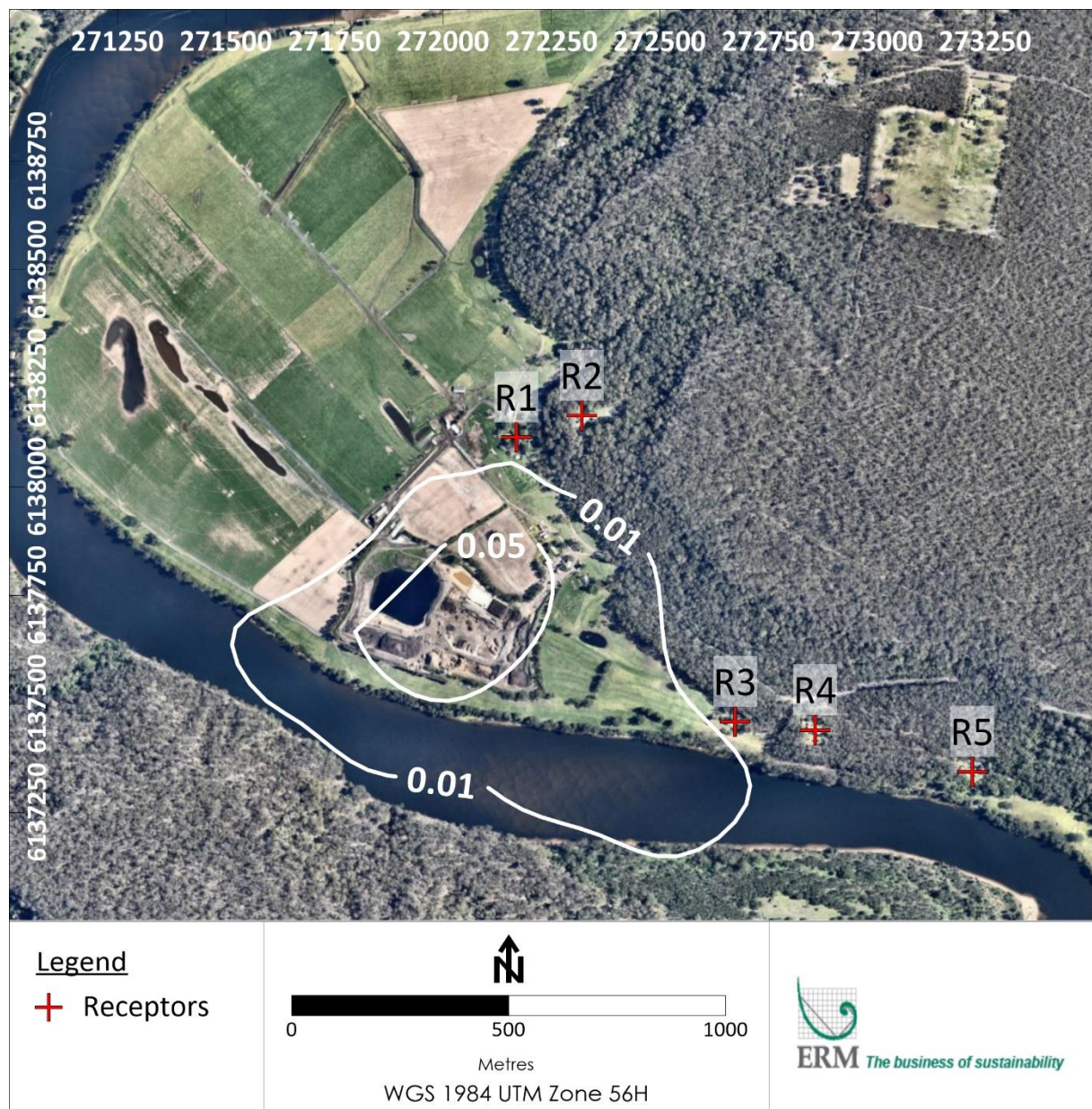


Figure 8-9: Predicted annual average PM_{2.5} concentrations (µg/m³) due to emissions from the Project alone

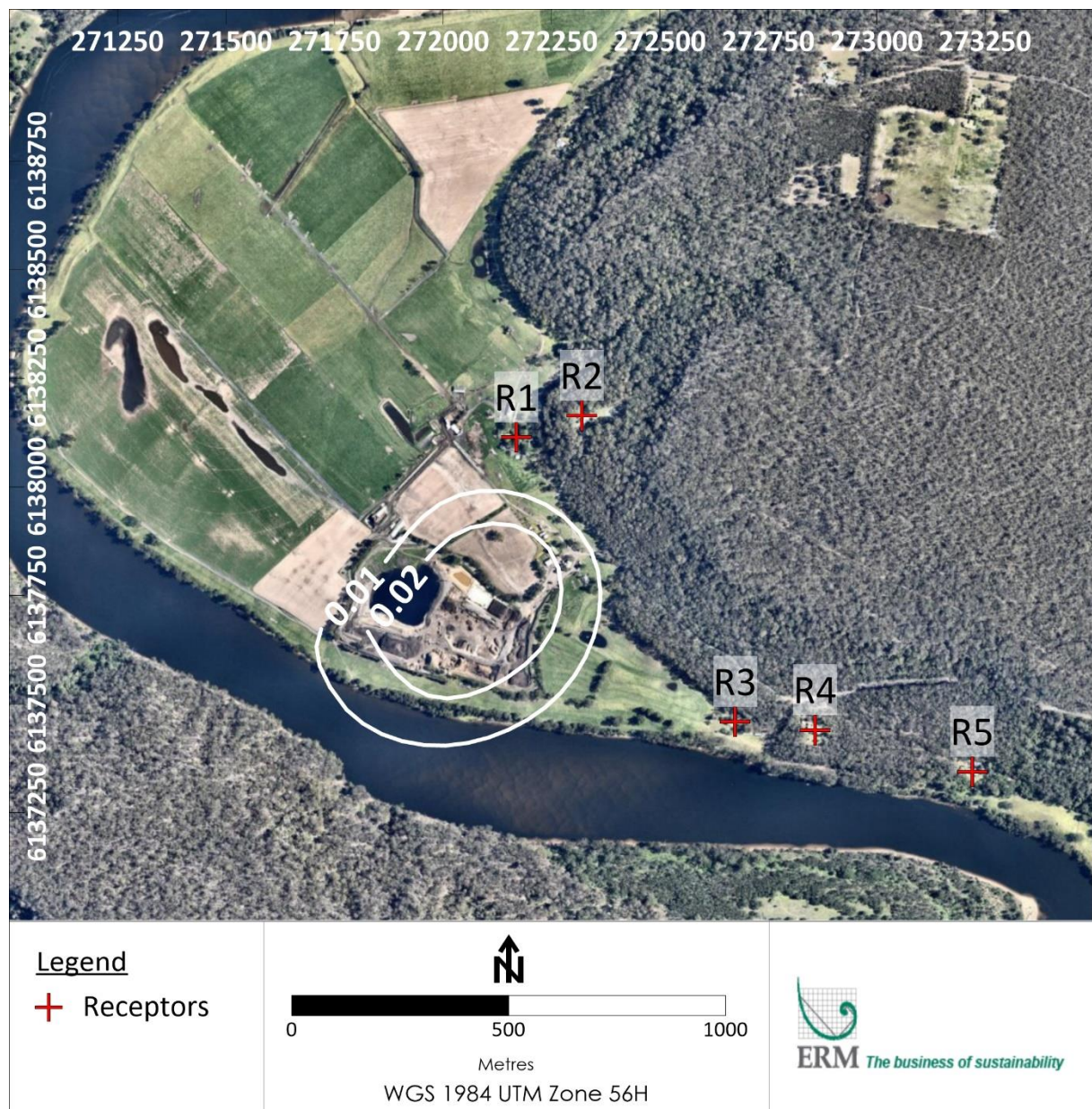


Figure 8-10: Predicted monthly average dust deposition levels (g/m²/month) due to emissions from the Project alone

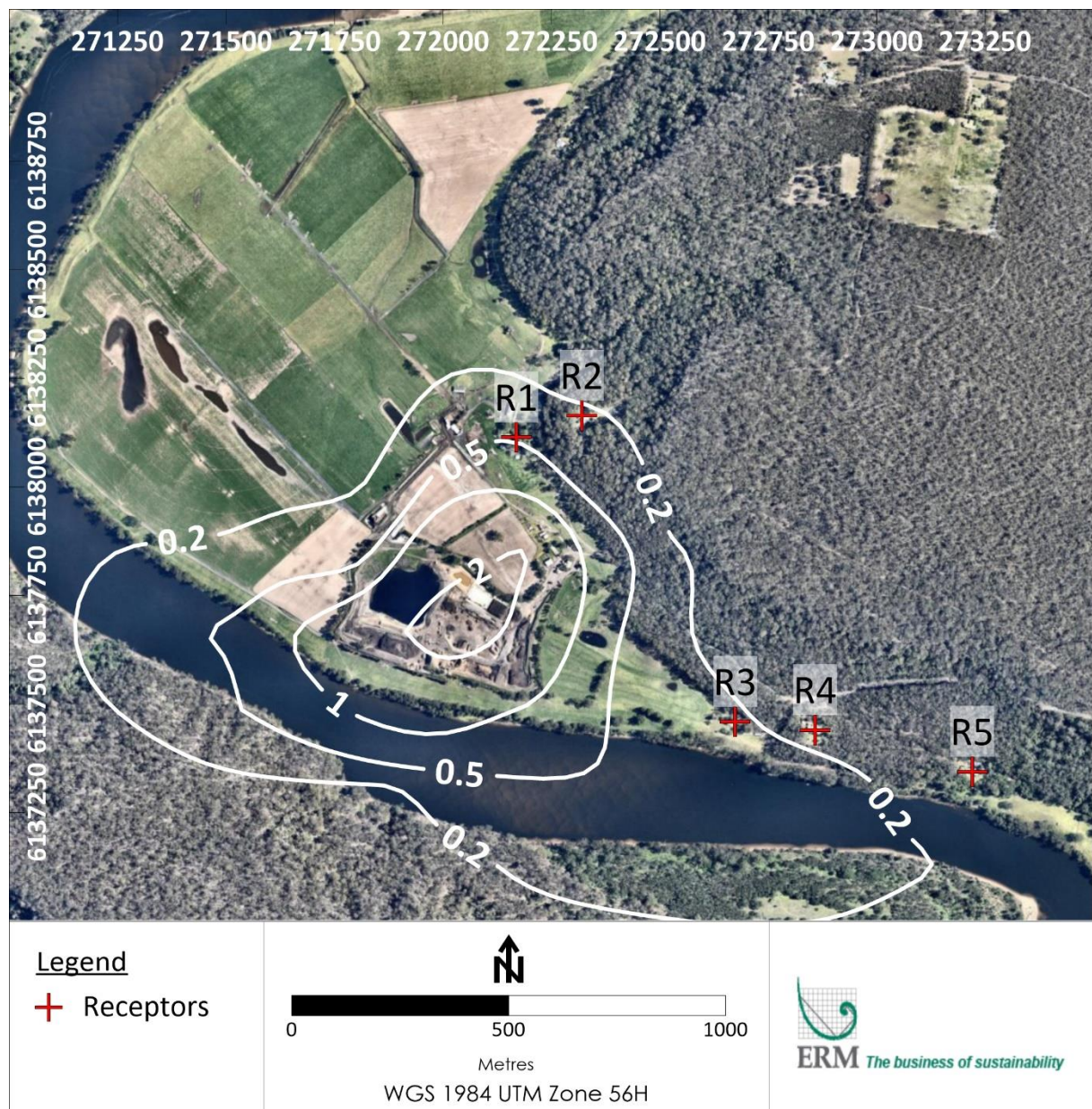


Figure 8-11: Predicted 24-hour average PM₁₀ concentrations (µg/m³) due to emissions from the Project alone

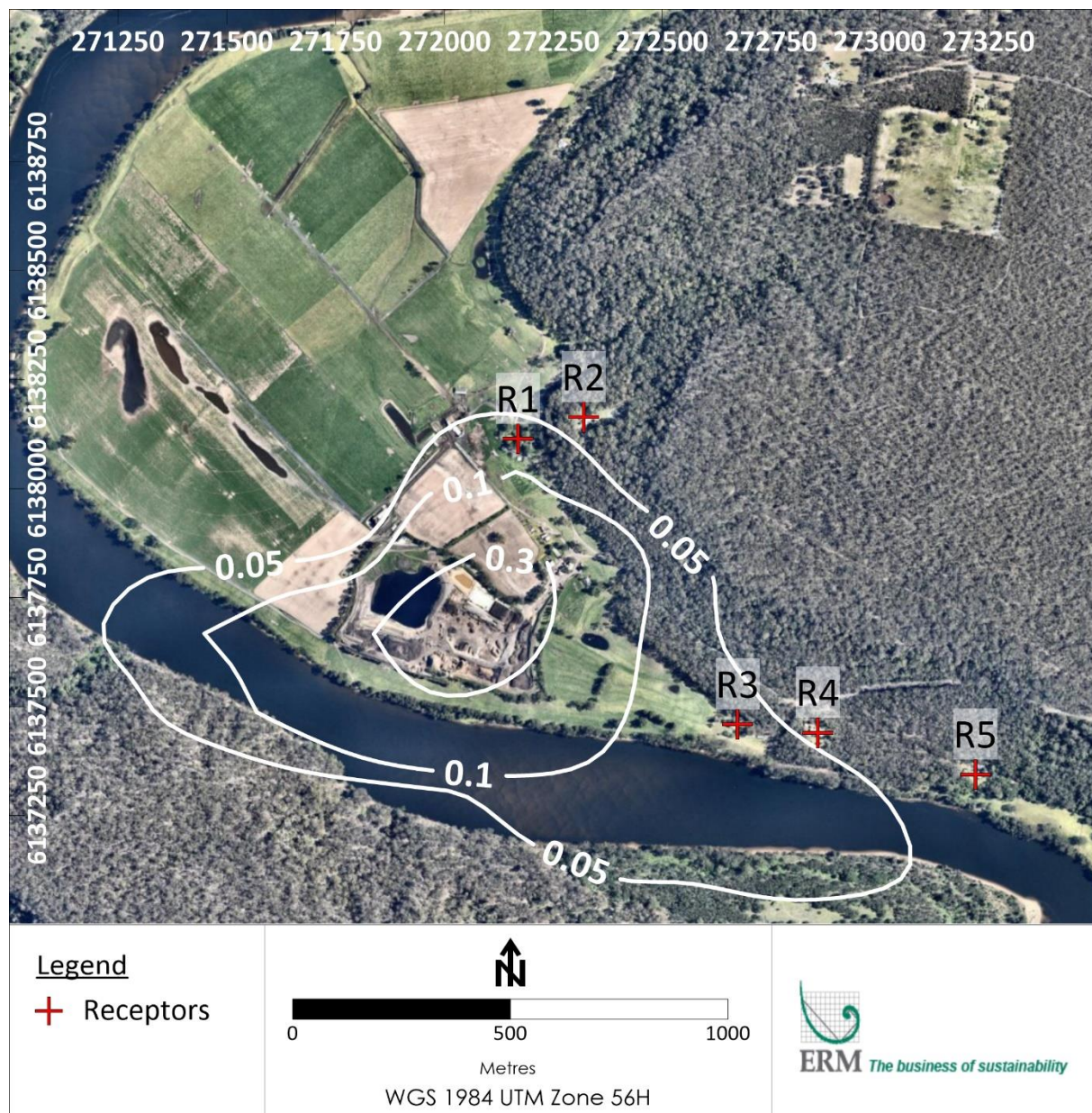


Figure 8-12: Predicted 24-hour average $PM_{2.5}$ concentrations ($\mu g/m^3$) due to emissions from the Project alone

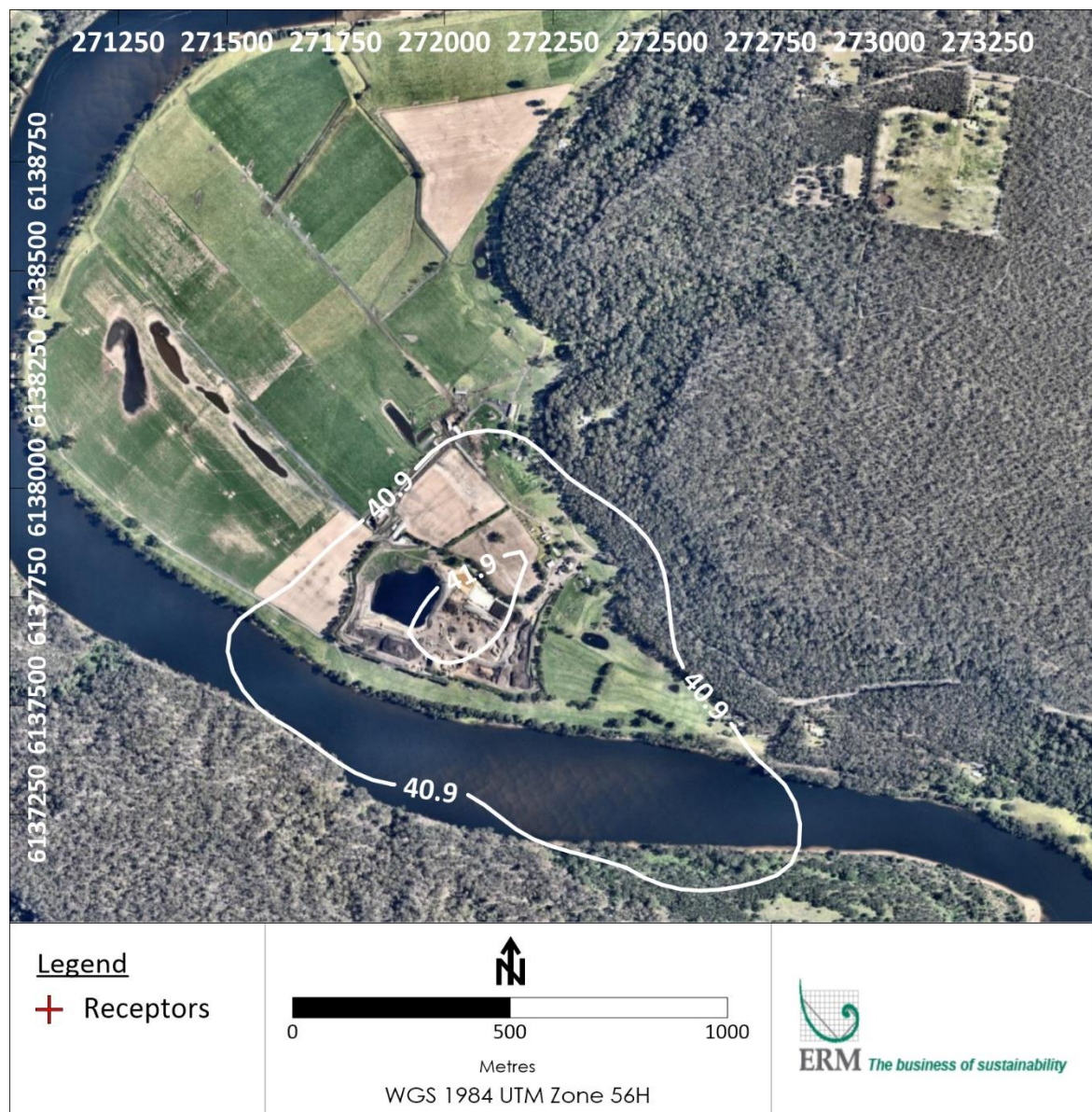


Figure 8-13: Cumulative predicted annual average TSP concentrations ($\mu\text{g}/\text{m}^3$)

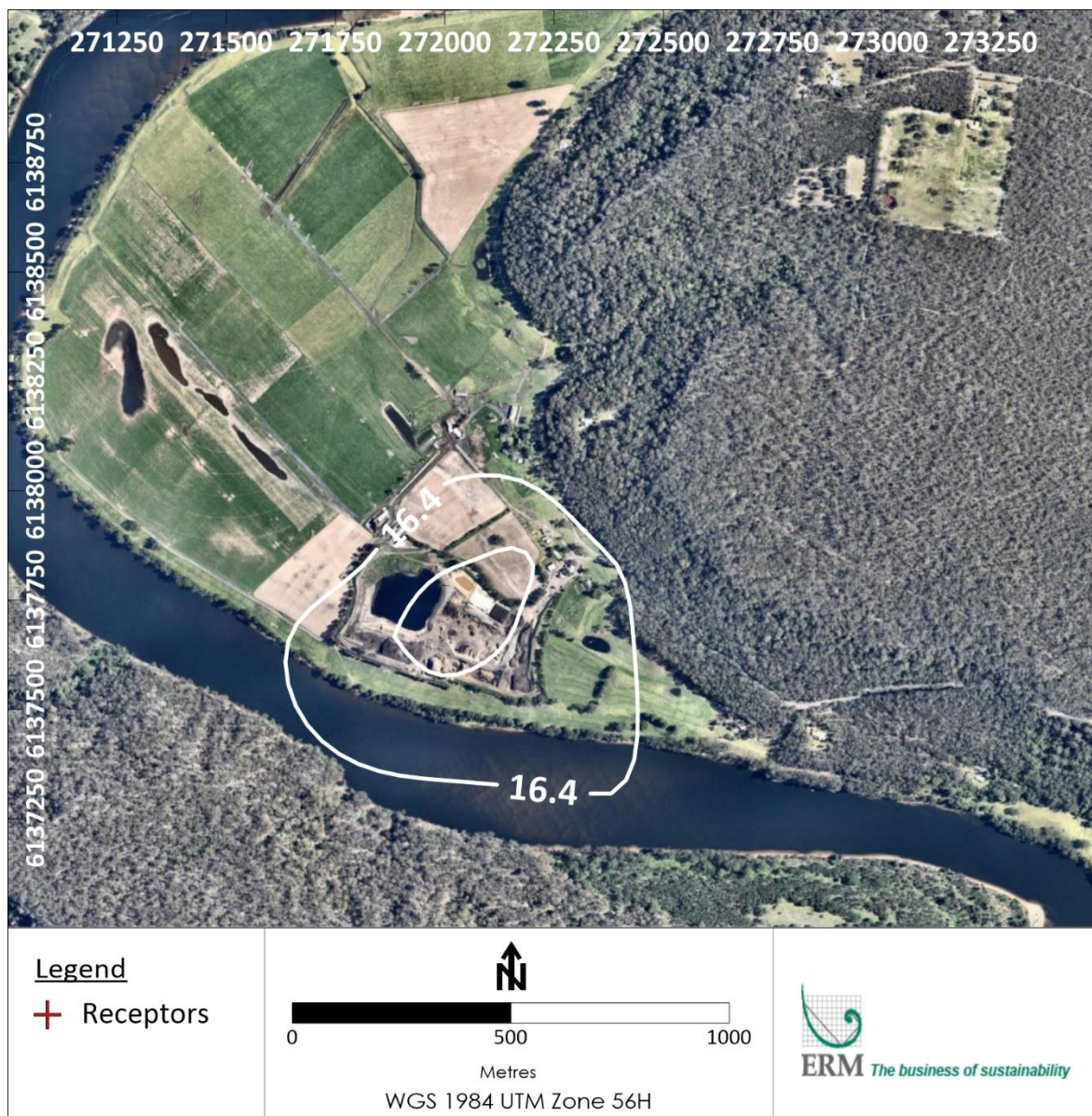


Figure 8-14: Cumulative predicted annual average PM₁₀ concentrations (µg/m³)

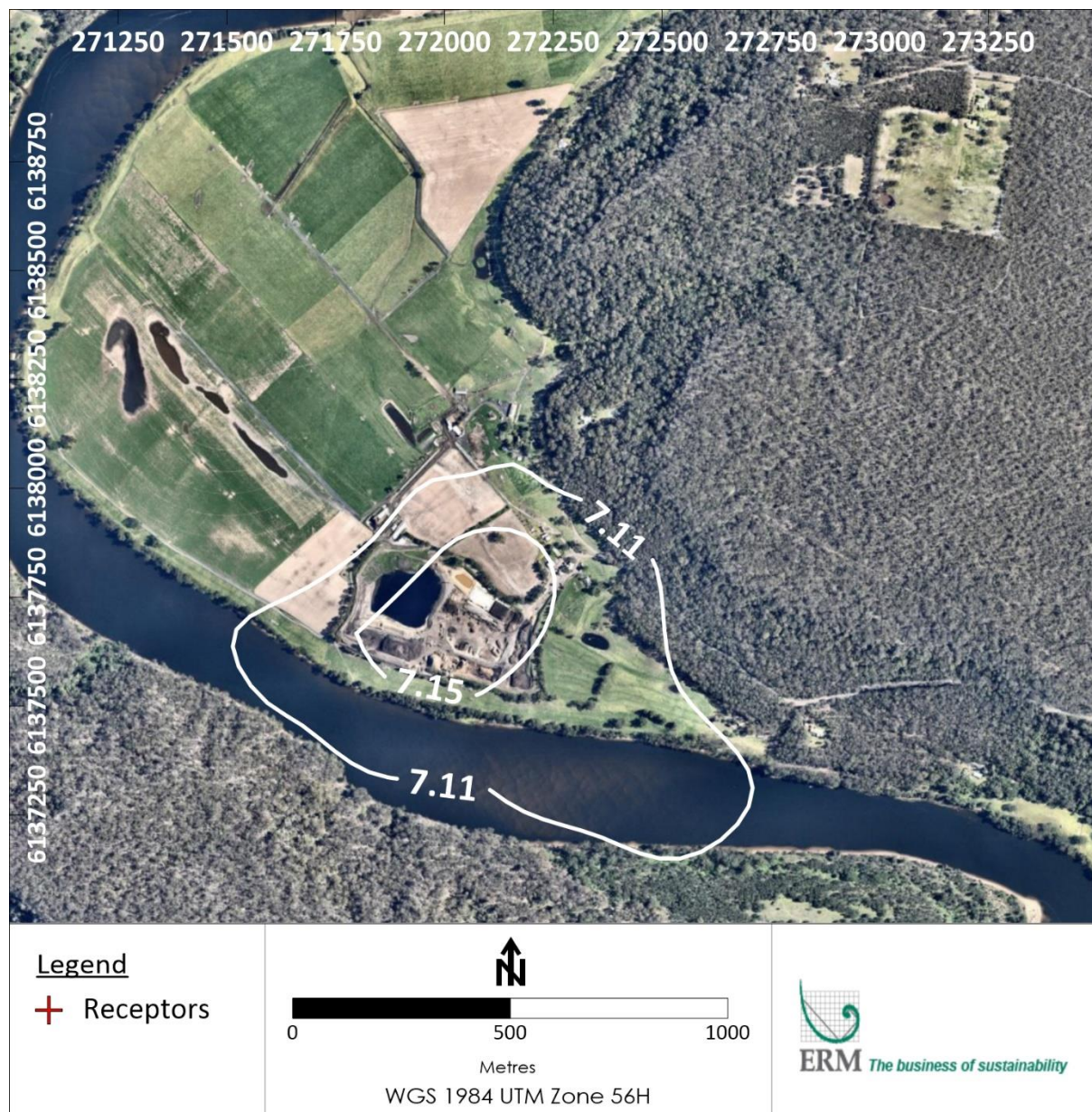


Figure 8-15: Cumulative predicted annual average PM_{2.5} concentrations (µg/m³)

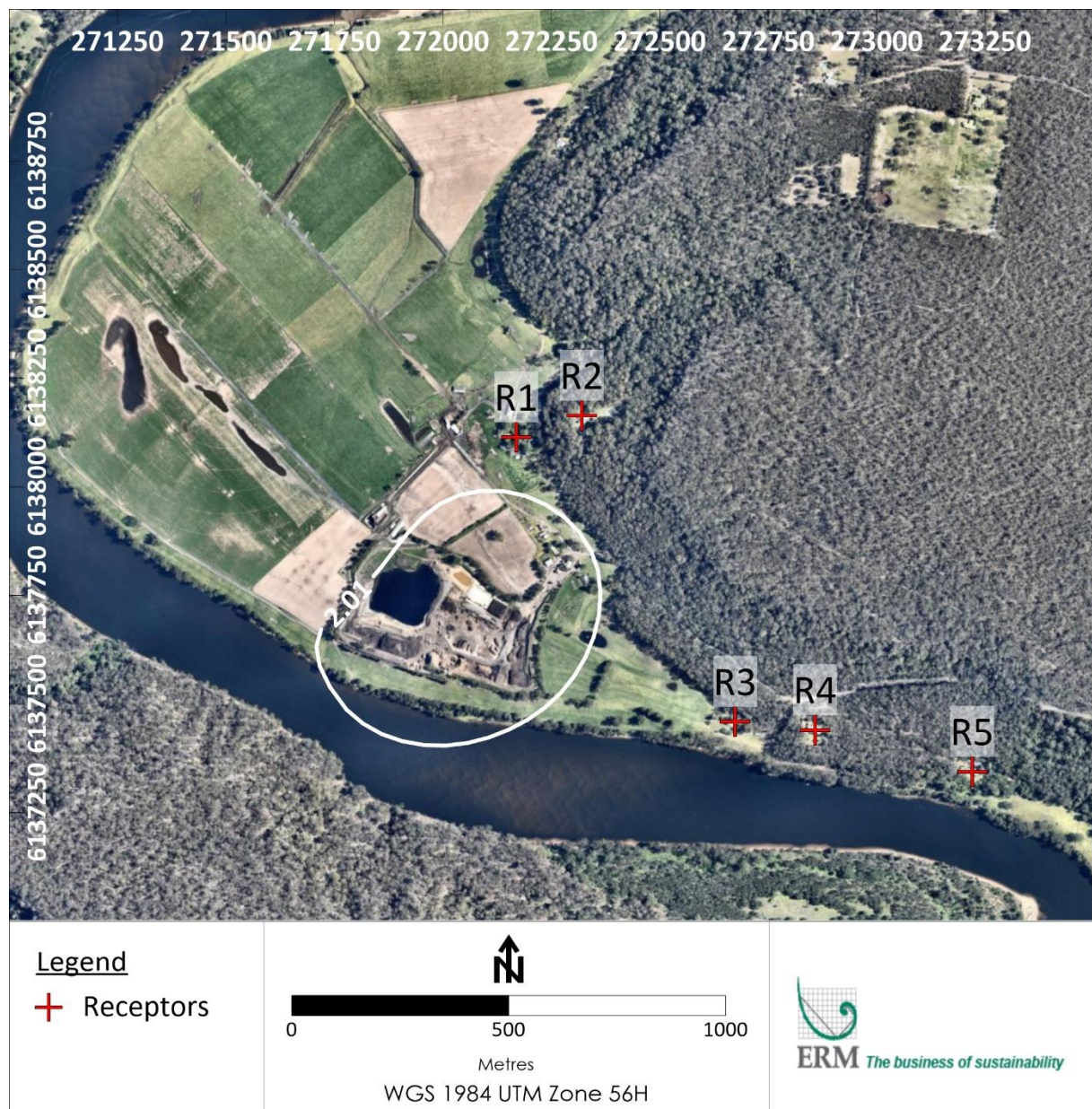


Figure 8-16: Cumulative predicted monthly average dust deposition levels ($\text{g/m}^2/\text{month}$)

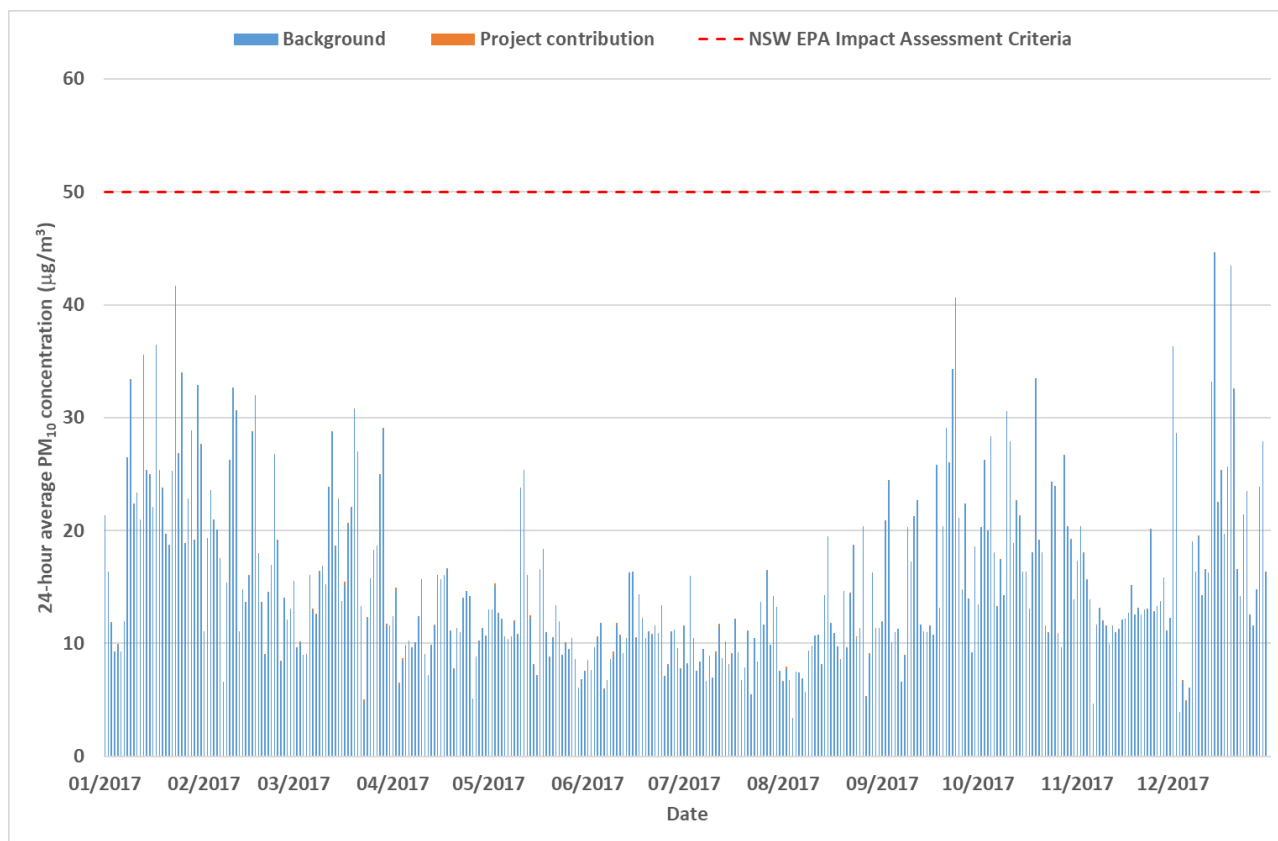


Figure 8-17: Time series results for 24-hour average PM₁₀ at Receptor 5

9. MITIGATION AND MANAGEMENT

There are a number of measures that Soilco can employ to mitigate the odour impacts from this site. Some of these are proactive and have already been incorporated into the design such as the use of the aerated pads. Using this technology to maintain aerated conditions in a controlled way is a key mitigation. Another is the use of biocover material on top of the aerated pads. Measurements have demonstrated that this has a significant impact in reducing emissions from this source.

Modelling has indicated the periods of the day where odour impacts are most likely to occur and also that the most significant source is the active turning of the garden organics windrows. To reduce the risk of impacts occurring, a proactive measure would be to restrict turning any windrows to between the hours of 7am and 3pm.

A number of mitigation measures are suggested by the proponent for different areas and activities on site and include such things as those described below.

9.1 Compost

- Material is size-reduced off-site as much as practicable. No unprocessed (non size-reduced) food waste would be received at the facility. Food waste and biosolids would be received at the site ready to be immediately placed in the composting process.
- Received material should be processed as efficiently as possible (i.e. not allowed to age for extended periods of time) and exposed pile area kept to a practical minimum.
- A layer of coarse composted material would be placed on top of the aerated static pile at depth approximately 250 mm to 300 mm. This biocover provides the following benefits during the active phase of pasteurisation:
 - It acts as a layer of thermal insulation to ensure that the entire stockpile maintains a temperature above 55°C
 - It acts as a form of odour control. Odour sampling undertaken by Ektimo (see Appendix B) has shown that odour is reduced when a biocover layer is present on SOILCOs existing aerated pad
 - Nutrient retention
 - Reduction in bird and insect activity as the external, post-composted, layer, is not attractive to pests
 - It assists with moisture retention within the compost; and
 - It is less visually obtrusive than the composting material
- All highly putrescible material (being food waste and biosolids) would be composted on the aerated static pile.
- Bi-weekly turning of windrows would ensure that all windrows maintain aerobic conditions.
- The turning (and wetting) of windrows would be closely monitored throughout the composting stage to ensure that appropriate aerobic conditions are maintained.
- Aeration of leachate ponds as deemed practicable.
- Should any stockpile be proven to be a significant source of odour, covering via a suitable tarpaulin or similar could be adopted.

9.2 Manufacturing

- Material stored within the new manufacturing, storage and distribution area would be restricted to mature compost, VENM, and up to 100 tonnes of manure.
- Windrow turning and manufacturing operations would not take place during times of high wind or during times of temperature inversions.

9.3 Water use and storage

- The surface area of stored leachate would be minimised through re-use, and draining the two proposed leachate ponds to the existing leachate ponds during normal operating and climatic conditions. That is, operating the primary holding pond with two collection/high rainfall storage ponds.
- The design of the leachate ponds promotes evaporation, which would assist in reducing the overall surface area of leachate.

9.4 Consultation

- On-going consultation with surrounding landowners, particularly the owner/resident of R1.

10. RISK ASSESSMENT

There is no specific guidance from the NSW EPA for the assessment of risk for a project such as this. An approach that has been adopted by EPA Victoria for industries working with animals is outlined in Appendix C. With regard to the assessment process itself, the following qualitative approach has been adopted.

Atmospheric dispersion models represent a simplification of the many complex processes involved in determining ground level concentrations of substances. Model uncertainty is composed of model chemistry/physics uncertainties, input data uncertainties (i.e. meteorology, emissions and release parameters), and stochastic uncertainties. In addition, there is inherent uncertainty in the behaviour of the random turbulence. The general sources of uncertainty in dispersion models and their potential effects on this assessment are summarised in Table 10-1.

Table 10-1: Model uncertainty summary

Source of uncertainty	Potential effects
Oversimplification of physics in model code (varies with type of model)	A variety of effects that can lead to both under-prediction and over-prediction. Errors are greater in Gaussian plume models, which do not include the effects of non-steady-state meteorology (i.e., spatially- and temporally-varying meteorology).
Emissions data	Ground-level concentrations are proportional to emission rate. Emission inventories are generated using either site specific measurement and/or literature based emission estimation methodologies. The literature information tends to provide a conservative estimate (i.e. higher than actual).
Emission release parameters	Emissions are either released as a constant over an annual period or as an hourly average, where data allows. In reality, emissions are intermittent and vary in intensity over duration less than an hour long.
Source types	Plumes behave differently depending on their type, such as elevated stacks, ground-level volumes or area sources. It is important to represent each source appropriately in the model to best represent reality.
Meteorological data	Wind speed and direction affect direction of plume travel. Wind speed affects plume rise and dilution of plume, resulting in potential errors in distance of plume impact from source, and magnitude of impact.
Inherent uncertainty	Models predict 'ensemble mean' concentrations for any specific set of input data (say on a 1-hour basis), i.e., they predict the mean concentrations that would result from a large set of observations under the specific conditions being modelled. However, for any specific hour with those exact mean hourly conditions, the predicted ground-level concentrations will never exactly match the actual pattern of ground-level concentrations, due to the effects of random turbulent motions and random fluctuations in other factors such as temperature.
Proximity of receptors	While not specifically part of the model itself, the location of receptors is important. Models tend to over predict for short durations and at distances close to modelled sources. The best model predictions are at distances further from the sources at longer durations.
Sensitivity of receptors	With regard to odour, this can be very subjective and the sensitivity of the receptor will be a factor in reality. The EPA odour criteria attempt to take this into account, as described in Section 3.1. The response of any individual to an odour is unpredictable.

This section assesses the risk of predicting impacts, using a risk matrix similar to that presented in the previous section, although this time more qualitative. We have looked at a number of features of odour modelling and then based on the data and assumptions used, made a qualitative assessment of risk. The risk matrix is presented in Table 10-2. The assessment using this matrix is presented in Table 10-3.

Table 10-2: Risk assessment matrix for modelling uncertainty

		Impact		
		Low (L)	Medium (M)	High (H)
Likelihood	High (H)	Medium	High	Very High
	Medium (M)	Low	Medium	High
	Low (L)	Low	Low	Medium

Table 10-3: Risk of errors in assessment

Source of uncertainty	Prior to control			Control / action	After control		
	Likelihood	Impact	Risk		Likelihood	Impact	Risk
Oversimplification of physics in model	Low	High	Medium	Use of the complex 3 dimensional model CALPUFF. This considers the varying nature of a dispersing plume, unlike a Gaussian model such as AERMOD or AUSPLUME.	Low	Low	Low
Non-specific Emissions data	High	High	Very High	As many on-site measurements taken as possible, including measurements with and without biocover on the aerated pads. Limitations on the time measured and the number of samples able to be taken does still leave some residual risk.	Medium	Medium	Medium
Emission release parameters and source types	Low	High	Medium	Simple site layout so all sources represented realistically, including airflow through the aerated pads as volume sources.	Low	Low	Low
Non site specific meteorological data	High	High	Very High	Site specific data not available, but use of the CALMET model enabled good estimates of local conditions including those induced by local terrain. This can be seen by the shape of the contours which follow the terrain.	Medium	Low	Low
Proximity of receptors	High	High	Very High	A number of receptors are very close. While the receptors cannot be moved they mitigation such as keeping the FOGO aerated and using biocover reduces odour impact.	High	Low	Medium
Sensitivity of receptors / landuse	Medium	High	High	The sensitivity of the nearest residents on northern boundary is likely to be low as they are either owned by the proponent or also undertaking odorous activities such as dairying.	Low	Low	Low

11. GREENHOUSE GAS ASSESSMENT

11.1 Methodology

Quantification of GHG emissions has been completed in accordance with the GHG Protocol (WRI & WBCSD, 2004), IPCC and Australian Government GHG accounting/classification systems.

This GHGA is also guided by the emission estimation methodologies endorsed under the National Greenhouse and Energy Reporting Regulations 2008 (the NGER Regulations) (as amended in 2019). These describe the detailed requirements for reporting under the NGER framework and also provide a basis for estimating emissions from proposed activities.

The Technical Guidelines for the Estimation of Greenhouse Gas Emissions by Facilities in Australia (the NGER Guidelines) (DoEE, 2019) support reporting under the NGER Act. They have been designed to assist corporations in understanding and applying the NGER Measurement Determination.

The NGER Guidelines are reporting year specific, and outline calculation methods and criteria for determining GHG emissions, energy production, energy consumption and potential GHG emissions embodied in combusted fuels. The latest published NGER Guidelines (at the time of writing) have been referenced.

11.1.1 The GHG protocol

The GHG Protocol establishes an international standard for accounting and reporting of GHG emissions. The GHG Protocol has been adopted by the International Organization for Standardisation, endorsed by GHG initiatives (such as the Carbon Disclosure Project) and is compatible with existing GHG trading schemes.

Under this protocol, three “scopes” of emissions (Scope 1, Scope 2 and Scope 3) are defined for GHG accounting and reporting purposes. This terminology has been adopted in Australian GHG reporting and measurement methods and has been employed in this assessment. These are represented visually in Figure 11-1. Scope 3 is not relevant for this project so only Scopes 1 and 2 are addressed. The definitions for Scope 1 and Scope 2 are provided in the following sections.

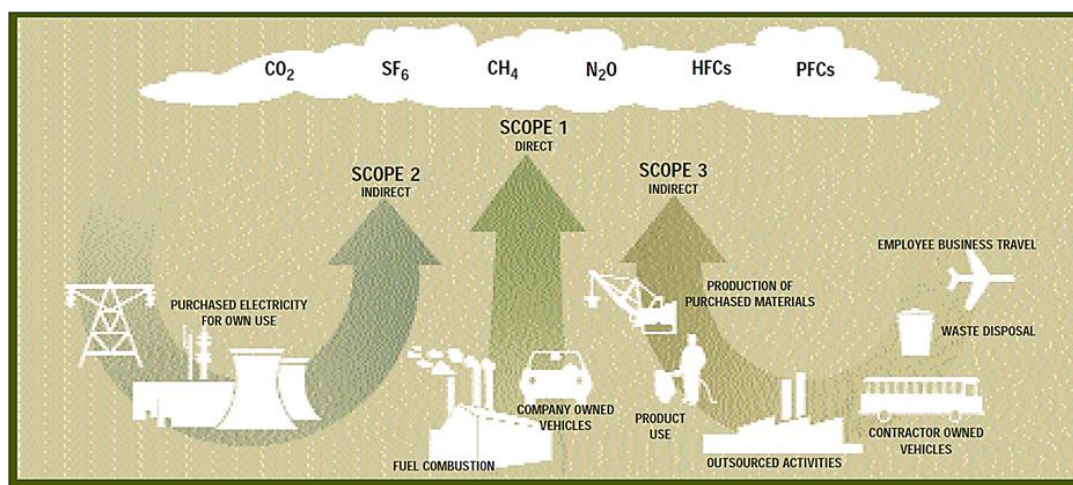


Figure 11-1: Overview of scope and emissions across a reporting entity

11.1.1.1 *Scope 1: Direct greenhouse gas emissions*

Direct GHG emissions are defined as those emissions that occur from sources that are owned or controlled by the reporting entity. Direct GHG gas emissions are those emissions that are principally the result of the following types of activities undertaken by an entity:

- Generation of electricity, heat or steam. These emissions result from combustion of fuels in stationary sources;
- Physical or chemical processing. Most of these emissions result from manufacture or processing of chemicals and materials, e.g., the manufacture of cement, aluminium, etc;
- Transportation of materials, products, waste and employees. These emissions result from the combustion of fuels in entity owned/controlled mobile combustion sources, e.g., trucks, trains, ships, aeroplanes, buses and cars; and
- Fugitive emissions. These emissions result from intentional or unintentional releases, e.g., equipment leaks from joints, seals, packing, and gaskets; methane emissions from coal mines and venting; HFC emissions during the use of refrigeration and air conditioning equipment; and methane leakages from gas transport.

11.1.1.2 *Scope 2: Energy product use indirect greenhouse gas emissions*

Scope 2 emissions are a category of indirect emissions that accounts for GHG emissions from the generation of purchased energy products (principally, electricity, steam/heat and reduction materials used for smelting) by the entity.

Scope 2 covers purchased electricity defined as electricity that is purchased or otherwise brought into the organisational boundary of the entity. Scope 2 emissions physically occur at the facility where electricity is generated. Entities report the emissions from the generation of purchased electricity that is consumed in its owned or controlled equipment or operations as Scope 2.

11.1.2 *Assessment approach*

GHG emissions have been estimated for the Project based upon the methods outlined in the following documents:

- The National Greenhouse and Energy Reporting (Measurement) Amendment Determination 2008 (as amended 2019);
- Site specific information;
- The NGER Guidelines; and
- The NGA Factors.

11.2 Scope 1 emissions – Fuel consumption

Consumption of diesel oil has been provided by SoilCo. The total diesel accounted for within the data is equal to diesel used for transport, stationary and non-combustion purposes. Diesel consumed on-site is used in the following activities:

- Operation of heavy machinery; and
- Diesel generators.

Emissions for Scope 1 diesel consumption are calculated using the following method:

Method 1 – emissions of carbon dioxide, methane and nitrous oxide from liquid fuels other than petroleum based oils or greases (Subdivision 2.41 of the NGER Determination 2008 (as amended in 2019)).

GHG emissions from diesel consumption were estimated using the following equation:

$$E_{ij} = \frac{Q_i \times EC_i \times EF_{ijoxec}}{1000}$$

Where:

E_{ij}	=	Emissions of GHG from diesel combustion	(t CO ₂ -e)
Q_i	=	Quantity of fuel	(GJ) ¹
EC_i	=	Energy content of fuel	(GJ/kL)
EF_{ijoxec}	=	Emission factor (Scope 1) for diesel combustion	(kg CO ₂ -e/GJ) ²

¹ GJ = giga joules

² kg CO₂-e/GJ = kilograms of carbon dioxide equivalents per gigajoule

Scope 1 fuel consumption emissions have been calculated using the energy content and emission factors from Part 3 of the NGER Measurement Determination and are presented in Table 11-1 and Table 11-2.

Table 11-1: Diesel (for stationary purposes) GHG emission factors – Scope 1

Fuel type	Energy Content (GJ/kL)	Emission factor (kg CO ₂ -e/GJ)		
		CO ₂	CH ₄	N ₂ O
Diesel oil	38.6	69.9	0.1	0.2

Source: Schedule 1, Part 3 of the NGER Determination (2008)(as amended 2019).

The estimated annual and total GHG emissions from diesel usage are presented in Table 11-2.

Table 11-2: Annual diesel fuel consumption and GHG emissions

Estimated Diesel Usage (kL/y)	Scope 1 Emissions (t CO ₂ -e)
473	1,276

11.3 Scope 2 emissions – Electricity consumption

Consumption of electricity has been provided by SoilCo. Emissions for Scope 2 electricity consumption are calculated using the following method:

Method 1 – Indirect (scope 2) emission factors from consumption of purchased electricity from a grid (Subdivision 7.2 of the NGER Technical Guidelines 2008 (as amended in 2017)).

GHG emissions from electricity consumption were estimated using the following equation:

$$Y = Q \times \frac{EF}{1000}$$

Where:

Y	=	Scope 2 Electricity emissions	(CO ₂ -e tonnes)
Q	=	Quantity of electricity purchased from the electricity grid during the year	(kWh/annum) ¹
EF	=	Scope 2 emission factor for the State of Territory in which the consumption occurs	(kg CO ₂ -e/kWh) ²

¹ kWh/annum = kilowatt hours per annum

² kgCO₂-e/kWh = kilograms of carbon dioxide equivalents per kilowatt hour

Scope 2 emissions have been calculated using an emission factor of 0.83 kg CO₂-e/kWh for New South Wales and Australian Capital Territory as sourced from Part 7.2 of the NGER Technical Guidelines 2008 (as amended 2017).

The estimated annual and total GHG emissions from electricity usage are presented in Table 11-3.

Table 11-3: Projected electricity consumption and Scope 2 GHG emissions

Electricity Consumption (kWh/y)	Scope 2 Emissions (t CO ₂ -e)
133,677	111

12. CONCLUSIONS AND RECOMMENDATIONS

This report has assessed the odour and dust impacts of the SOILCO CMF located in Longreach near Nowra, NSW.

Dispersion modelling has been used to predict off-site odour and dust concentrations at nearby residential receptors. The dispersion modelling took account of local meteorological conditions and terrain information and used on-site odour measurements to determine odour emission rates.

Results from the dispersion modelling indicate that the 6 OU contour extends to one of the neighbouring residences to the north. This residence is currently operated as a dairy and the risk of odour impact to sensitive receptor locations from the CMF site is predicted to be low.

When comparing the odour results from this assessment with the odour results from the existing approved operations there are very minor changes. While the volume of material proposed to be processed at the site is increasing, the mitigation measures such as the use of biocover on the aerated pads will reduce odour emission rates. Overall, the changes between existing and proposed operations are minimal, as are the predicted impacts.

A worst case odour scenario of the entire garden organics windrows being turned every day. This will not be the case and will happen approximately twice per week. Even so, ensuring windrows are only turned between 7am and 3pm is predicted to keep peak odour concentrations below the criterion.

For dust, the dispersion modelling indicates that there are no exceedances of the NSW EPA impact assessment criteria for TSP, PM₁₀, PM_{2.5} or dust deposition either from the project alone or cumulatively at nearby sensitive receptors.

13. REFERENCES

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Appendix A FIVE YEAR METEOROLOGICAL ANALYSIS

Review of Available Meteorological Stations

Air quality impacts are influenced by meteorological conditions, primarily in the form of gradient wind flow regimes, and by local conditions generally driven by topographical features and interactions with coastal influences, such as the sea breeze. The local dispersion meteorology for the site, in relation to wind speed and direction, has been reviewed based on the data available at nearby meteorological stations.

The closest weather station to the Project site is run by the Bureau of Meteorology located at Nowra Ran Air Station AWS approximately 9 km south east of the Project site.

Representative Year for Modelling

As specified in the Approved Methods, five years of meteorological data are required to be reviewed so that a representative year of meteorological conditions can be selected. Figure B-1 to Figure B-5 present the annual wind roses from BoM Nowra Ran AWS for 2015 to 2019. Data from this station was used to analyse the prevailing wind conditions on a seasonal and annual basis. The review identified 2017 as a representative year for dispersion modelling with no anomalous wind patterns compared to the other years examined and is therefore considered representative year for dispersion modelling.

The wind rose for the annual period 2017 presented in Figure B-3 indicates that winds from west-north-west were dominant and the percentage of occurrence of calm wind conditions (wind speeds less than 0.5 m/s) was 3.2%.

In terms of the seasonal behaviour, winds from the west were dominant during all seasons except summer, when winds were dominant from the south. Calm wind conditions were generally consistent across all seasons: summer (5%), autumn (3.5%), winter (1.5%), spring (3%).

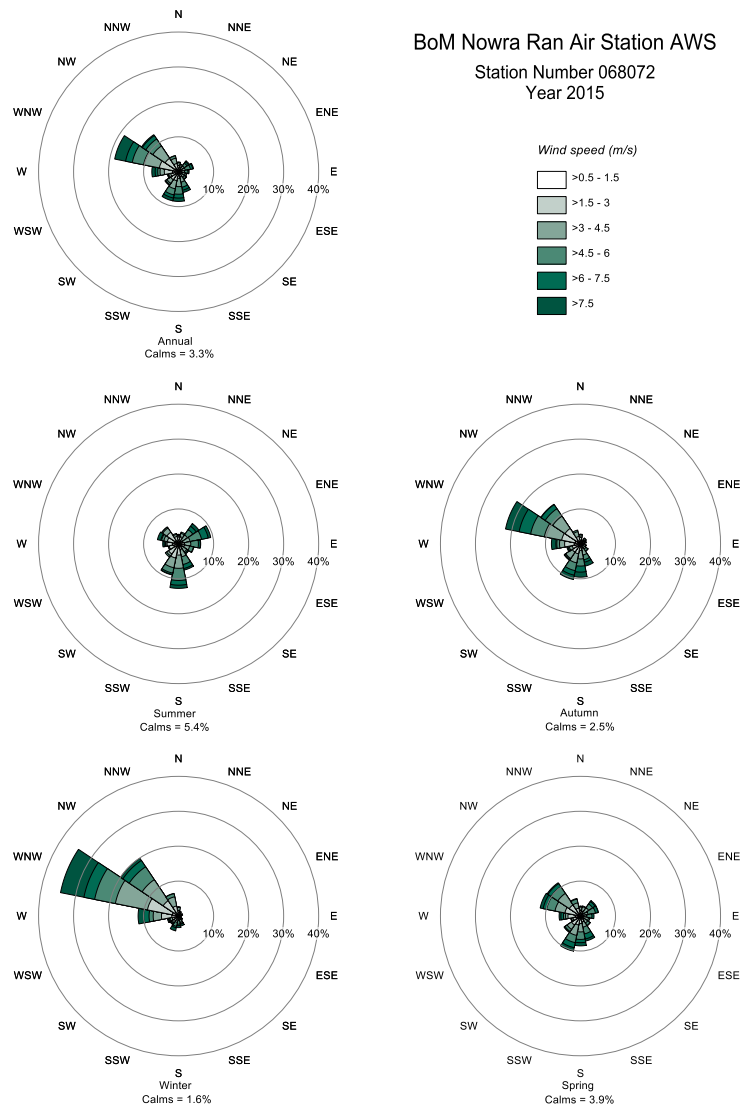


Figure B-1: Annual wind roses for Now Ran AWS for 2015

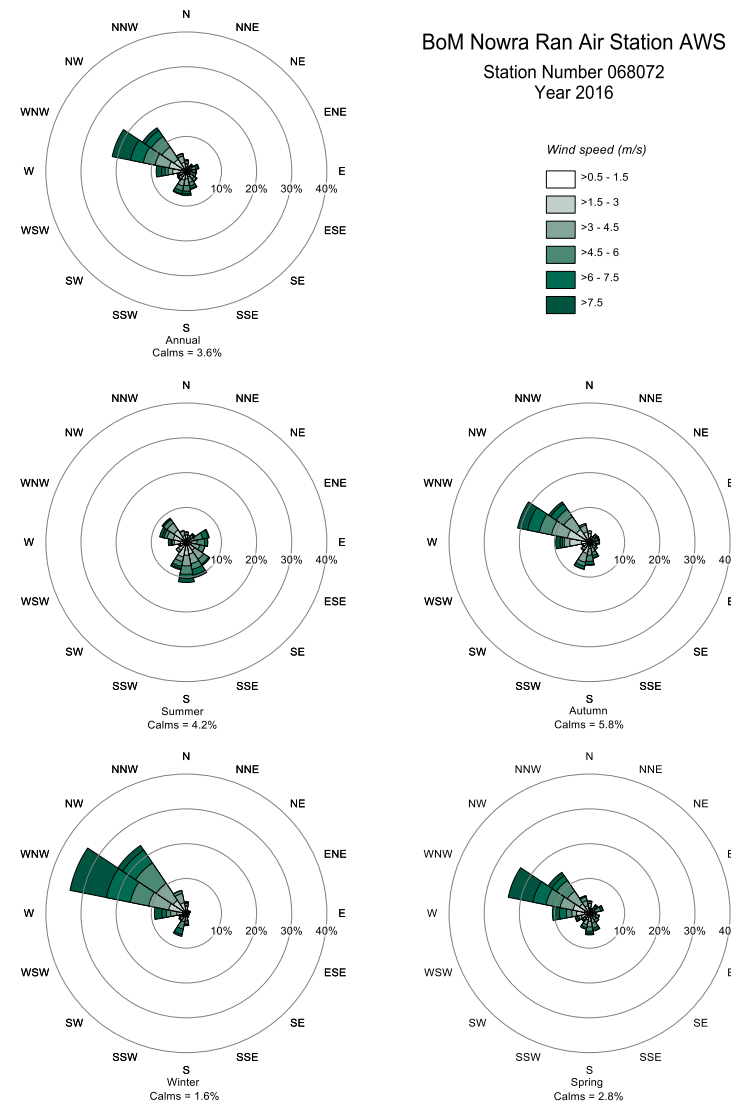


Figure B-2: Annual wind roses for Now Ran AWS for 2016

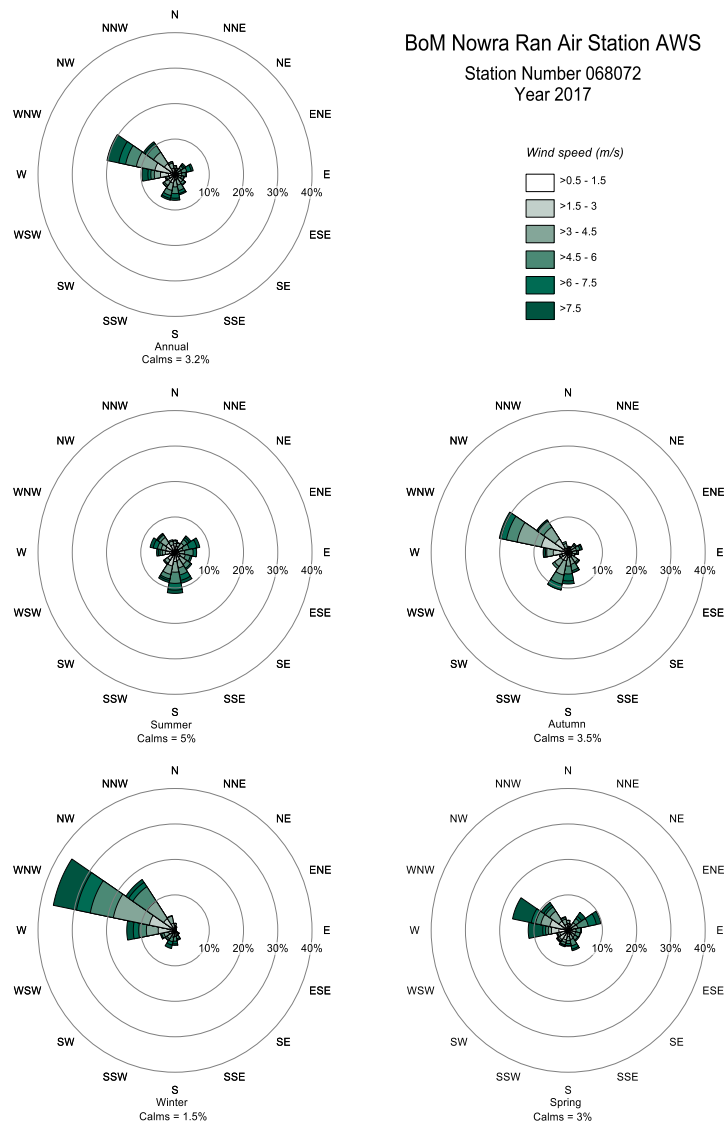


Figure B-3: Annual wind roses for Now Ran AWS for 2017

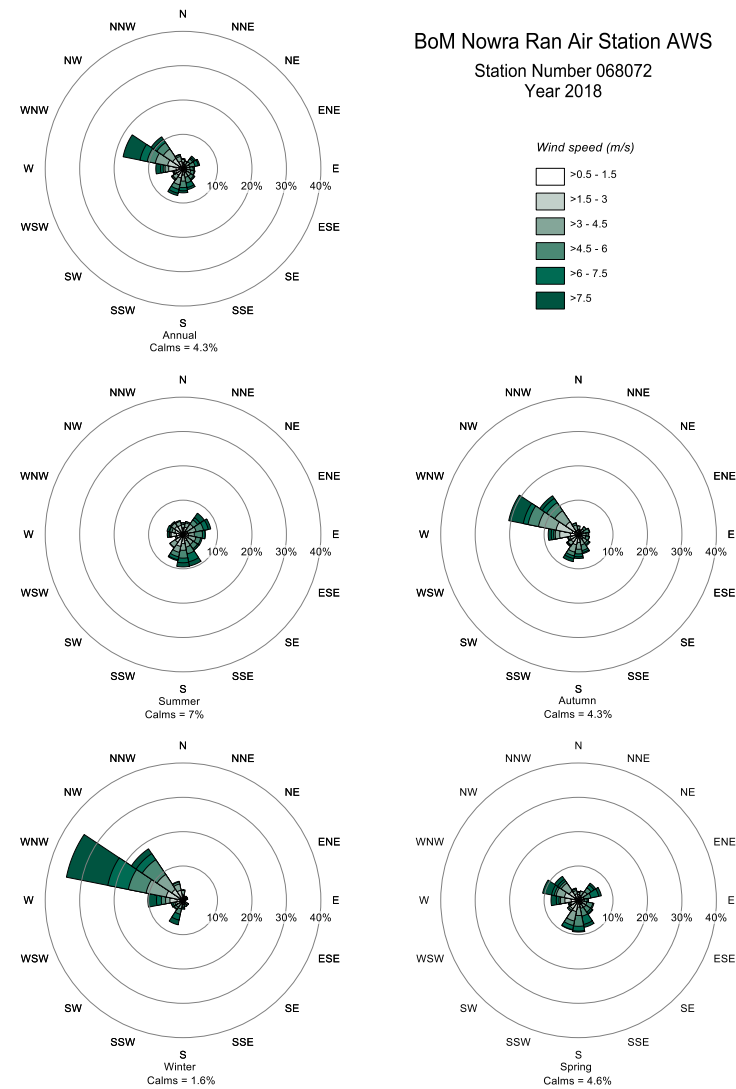


Figure B-4: Annual wind roses for Now Ran AWS for 2018

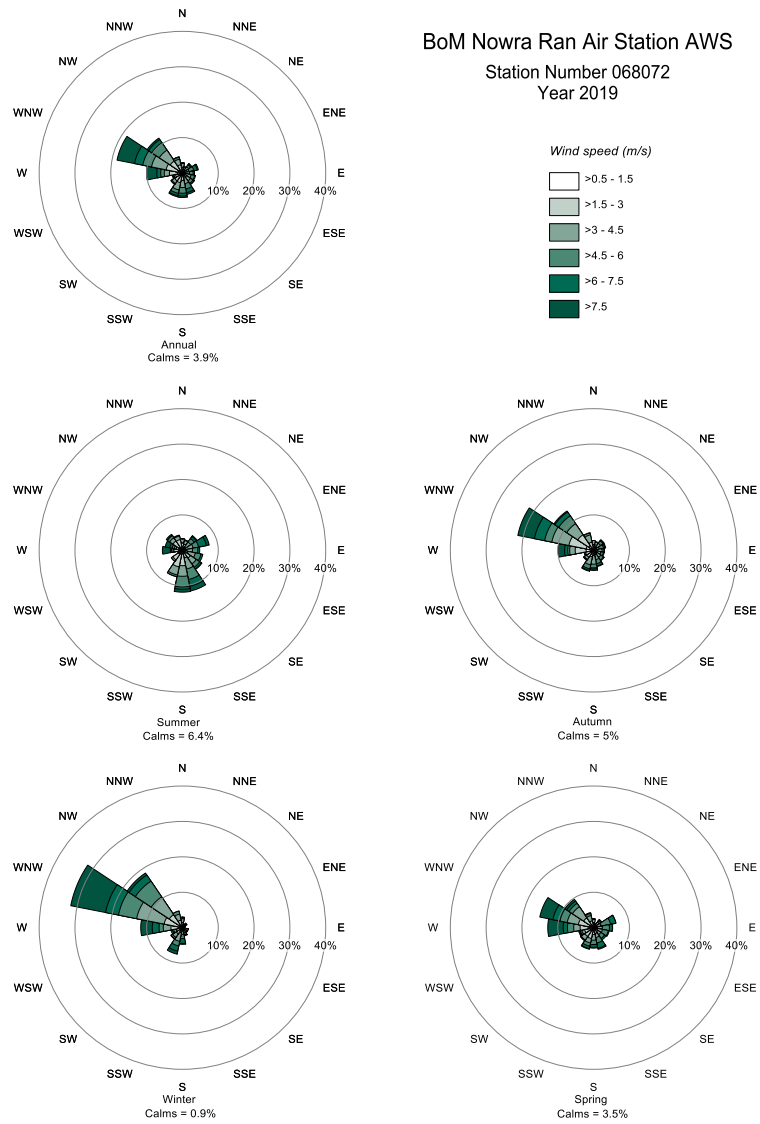


Figure B-5: Annual wind roses for Now Ran AWS for 2019

Appendix B RISK ANALYSIS

There is no specific guidance from the NSW EPA for the assessment of risk for a project such as this, but the Victorian EPA Publication 1643 details a methodology for undertaking odour risk assessments for industries working with animals in Victoria. While the odour character may be different for this project, we have adopted a similar approach to investigate the potential risks.

Table B-1 contains the risk matrix used for assessing compliance for the most exposed sensitive receptors.

As outlined in the EPA discussion paper, a risk ranking of:

- Low (L) means the development is unlikely to create adverse odour amenity problems;
- Medium (M) means the development may create adverse odour amenity problems – Mitigation technologies or changes in practices required to render the risk low;
- High (H) – Project is unlikely to be able to proceed without substantial mitigation or re-siting.

The Victorian EPA matrix relies on the use of percentiles to consider the frequency of odour impact to a sensitive receptor. For each receptor, the 99.9th, 99.5th and 98th percentiles were extracted from the model results and converted to three minute averages using Equation 1. The highest result of the year for each percentile and receptor was used and applied to the risk matrix.

Equation 1:

$$Conc_{3-min} = Conc_{1-hour} \times \left(\frac{60}{3}\right)^{0.2}$$

Table B-1: Risk assessment matrix documented in Victoria EPA Publication 1643

Frequency		Odour concentration		
Odour events per year (hours)	Percentile	10+ OU	6-9 OU	1-5 OU
0 to 9	100 th to 99.9 th	See note below		
10 to 44	99.9 th to 99.5 th	High	Medium	Low
45 to 175	99.5 th to 98 th	High	High	Medium
More than 175	Less than 98 th	High	High	Medium

The highest nine events per year are deemed statistical outliers. The Victorian EPA has low confidence in these estimates and recommends that they be disregarded for the purposes of this risk assessment approach.

Table B-2 and Table B-3 show the predicted concentrations for the 99.9th percentile, the 99.5th percentile and the 98th percentile for all modelled sensitive receptors, along with the highest risk ranking for each receptor.

A concentration of 1 OU is defined as a level at which 50% of the population can detect the sensation of an odour in a laboratory setting. In the ambient environment, 1 OU is not typically detectable. The odour typically becomes detectable and recognisable in the ambient environment at a level of about 5 OU (Capelli, et al., 2013).

The risk assessment results for the normal operating scenario (Table B-2), indicates that there is medium risk of odour impact under normal operating conditions, with the exception of R1 where the risk is high. This is not unexpected given the results presented in Figure 8-1, which showed potential exceedances of the criterion at this location. It is likely that the remaining receptors will experience odour from time to time, however the risk is low for R3, R4 and R5 for the 99.9th percentile. As described in the NSW EPA *“Technical Notes – Assessment and management of odour from stationary sources in NSW”* (Technical Notes) (DEC NSW, 2006), these odour assessment criteria are concerned with controlling odours to ensure offensive odour impacts will be effectively managed but are not intended to ‘no odour’.

Table B-3 shows the same presentation for the worst-case scenario. As expected, the risk increases at those residences closest to the facility, but remain low (at the 99.9th percentile) for R5. As demonstrated in Section 8.1.2 (Figure 8-6), these worst case impacts can likely be managed by ensuring the windrows are turned at certain hours of the day. It should also be noted that the modelling has assumed a worst-case of windrow turning every day. Clearly this will not be the case, as the process only occurs twice per week and takes approximately 4 hours to complete. It is useful though to see that even under these conditions the risks are only high for the closest two residences, one of which is an operating dairy.

It is also helpful to put these values in context of the number of events, or hours, when these concentrations are predicted to occur. For example, for the worst case scenario at R3 (Table B-3), the model predicted:

- 9 hours in the year where the odour concentration was above 5 OU;
- 44 hours in the year above 3 OU (this is total hours and includes the 9 hours above 9 OU); and
- 175 hours in the year above 2 OU (approximately 2% of the year the odour is above 2 OU)

Noting that nearly all of these hours are before 7am or after 3pm (see Figure 8-6) then ensuring the turning times are within this period will be an important mitigation measure. Knowing that the windrows are not turned every day (as modelled) but at most twice per week, will reduce the risk rating to 'Low'.

Table B-2: Predicted odour concentrations (OU) at the three percentiles and risk impact for each sensitive receptor for normal operating scenario

Receptor number	Normal operating scenario			Risk rating
	99.9 th percentile	99.5 th percentile	98 th percentile	
R1	11	9	5	High
R2	7	5	2	Medium
R3	5	3	2	Medium
R4	3	2	2	Medium
R5	2	1	1	Medium

Table B-3: Predicted odour concentrations (OU) at the three percentiles and risk impact for each sensitive receptor for normal operating scenario

Receptor number	Worst case operating scenario (for all hours of the day)			Risk rating
	99.9 th percentile	99.5 th percentile	98 th percentile	
R1	13	10	6	High
R2	8	5	2	Medium
R3	5	4	2	Medium
R4	4	3	2	Medium
R5	2	2	1	Medium

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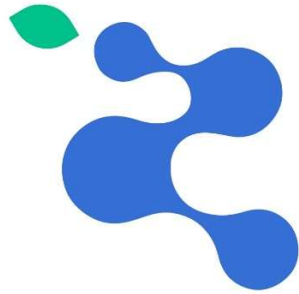
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Attachment 2

**SOILCO Wogamia Composting and
Manufacturing Facility Odour Validation
Audit**



Zephyr
Environmental

Soilco Wogamia Composting and Manufacturing Facility

Odour Validation Audit

Project number: 0369

Date: 11 June 2025



Document details

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EXECUTIVE SUMMARY

Zephyr Environmental Pty Ltd (Zephyr) was commissioned by SOILCO Pty Ltd (SOILCO) to complete an odour validation audit of SOILCO's Wogamia Facility located in West Nowra (NSW).

The audit is required as part of the facility's NSW Environment Protection Authority (EPA) Environment Protection Licence (EPL 11542), Special Condition E1, and covers composting, recourse recovery, waste processing, and waste storage activities at the site.

Special Condition E1 states the requirement for a suitably qualified independent expert, experienced in the characterisation and treatment of odours from composting operations.

The objective of this work is to complete an odour validation audit, which is intended to be submitted to the NSW EPA in accordance with EPL 11542 Special Condition E1, namely:

- Submission of an Odour Validation Audit Report to the EPA, carried out by a suitably qualified independent expert experienced in the characterisation and treatment of odours from composting operations [This document].
- Provision of a summary of any odour complaints received, and actions taken to reduce odour emissions where complaints are verified [refer Section 2].
- Completion of a field odour survey that characterises the frequency, intensity, duration, offensiveness, location and extent of off-site odours [refer Section 3].
- Benchmarking the design and management practices at the premises against industry best practice for minimising odour emissions [refer Section 4].
- Identification of additional odour mitigation measures, if required [refer Section 5].

Upon completion of the above tasks, the conclusion of this odour validation audit is that the facility is adequately managing its odour risk, and it is not considered that additional odour mitigation is warranted.

As identified during the field odour surveys, the first hours of operation represent 'high odour risk' due to the prevalence of low wind speeds, potential temperature inversions, as well as down-river air drainage flows.

The detection of 'distinct' odour at this time at locations representative of the eastern sensitive receptors further supports that particular attention to odour management is required during this time.

Current odour management includes that windrow turning schedules are adjusted during westerly wind events to reduce potential impacts on sensitive receptors.

In the event of future odour complaints from eastern sensitive receptors, the facility should consider further restriction of windrow turning hours, e.g. from 8am onwards.

1. BACKGROUND INFORMATION

1.1. INTRODUCTION

Zephyr Environmental Pty Ltd (Zephyr) was commissioned by SOILCO Pty Ltd (SOILCO) to complete an odour validation audit of SOILCO's Wogamia Composting and Manufacturing Facility located in West Nowra, NSW.

The audit is required as part of the facility's NSW Environment Protection Authority (EPA) Environment Protection Licence (EPL 11542), Special Condition E1, and covers composting, recourse recovery, waste processing, and waste storage activities at the site.

Special Condition E1 states the requirement for a suitably qualified independent expert, experienced in the characterisation and treatment of odours from composting operations.

The objective of this work is to complete an odour validation audit, which is intended to be submitted to the EPA in accordance with EPL 11542 Special Condition E1.

1.2. SPECIAL CONDITION E1

EPL 11542 Special Condition E1 is reproduced, below, along with where each requirement is addressed within this document:

E1 Odour validation audit

E1.1 Within 12 months of the commencement of expanded operations the licensee must submit an Odour Validation Audit Report to the EPA. [This document].

E1.2 The Odour Validation Audit Report must be carried out by a suitably qualified independent expert experienced in the characterisation and treatment of odours from composting operations.

E1.3 The Odour Validation Audit must include:

a) A summary of any odour complaints received, and actions taken to reduce odour emissions where complaints are verified. [refer Section 2].

b) A field odour survey that characterises the frequency, intensity, duration, offensiveness, location and extent of off-site odours. . [refer Section 3].

c) Benchmark the design and management practices at the premises against industry best practice for minimising odour emissions. . [refer Section 4].

E1.4 Using the results of E1.3a), E1.3b) and E1.3c), if it is identified that the facility requires additional odour mitigation measures the report must include:

a) Proposed mitigation works and/or management practices to ensure that odour is minimised as far as is practicable; and

b) A timetable for the implementation of these works. [refer Section 5].

1.3. FACILITY DESCRIPTION

SOILCO's Composting and Manufacturing Facility (CMF) is located at 135 Wogamia Road, Longreach, NSW in a valley along the Shoalhaven River. The CMF holds Development Consent RA20/1001 and an Environment Protection Licence (EPL 11542) issued by the NSW EPA.

The latest Modification to the facility sought to increase processing limits to allow the receipt, processing and storage of a total of 130,000 tonnes per annum (tpa) of materials, split as:

- up to 100,000 tpa of waste material such as food waste, organics, manure and biosolids
- up to 30,000 tpa of Virgin Excavated Natural Material (VENM)
- 15,000 tpa drilling mud (noting that SOILCO are currently not receiving this material). The combined total of imported VENM and drilling muds is not to exceed 30,000 tpa

The modification also sought to construct and operate new infrastructure to support the increased operations. Following approval of the CMF's latest modification, the EPA varied EPL 11542 to include Special Condition E1, as reproduced above.

The two main processing areas at the SOILCO site include aerated pads and the windrows.

The aerated static pads process up to 45,000 tpa of material which includes blends of food waste, garden waste processing is as follows:

- Food organics and garden organics (FOGO)
- Oversize material is used as biocover and placed on top of the material to reduce odour
- In any week, two bays will be filled, four bays will be turned, two bays will be taken to the product storage area
- Each bay is turned on average, every one to two weeks and covered again with biocover.

The windrows process up to 33,000 tpa of material which includes garden and wood waste, processed fibrous organics, and natural organics fibrous materials. The processing is as follows:

- Windrows are turned twice per week and the process takes about four hours to complete
- No FOGO or biosolid material is included on the windrows.

Once each of these processes is complete the composted material is moved to the manufacturing and storage area on the northern boundary of the site, to await distribution. The composted green waste material is blended with manure, as required, in the manufacturing and storage area.

The nearby sensitive receptors are shown in Figure 1.1. It is noted that the R2 belongs to the landowners of the project site and could therefore be considered to be project related. R1 is currently operated as a dairy.

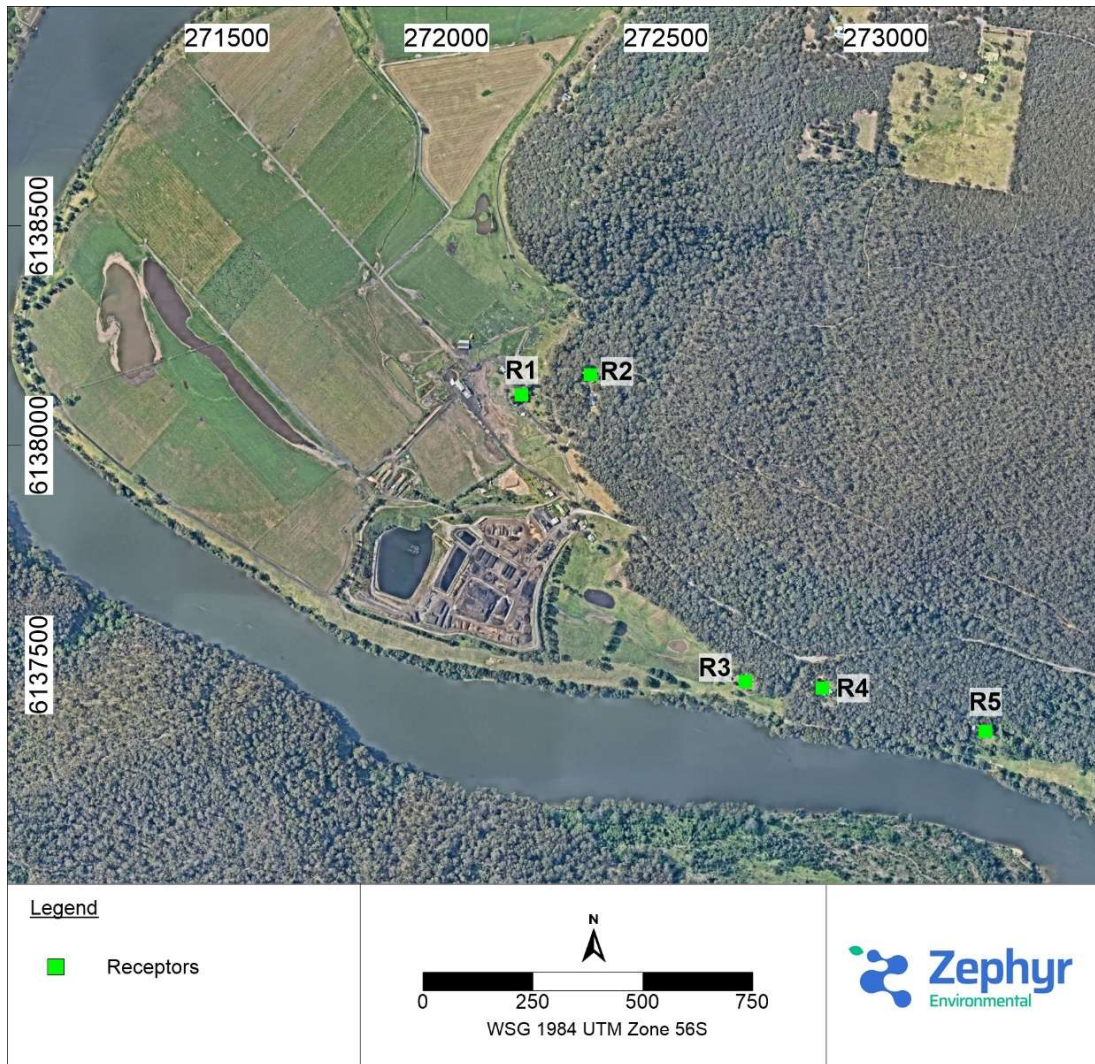


Figure 1.1: SOILCO CMF and the sensitive receptor locations

1.4. WIND DIRECTION AND SPEED

Wind roses show the frequency of occurrence of winds by direction and strength at a specific location over a defined time period. The bars correspond to the 16 compass points from a central point and the length of each bar represents the frequency of the winds from that direction.

Annual, seasonal, and time of day wind roses for the SOILCO CMF site location are presented in Figure 1-2 to Figure 1-4.

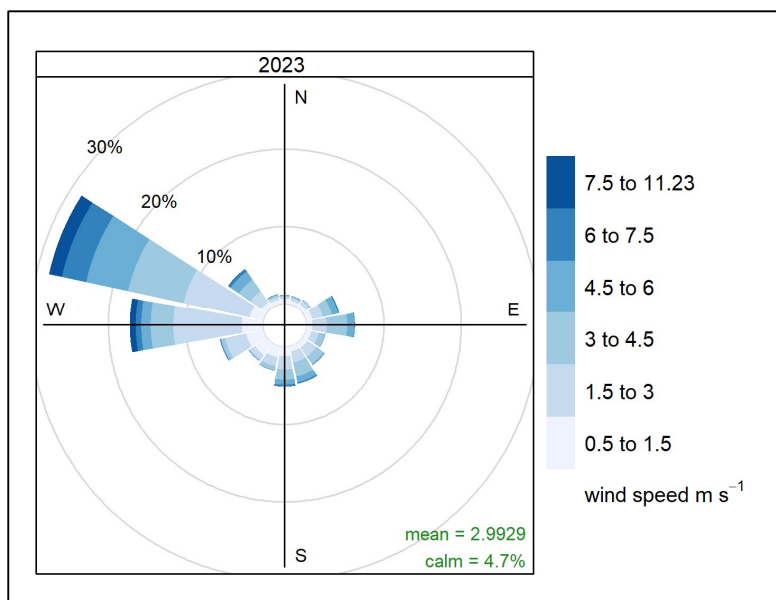


Figure 1-2: Annual wind rose for SOILCO CMF site for 2023

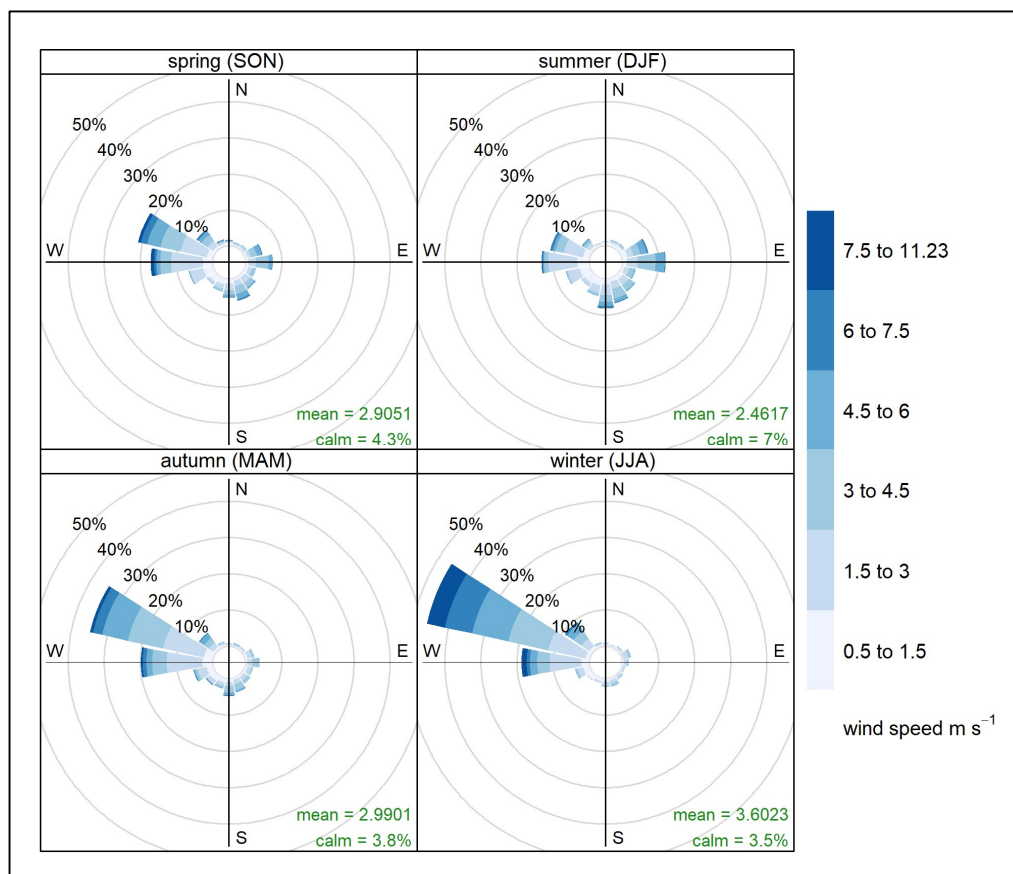


Figure 1-3: Seasonal wind rose for SOILCO CMF site for 2023

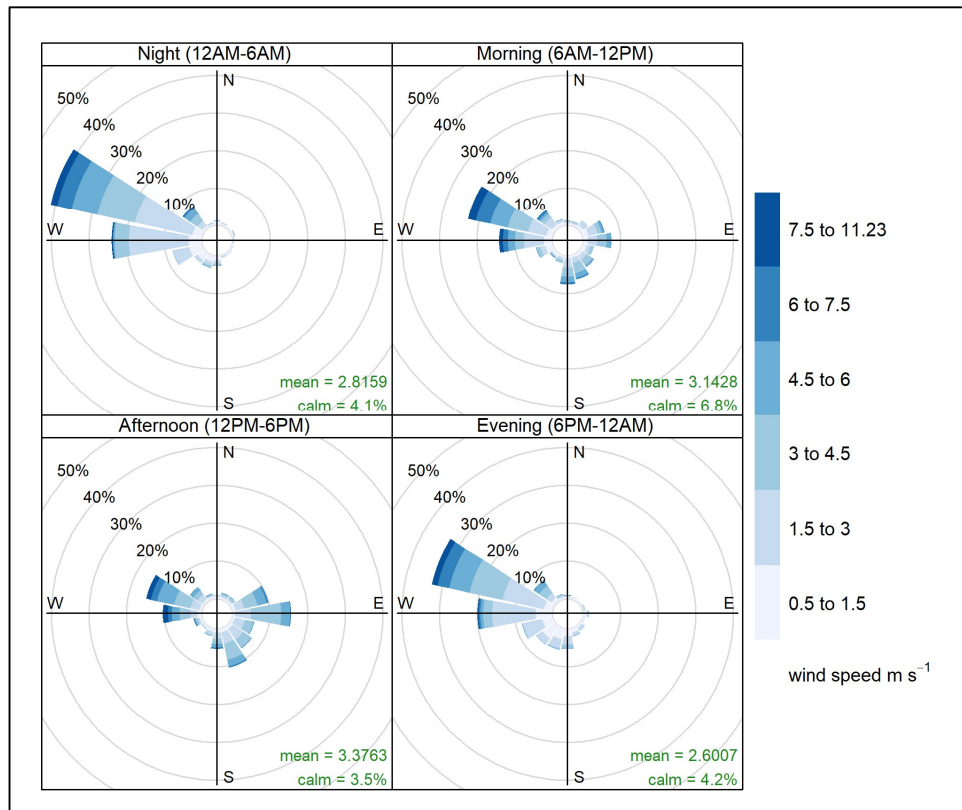


Figure 1-4: Time of day wind rose for SOILCO CMF site for 2023

Figure 1-2 to Figure 1-4 indicate that the locality is dominated by north westerly winds throughout the year, except in summer. Winds from this quadrant will carry potential odour emissions away from the nearest (non-project related) sensitive receptor, R1.

As expected, the highest wind speeds occur in the daytime (between 6 am and 6 pm) with weaker winds at night-time. These higher wind speeds will therefore occur during the facility's operational hours and will assist in increasing effective odour dispersion downwind (i.e. towards sensitive receptors R3, R4 and R5).

2. SUMMARY OF ODOUR COMPLAINTS

Odour complaint information is recorded by SOILCO and was provided to Zephyr by Patrick Gilmartin, Environmental Resources Officer, SOILCO Pty Ltd.

A summary of the odour complaints data is provided in Table 2-1.

Table 2-1: SOILCO CMF odour complaints summary

Parameter	Complaint #1	Complaint #2	Complaint #3	Complaint #4
Date	6/04/2023	7/04/2023	14/04/2023	12/05/2025
#Enquiries	1	1	1	1
Day	Thursday	Friday	Friday	Monday
Enquiry Time	Not available	Not available	Not available	9:17 am
Enquiry Location	Suppressed	Supressed	Suppressed	Longreach Road, Longreach
Site Operational	Yes	No	Not available	Yes
Type of Material Being Processed	Food and Garden Organics, Timber Waste	No material processed	Not available	Food and Garden Organics, Timber Waste
Activities Conducted	Batch soil, screening material, turning windrows, plant maintenance and yard maintenance, transporting	Not available	Food and Garden Organics, Compost, Timber Waste	Batch soil, screening material, turning windrows, plant maintenance and yard maintenance, transporting
Average Wind Speed (km/hr)	0.6	3.9	1	1.33
Dominant Wind Direction	S	W	SSW	SE
Temperature (C)	18.1	18	15.3	17.22
Rainfall (mm)	0	0	0	0

The information in Table 2-1 indicates that odour complaint frequency is low (four events recorded in the previous two years) with a single odour complaint having been recorded since the latest modification was approved (and Special Condition E1 was imposed).

SOILCO maintained in its response to the EPA that the odour complaint on the 12/05/2025 (the only recorded complaint captured by Special Condition E1) was related to an odour from a transport vehicle bringing Food Waste to its premises and was not directly attributable to the CMF operation.

3. FIELD ODOUR SURVEY

3.1. OVERVIEW

Zephyr completed field odour surveys at the boundary of the CMF and in the vicinity of off-site sensitive receptors to characterise the frequency, intensity, duration, offensiveness, location and extent of off-site odours.

Odour surveys were completed by Zephyr personnel in varying meteorological conditions and times of day.

The odour surveys were conducted in accordance with the NSW EPA's *Guide to Conducting Field Odour Surveys* (2021). This guide provides a standardised approach for assessing odour impacts in the field, to ensure odour surveys are conducted in a reliable and repeatable manner.

The 10-minute odour assessment procedure captures upwind and downwind of a suspected source, the locations where sensitive members of the community may attend or reside, and the odour intensity and character. The odour intensity scale for the 10-minute assessments is provided in Table 3-1.

Table 3-1: Odour intensity scale detailed in NSW EPA's Guide to Conducting Field Odour Surveys (2021)

Perceived odour strength	Intensity level rating	Interpretation
Extremely strong	6	Extremely strong odour detectable. For an offensive type of odour, the reaction would be to immediately mitigate until the exposure level is reduced. The odour generally cannot be tolerated.
Very strong	5	The odour character is clearly recognisable. For an offensive type of odour, exposure to this level is considered unpleasant/undesirable to the point that action to mitigate against further exposure is considered or taken.
Strong	4	The odour character is clearly recognisable. For an offensive type of odour, exposure to this level would be considered unpleasant/undesirable.
Distinct	3	The odour character is clearly recognisable. Note that this must still apply even if in a different context or situation – for example, not knowing or expecting what type of odour may be present. The odour is tolerable – even for an offensive odour.
Weak	2	The assessor is reasonably sure that odour is present but not 100% sure of the odour character.
Very weak	1	The odour character is not recognisable. There is probably some doubt whether the odour is actually present.
Not detectable	0	No odour present.

In addition to making intensity observations, the observer also notes the character of the odour or odours observed, if that can be determined. Generally, the observations are focussed on the targeted odour. If other relevant odours or background odours are present in significant intensities this is also noted and recorded as appropriate.

The observer also notes that the general meteorological conditions at the beginning and end of the 10-minute period. These observations include descriptors of wind strength, cloud cover and precipitation.

Zephyr conducted odour surveys using two observers between 20 and 21 May 2025, as detailed in Table 3-2, to determine the presence and intensity of any odours in the surrounding area of the CMF.

Figure 3-1 shows the locations of the various survey locations in relation to the CMF. Further information related to the odour surveys can be found in the Odour Survey Report (Appendix A).

Table 3-2: The date and time of the odour surveys conducted around the SOILCO CMF

Survey campaign	Date	Campaign start time	Number of 10-minute observations
1	20.05.2025	13:00	12
2	20.05.2025	17:30	12
3	21.05.2025	07:00	16

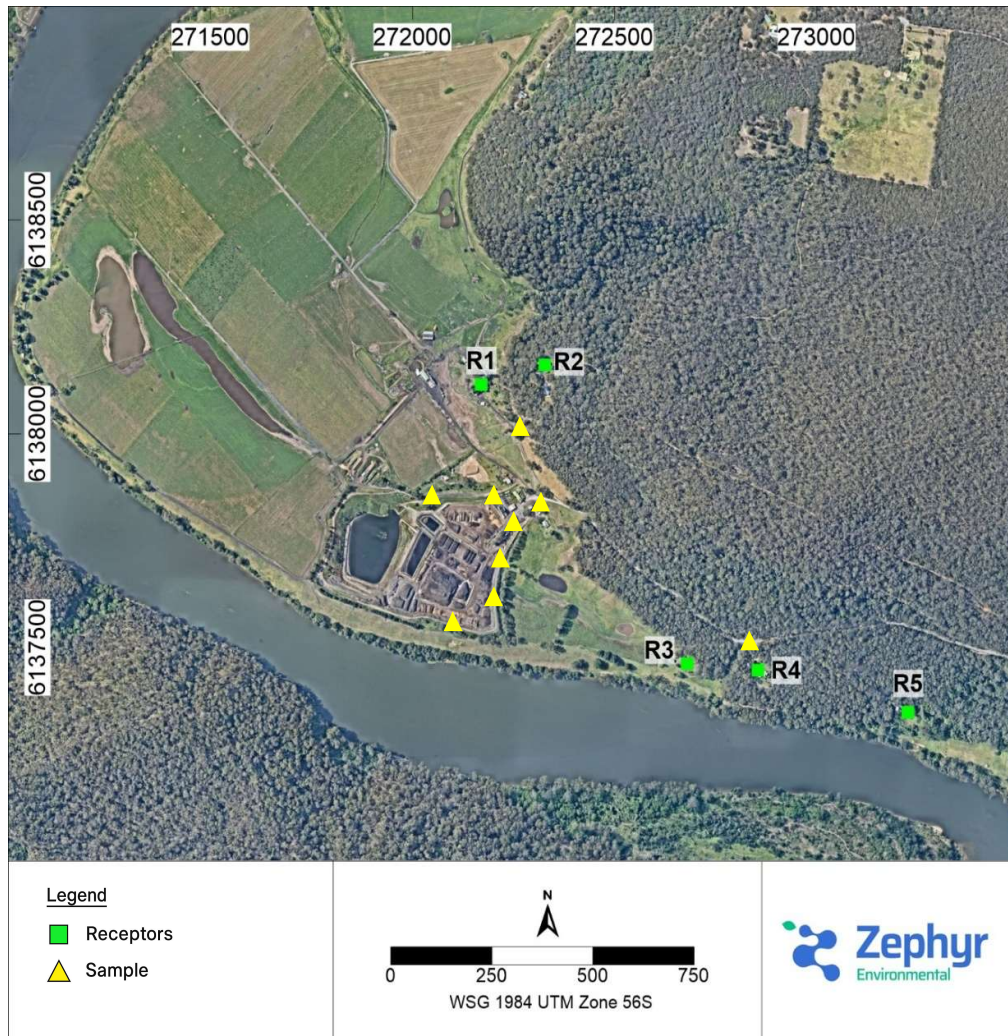


Figure 3-1: Location of odour surveys in relation to the CMF and sensitive receptors

3.2. ODOUR SURVEY RESULTS

A total of 40 x 10-minute odour surveys were completed between 20 and 21 May 2025, across nine locations within the vicinity of the CMF, including locations within the facility boundary. The winds on 20 May were predominantly from the west or west-southwest, whilst on 21 May the predominant wind direction was from the south or southwest. All wind speeds observed were light.

The character of an odours detected ranged from “cattle”, “rotting garbage”, and “garden organics” as a function of location, wind direction, and time of day. The full results for each of the odour surveys conducted in May 2025 can be found in the Odour Survey Report (Appendix A).

Figure 3-2 shows the results from odour survey campaign 3, which is highlighted as it shows the maximum observed odour intensities at locations representative of (non-project related) off-site sensitive receptors.

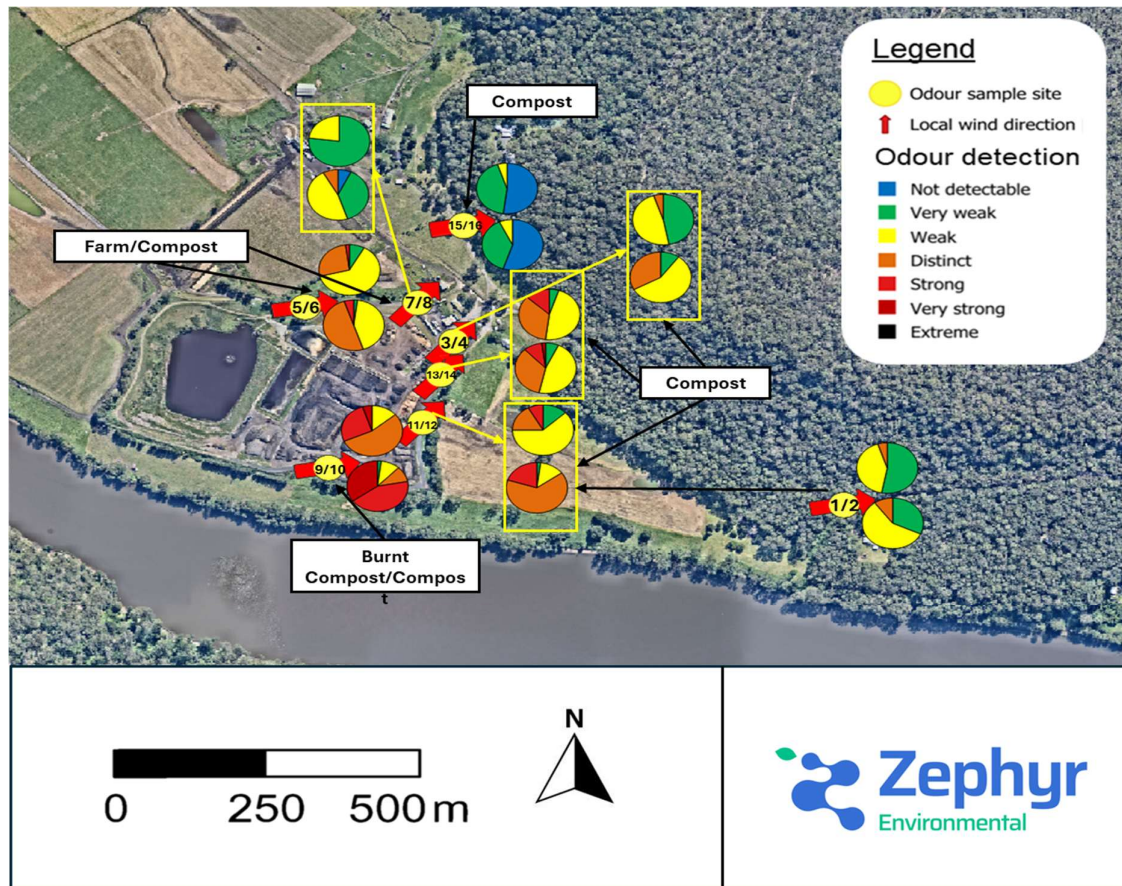


Figure 3-2: Odour Survey Campaign 3- locations and proportions of odour detection

Figure 3-2 shows that during Observations 1 and 2, representative of sensitive receptor R4, up to 1-minute of the 10-minute survey period, a “distinct” odour of “compost” was observed.

The odour observation start time (07.00) for Odour Survey Campaign 3 was specifically targetted as being ‘high odour risk’ due to the prevalence of low wind speeds, potential temperature inversions, and commencement of facility operations. The detection of ‘distinct’ odour is thus not a determination of offensive odour beyond the site boundary, but rather this time of day is flagged for particular attention during the ongoing odour management at the facility.

4. BENCHMARKING DESIGN AND MANAGEMENT PRACTICES

A review of the design and management practices at the site was undertaken with a focus on odour control. This included on-site observation, interviews with key personnel, and evaluation of the site's odour management practices against industry best practice. A photo log of activities completed during the site inspection is provided in Appendix B.

Table 4-1 provides a summary of the facility's design and management practices at the premises against benchmarked against industry best practice for minimising odour emissions.

Table 4-1: Industry best practice odour control benchmarking

Best practice measure	Conducted at the facility?	Commentary
Immediate processing of organic materials	Yes	Minimising the time the organic waste is stored before processing reduces the risk of off-site odour impact.
Aerated pads	Yes	Aerated pads maintain aerated conditions and thus reduce odour emissions
Aerated static piles	Yes	Aerated windrows maintain aerated conditions and thus reduce odour emissions
Use of biocovers	Yes	The use of a biocover actively reduces odour emissions at source.
Restricted hours - windrow turning	Yes	Turning of windrows is one of the most prominent odour sources. Restrict turning windrows between the hours of 7 am and 3 pm reduces the risk of off-site impacts.
Leachate pond monitoring	Yes	The leachate ponds are one of the most prominent odour sources. It is also important to continue to monitor the leachate ponds to ensure these are aerated to operate effectively.
Inspection of feedstock upon arrival	Yes	low-quality materials are flagged via site reporting procedures.
In-house odour survey	Yes	Odour monitoring is conducted weekly on and off site, with inspections increased in response to complaints.
Community engagement	Yes	Ongoing engagement with surrounding landholders is used to promote transparency and supports early issue resolution.
Minimising storage time	Yes	Long storage periods increase the risk of anaerobic conditions that can lead to odours.
Enclosure of potentially odorous activities	No	Current odour mitigation is deemed to be adequate in mitigating off-site odour risks. Enclosure of a pre-existing facility is generally prohibitively expensive.
Use of biofilter	No	A biofilter is only effective where potentially odorous activities are contained (i.e. within an enclosure – refer comments above).

5. ODOUR MITIGATION

5.1. CURRENT ODOUR MITIGATION

The benchmarking exercise completed in Section 4 provides commentary on some of the odour mitigation activities currently completed at the facility. A summary of the current odour management context and mitigation is additionally provided below.

5.2. POTENTIAL IMPACTS

The generation of nuisance odours and vapours during the operation of the SoilCo Wogamia facility has the potential to impact nearby sensitive receptors, including residential properties and commercial establishments. Such impacts may arise from various stages of the composting process, including feedstock receipt, material processing, windrow turning, and leachate pond management.

5.3. PERFORMANCE CRITERIA

Odour management performance is governed by the EPL, relevant development approvals, and the Site-Specific Management Plan (SSMP). These documents establish measurable expectations for odour control, including the requirement that no offensive odours are to be detected beyond the premises. In the event that offensive odours are reported, the facility is required to investigate and submit a written report to the NSW EPA.

5.4. MANAGEMENT STRATEGIES

The facility operates under a SSMP which outlines odour control strategies, with a clear operational objective to minimise odour emissions and prevent the generation of offensive odours beyond the site boundary.

- **Key operational and infrastructure-based odour controls**
 - **Receival Area Controls**
 - All incoming feedstock loads are inspected by a site operator to verify compliance with site requirements.
 - Unprocessed or non-size-reduced food waste is not accepted at the facility.
 - High-risk feedstocks such as food waste and biosolids are placed directly into the composting process.
 - The receival area is cleaned regularly, and litter patrols are routinely undertaken.
 - **Aerated Pads**
 - The Aerated Pads system is a central odour mitigation strategy at the site, allowing controlled aerobic composting conditions.
 - Regular inspection and maintenance of aeration ductwork to ensure airflow is efficient and clear of any obstruction.
 - All highly putrescible material (food waste and biosolids) is to be composted on the aerated pads.
 - This is considered industry best practice, and on-site measurements have demonstrated the significant odour reductions that are achieved using this method.
 - **Windrow Management**
 - Windrow turning is restricted to between 7am and 3pm.
 - Windrows are turned bi-weekly, and moisture levels are managed to maintain aerobic conditions.

- Turning schedules are adjusted during westerly wind events to reduce potential impacts on sensitive receptors.
- Compost Stockpiles
 - Finished compost is stored in discrete piles with wind management controls such as water sprays and tarpaulin covering to further ensure material is not blown from stockpiles.
 - All transport vehicles carrying compost product are required to remain covered.
- Leachate Management
 - Leachate ponds are aerated as deemed practicable.
 - The surface area of stored leachate is minimised through re-use, and draining the leachate ponds to the existing leachate ponds during normal operating and climatic conditions
- General Controls and Monitoring
 - Anaerobic conditions are avoided through proper site grading and water management infrastructure (carbon amendment may be added).
 - Weekly inspections are conducted to monitor odour sources on and off-site.
 - Pond levels are managed to prevent anaerobic conditions and off-site odour risk.
 - Voluntary Environmental Audits are conducted by site staff regularly to monitor for odour. These are then recorded in SOILCO's QSE register (*REG015*)

5.5. ADDITIONAL ODOUR MITIGATION

In view of the field odour surveys documented in Section 3, the industry benchmarking completed in Section 4, and commentary on current odour mitigation, it is not considered that additional odour mitigation is warranted.

6. CONCLUSIONS

Zephyr Environmental Pty Ltd (Zephyr) was commissioned by SOILCO Pty Ltd (SOILCO) to complete an odour validation audit of SOILCO's Wogamia Facility located in West Nowra, NSW.

The audit is required as part of the facility's NSW Environment Protection Authority (EPA) Environment Protection Licence (EPL 11542), Special Condition E1, and covers composting, recourse recovery, waste processing, and waste storage activities at the site.

Special Condition E1 states the requirement for a suitably qualified independent expert, experienced in the characterisation and treatment of odours from composting operations.

The objective of this work is to complete an odour validation audit, which is intended to be submitted to the EPA in accordance with EPL 11542 Special Condition E1, namely:

- Submission of an Odour Validation Audit Report to the EPA, carried out by a suitably qualified independent expert experienced in the characterisation and treatment of odours from composting operations [This document].
- Provision of a summary of any odour complaints received, and actions taken to reduce odour emissions where complaints are verified [refer Section 2].
- Completion of a field odour survey that characterises the frequency, intensity, duration, offensiveness, location and extent of off-site odours [refer Section 3].
- Benchmarking the design and management practices at the premises against industry best practice for minimising odour emissions [refer Section 4].
- Identification of additional odour mitigation measures, if required [refer Section 5].

Upon completion of the above tasks, the conclusion of this odour validation audit is that the facility is adequately managing its odour risk and it is not considered that additional odour mitigation is warranted.

As identified during the field odour surveys, the first hours of operation represent 'high odour risk' due to the prevalence of low wind speeds, potential temperature inversions, as well as down-river air drainage flows.

The detection of 'distinct' odour at this time at locations representative of the eastern sensitive receptors further supports that particular attention to odour management is required during this time.

Current odour management includes that windrow turning schedules are adjusted during westerly wind events to reduce potential impacts on sensitive receptors.

In the event of future odour complaints from eastern sensitive receptors, the facility should consider further restriction of windrow turning hours, e.g. from 8 am onwards.

7. REFERENCES

NSW EPA (New South Wales Environmental Protection Authority) (2021), Guide to conducting field odour surveys.

APPENDIX A – ODOUR SURVEY REPORT

To:	Dave Schumacher / Michelle Villegas
Client	SOILCO Odour Validation Audit
From:	Zephyr Environmental
Date:	28 May 2025
Subject:	Odour survey report
Purpose:	Wogamia Odour Validation Audit

Background and context

Zephyr Environmental (Zephyr) was commissioned by SOILCO to conduct odour surveys for the odour assessment of SOILCO's Wogamia Facility located in West Nowra (NSW). The audit is required as part of the facility's Environmental Protection Agency (EPA) licence (11542), Special Condition E1, and covers composting, recourse recovery, waste processing, and waste storage activities at the site. The Condition states the requirement for a suitably qualified independent expert, experienced in the characterisation and treatment of odours from composting operations. The objective of this work is to complete an odour validation audit, which is intended to be submitted to the EPA in accordance with Special Condition E1, of SOILCO's EPA EPL.

The SoilCo Wogamia facility is located in a semi-rural area and operates as an organics processing and composting facility. At the time of the site assessment, key activities observed at the premises included:

- Delivery of organic feedstock by commercial transport vehicles
- Acceptance of food organics and garden organics (FOGO) for immediate processing
- Operation of aerated static piles and open windrows for composting
- Screening and handling of mature compost for reuse as a soil amendment
- Management and aeration of leachate ponds
- Routine inspection, monitoring, and maintenance activities carried out by on-site staff

These activities are consistent with the facility's approved operations and odour management plan.

Odour survey methodology

The odour surveys were conducted in accordance with the NSW EPA's *Guide to Conducting Field Odour Surveys* (2021). The guide provides a standardised approach for assessing odour impacts in the field, to ensure odour surveys are conducted in a reliable and repeatable manner.

The three survey campaigns were completed between 20 and 21 May 2025. Two surveys were carried out on the 20 May, and one on the 21 May, as detailed in Table A-1.

Table A-1: Date and time of the odour surveys campaigns conducted around the CMF

Campaign No.	Date	Time of day	Number of samples
1	20.05.2025	13:00	12
2	20.05.2025	17:30	12
3	21.05.2025	07:00	16

Results of field surveys

The results of the odour survey campaigns completed between 20 – 21 May 2025 are presented in Figure A-1 to A-3 below. The arrows depict the direction the wind is flowing towards. For example, a westerly wind flows from west to east, and therefore the arrows would point to the east in this scenario. Surveys were taken downwind and upwind of the GWMC.

Survey Campaign 1 consisted of 12 surveys taken between 1:01 pm and 2:22 pm, under low wind speeds (1.0 – 3.0 m/s) predominantly from the west or west-southwest direction, as shown in Figure A-1. Survey Campaign 1 was also conducted with moderate cloud cover or light precipitation.

There were weak to strong odours detected immediately West of the CMF (surveys 3, 4). The odours were associated with Farm from the adjacent cattle farm. Surveys 1, 2, 3 and 4 pertained to predominantly very weak to weak detections along with instances of distinct animal related odour. No Soilco related odour was detected for these samples. Samples 5, 6, 7, and 8 remained relatively odorless – very weak with minimal weak detections of compost. Samples 9 and 10 both recorded distinct odour early within the survey and became non-detectable by the later stages. Samples 11 and 12 both pertained to predominantly non detectable to very weak odours, with weak and distinct detections also recorded. A strong detection associated with compost was detected near the end of the survey, however it was noted this was due to a composted loaded truck driving past. Samples 5-12 all contained only compost related odour characters.

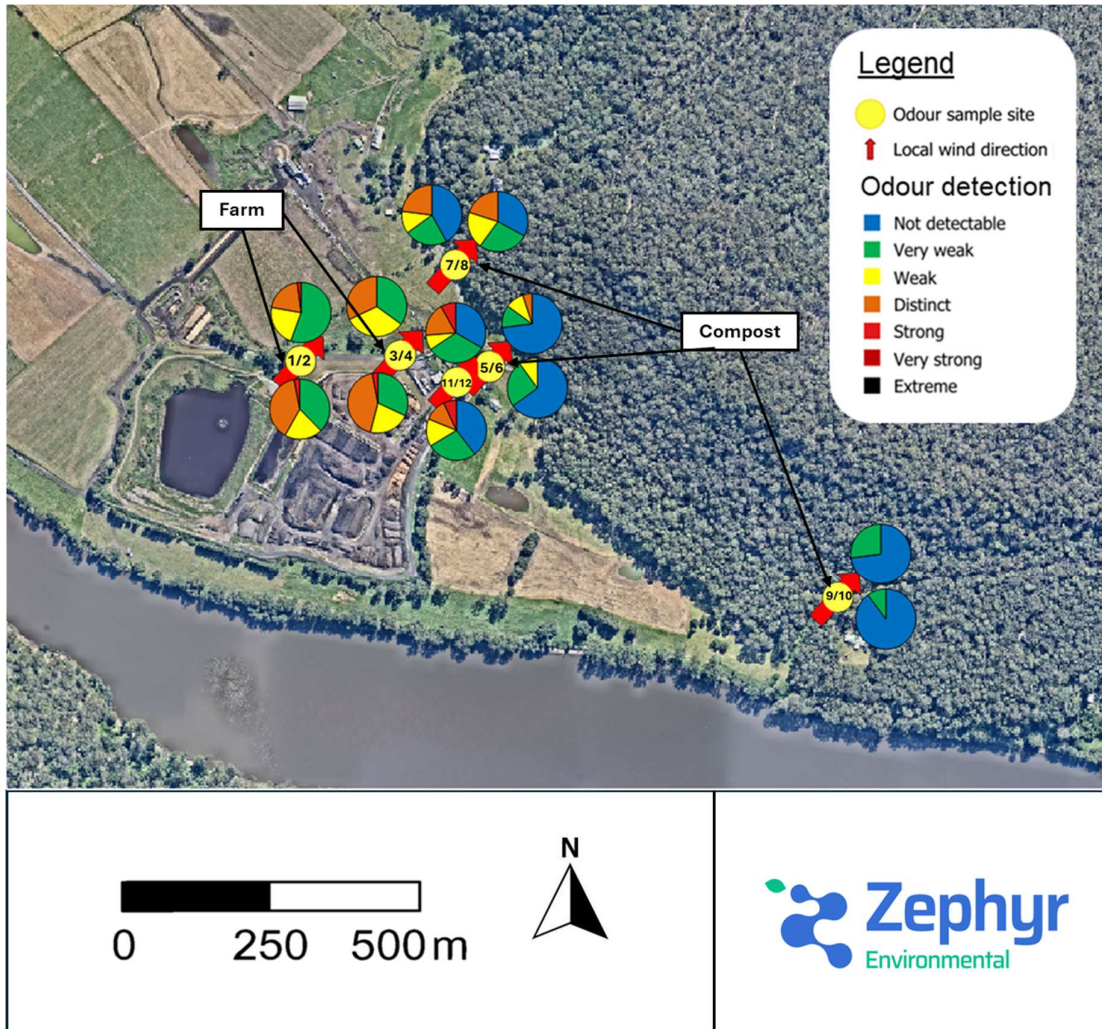


Figure A-1: Field odour survey locations (survey 1), odours detected and wind direction

Survey Campaign 2 consisted of 12 surveys taken between 05:25 pm and 06:36 pm, under calm to low wind conditions (0.7 – 1.5 m/s) predominantly from the Northwest, as shown in Figure A-2. Survey Campaign 2 was also conducted with moderate to heavy cloud cover and occasional light precipitation.

Surveys 5, 7, 8, 9 and 10 contained non-detectable to very weak odour, with sample 6 containing similar results with 1 minute of a weak compost associated odor being detected. Samples 1, 2, 3, and 4 contained mostly weak to distinct odour, with some strong odour detections present in samples 3 and 4. All noted odors were related to farm processes, it was noted that numerous cows were grazing within 5-10m of these samples. Samples 11 and 12 (near both receptors 3 and 4) contained mostly very weak to weak odors, with 20 seconds of a distinct odor being detected in sample 12. All odor in samples 11 and 12 were related to compost.

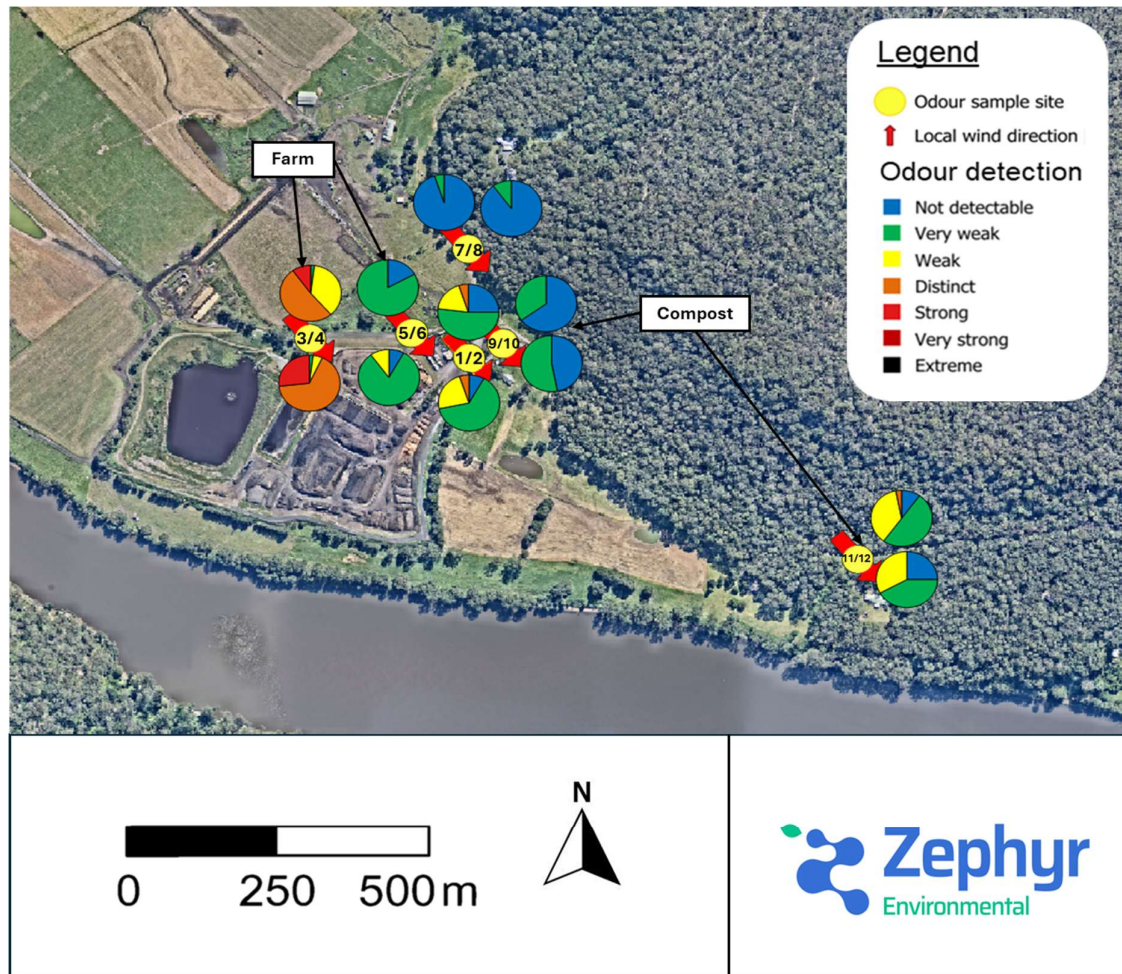


Figure A-2: Field odour survey locations (survey 2), odours detected and wind direction

Survey Campaign 3 consisted of 16 surveys taken between 07:07 am and 08:52 am, under calm wind to light wind conditions (0.3 to 2.4 m/s) predominantly from the west - southwest, as shown in Figure A-3.

Very weak to distinct compost-related odours were detected in samples 1 and 2 located west of the facility close to receptors 3 and 4. Samples 3 and 4 contained weak to distinct odor related to compost, with samples 7 and 8 containing similar results related to animal odours. Samples 5, and 6 contained similar results with small period of a strong odor identified as a mix of animal and compost. Samples 9, 10, 11, 12, 13, and 14 conducted within the site boundary contained a range of compost related odour with prolonged periods of strong detections. In this time it was noted a “hot spot” was blowing towards the sample area. Samples 9 and 10 on the south side of the facility recorded periods of a very strong odours associated with burning compost. Samples 15 and 16 remained within very weak to weak detection relating to compost, with small periods of weak odour.

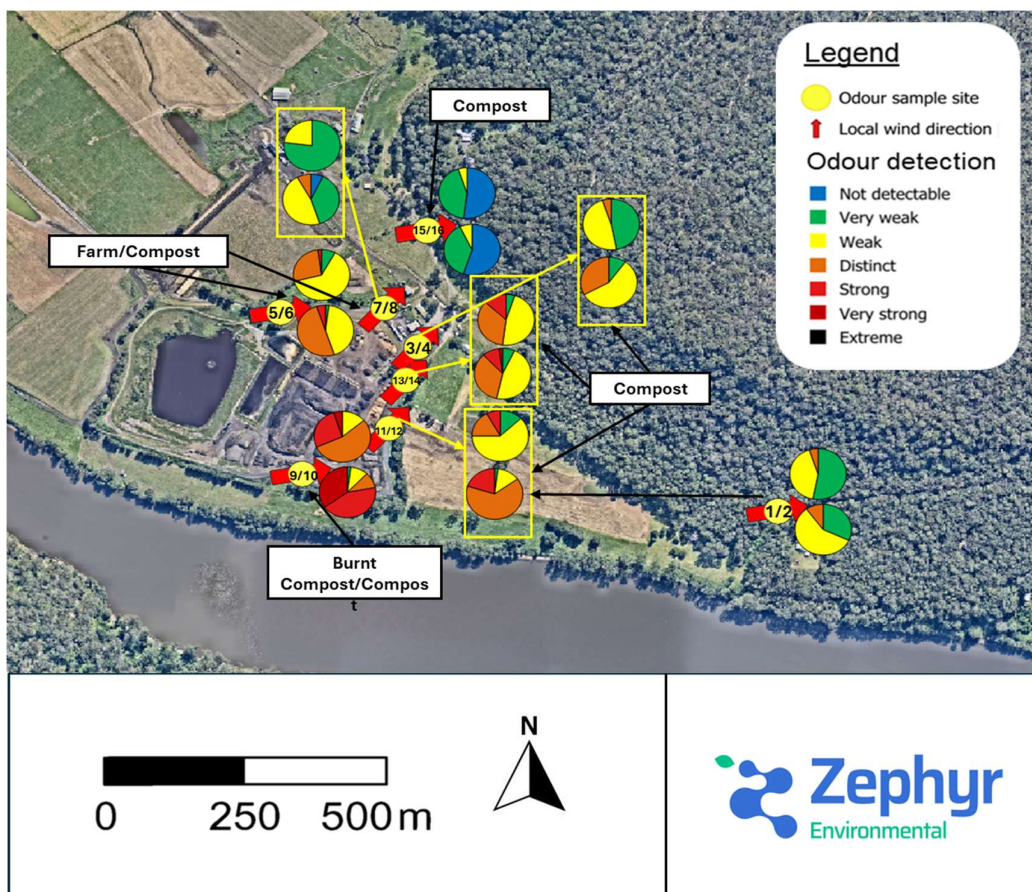


Figure A-3: Field odour survey locations (survey 3), odours detected and wind direction

APPENDIX B – SITE VISIT PHOTO LOG



Figure B-1: Leachate ponds at SOILCO Wogamia



Figure B-2: Windrow at SOILCO Wogamia



Figure B-3: Truck unloading at SOILCO Wogamia

Attachment 3

Evan Smith - odour accreditation



THE ODOUR
UNIT *m³*

CERTIFICATE OF QUALIFICATION ODOUR ASSESSOR

This certificate is awarded to

Evan Smith

has successfully qualified as an odour assessor under the Australian Standard AS/NZS 4323.3 criteria.

n-butanol threshold criteria (ppb): $20 \leq \chi \leq 80$
Assessor mean threshold (ppb): **44.9**

Standard deviation criteria: $10^{\text{sr}} < 2.3$
Assessor standard deviation: **1.61**

The Odour Unit (Qld) Pty Ltd

Melissa Gilbert
Laboratory Co-ordinator

17 July 2025

Date