Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014

The Ocean2Earth compost order June 2021

Introduction

This order, issued by the Environment Protection Authority (EPA) under clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 (Waste Regulation), imposes the requirements that must be met by suppliers of Ocean2Earth compost to which '*The Ocean2Earth compost exemption June 2021*' applies. The requirements in this order apply in relation to the supply of Ocean2Earth compost for application to land as a soil amendment.

1. Waste to which this order applies

1.1. This order applies to Ocean2Earth compost. In this order, Ocean2Earth compost means compost made from marine waste and pine bark mulch that has undergone composting by Ocean2Earth Pty Ltd at the Bega Valley Shire Council Merimbula Waste Depot, Sapphire Coast Drive, Merimbula NSW 2548 (Environment Protection Licence number 6044). Ocean2Earth compost may also be blended with composted pine bark to create potting mix by Corkhill Bros Sales Pty Ltd at Mugga Lane Resource Management Centre, Mugga Lane, Symonston, ACT.

2. Persons to whom this order applies

2.1. The requirements in this order apply, as relevant, to any person who supplies Ocean2Earth compost that has been generated, processed or recovered by the person.

2.2. This order does not apply to the supply of Ocean2Earth compost to a consumer for land application at a premises for which the consumer holds a licence under the *Protection of the Environment Operations Act 1997* (POEO Act) that authorises the carrying out of the scheduled activities on the premises under clause 39 'waste disposal (application to land)' or clause 40 'waste disposal (thermal treatment)' of Schedule 1 of the POEO Act.

3. Duration

3.1. This order commences on 11 June 2021 and is valid until 11 June 2023 or until revoked by the EPA by notice in writing at an earlier date.

4. Generator requirements

The EPA imposes the following requirements on Ocean2Earth Pty Ltd who generates and supplies Ocean2Earth compost.

General conditions

4.1. The generator must undertake the process of composting for Ocean2Earth compost supplied under this order.

4.2. The generator must construct Ocean2Earth compost batches with a minimum volume of 150m^3 and a maximum volume of 180m^3.

4.3. The generator must screen the Ocean2Earth compost to <40mm to remove any oversized materials, after composting has completed.

4.4. The generator must ensure that the Ocean2Earth compost does not contain asbestos, engineered wood products and preservative treated or coated wood residues.

4.5. The generator must not mechanically size-reduce the Ocean2Earth compost through methods such as hammer milling, crushing or grinding:

4.5.1. prior to obtaining the results from the collection and testing of samples and;

4.5.2. where the testing of samples return concentrations of 'glass, metal and rigid plastics >2mm' and 'plastics – light flexible or film >5mm' above the absolute maximum concentrations set in Table 1.

4.6. The generator must ensure that the Ocean2Earth compost is ready for land application prior to transport to a consumer.

Sampling requirements

4.7. On or before supplying Ocean2Earth compost, the generator must follow the written sampling plan entitled: Sampling Analysis Quality Plan (SAQP) for characterisation of Marine Waste Compost for Reuse, JN19244_SAQP_O2E_Compost_FINAL DRAFT_v7, Elgin Associates Pty Ltd, 20 June 2021 (Elgin 2021). This document can be found as **Attachment 1** to this order.

4.8. The generator must undertake representative sampling and testing for each batch of Ocean2Earth compost as required under clauses 4.9 to 4.14 below. The sampling must be carried out in accordance with the written sampling plan.

4.9. The generator must undertake representative sampling of Ocean2Earth compost by collecting the number of discrete and composite samples in Column 2 of Table 1 and testing each sample for the corresponding attributes listed in Column 1 of Table 1.

4.10. The generator must store Ocean2Earth compost appropriately until the representative sampling results are validated as compliant with the absolute maximum concentration set out in Column 3 of Table 1.

Chemical and other material requirements

4.11. The generator must not supply Ocean2Earth compost to any person if, in relation to any of the attributes listed in Column 1 of Table 1 of Ocean2Earth compost the attribute concentration of any representative sample exceeds the absolute maximum concentration or other value listed in Column 3 of Table 1.

4.12. The absolute maximum concentration in any Ocean2Earth compost supplied under this order must not exceed the absolute maximum concentration or other value listed in Column 3 of Table 1.

Table 1

Column 1	Column 2	Column 3
Attributes	**Minimum number of samples per batch**	**Absolute maximum concentration** (mg/kg 'dry weight' unless otherwise specified)
1. Cadmium	2 composite samples	1
2. Lead		75
3. Arsenic		10
4. Chromium (total)		50
5. Copper		75
6. Nickel		30
7. Zinc		150
8. Individual organochlorine pesticides (OCPs)		Not applicable [1]
9. Individual polychlorinated biphenyls (PCBs)		Not applicable [1]
10. Mercury	4 composite samples	1
11. pH		5.0 – 8.0
12. Electrical Conductivity		4 dS/m
13. Glass, metal and rigid plastics >2 mm		0.5%
14. Plastics – light, flexible or film >5 mm		0.05%
15. *Salmonella spp.*	8 discrete samples	Absent in 50g [2]
16. *Escherichia Coli (E. Coli)*		<100 MPN/g [3]
17. *Thermotolerant Coliforms*		<1000 MPN/g [3]
18. *Vibrio parahaemolyticus*		Absent in 50g
19. *Bacillus cereus*		<100 CFU/g [4]
20. *Clostridium perfringens*		Not applicable [1]

Notes

[1] While an absolute maximum concentration limit is not included for attribute 8, 9 and 20, it must be tested for in each sample and records kept of the results.

[2] 50g laboratory subsample collected from the grab sample that is submitted for microbiology analysis, as per AS5013.10-2009.

[3] MPN = most probable number

[4] CFU = colony forming units

Test methods

4.13. The generator must ensure that any testing of samples required by this order is undertaken by analytical laboratories accredited by the National Association of Testing Authorities (NATA), or equivalent.

4.14. The generator must ensure that the attributes (listed in Column 1 of Table 1) in the Ocean2Earth compost it supplies are tested in accordance with the test methods specified below or other equivalent analytical methods. Where an equivalent analytical method is used the detection limit must be equal to or less than that nominated for the given method below:

4.14.1. Test methods for measuring parameters 1 – 7 of Table 1:

4.14.1.1. Sample preparation by digestion using USEPA SW-846 Method 3051A Microwave assisted acid digestion of sediments, sludges, soils, and oils (or an equivalent analytical method).

4.14.1.2. Analysis using USEPA SW-846 Method 6010C Inductively coupled plasma - atomic emission spectrometry, or an equivalent analytical method with a detection limit <10% of the stated absolute maximum concentration in Table 1, Column 2 (i.e. <0.1 mg/kg dry weight for cadmium).

4.14.1.3. Report as mg/kg dry weight.

4.14.2. Test method for measuring individual organochlorine pesticides:

4.14.2.1. Analysis using USEPA SW-846 Method 8081B Organochlorine pesticides by gas chromatography, or an equivalent analytical method.

4.14.2.2. Individual organochlorine pesticide analysis must include Aldrin, Dieldrin, Dichlorodiphenyltrichloroethane (DDT), Chlordane, Endrin, Heptachlor and Hexachlorobenzene (HCB).

4.14.2.3. Report as mg/kg dry weight.

4.14.3. Test method for measuring individual polychlorinated biphenyls:

4.14.3.1. Analysis using USEPA SW-846 Method 8082A Polychlorinated Biphenyls (PCBs) by gas chromatography (or an equivalent analytical method).

4.14.3.2. Measure the following individual PCBs: Aroclor 1016 (CAS Registry No. 12674-11-2), Aroclor 1221 (CAS Registry No. 11104-28-2), Aroclor 1232 (CAS Registry No. 11141-16-5), Aroclor 1242 (CAS Registry No. 53469-21-9), Aroclor 1248 (CAS Registry No. 12672-29-6), Aroclor 1254 (CAS Registry No. 11097-69- 1), Aroclor 1260 (CAS Registry No. 11096-82-5).

4.14.3.3. Report individual listed PCBs as mg/kg dry weight.

4.14.4. Test method for measuring the mercury concentration:

4.14.4.1. Analysis using USEPA SW-846 Method 7471B Mercury in solid or semisolid waste (manual cold vapour technique), or an equivalent analytical method with a detection limit <20% of the stated absolute maximum concentration in Table 1, Column 2 (i.e. <0.2 mg/kg dry weight).

4.14.4.2. Report as mg/kg dry weight.

4.14.5. Test method for measuring pH:

4.14.5.1. Prepare sample by mixing one part of Ocean2Earth compost with 5 parts of water using analysis method 4A1 pH of 1:5 soil/water suspension from SOIL CHEMICAL METHODS – Australasia, Rayment and Lyons 2011, or an equivalent analytical method.

4.14.5.2. Report as pH on an air-dry basis.

4.14.6. Test method for measuring electrical conductivity:

4.14.6.1. Analysis using Method 3A1 Electrical Conductivity (EC) from SOIL CHEMICAL METHODS – Australasia, Rayment and Lyons 2011, using a 1:5 Ocean2Earth compost:water extract.

4.14.6.2. Report deciSiemens per metre (dS/m) on an air-dry basis.

4.14.7. Test method for measuring physical contaminants 13 and 14:

4.14.7.1. Australian Standard AS4454-2012 Composts, soil conditioners and mulches, "Appendix I - Method For Determination Of Moisture Content And Level Of Visible Contamination". This test must be conducted under bright and direct light.

4.14.7.2. Results must be reported as % contamination dry weight.

4.14.8. Test method for measuring *Salmonella spp*:

4.14.8.1. Australian Standard AS5013.10-2009 Food microbiology - Microbiology of food and animal feeding stuffs - Horizontal method for the detection of Salmonella spp., or an equivalent analytical method.

4.14.8.2. Report as absent or present in 50 grams.

4.14.9. Test method for measuring *Escherichia coli*:

4.14.9.1. Australian Standard AS5013.15-2006 Food microbiology - Microbiology of food and animal feeding stuffs - Horizontal method for the detection and enumeration of presumptive Escherichia coli - Most probable number (MPN) technique, or an equivalent analytical method.

4.14.9.2. Report as MPN / g.

4.14.10. Test method for measuring *Vibrio parahaemolyticus*:

4.14.10.1. Australian Standard AS 5013.18-2010 Food microbiology - Method 18: Examination for specific organisms - Vibrio parahaemolyticus, or an equivalent analytical method.

4.14.10.2. Report as absent or present in 50g.

4.14.11. Test method for measuring *Bacillus cereus*:

4.14.11.1. Australian Standard AS 5013.2-2007 Food microbiology - Microbiology of food and animal feeding stuffs - Horizontal method for the enumeration of Bacillus cereus - Colony-count technique at 30C - colony forming units (CFU) technique, or an equivalent analytical method.

4.14.11.2. Report as CFU / g.

4.14.12. Test method for measuring *Clostridium perfringens*:

4.14.12.1. Australian Standard AS 5013.16-2006 Food microbiology – Microbiology of food and animal feeding stuffs - Horizontal method for the enumeration of Clostridium perfringens — Colony-count technique – colony forming units (CFU) technique, or an equivalent analytical method.

4.14.12.2. Report as CFU / g.

Reprocessing, segregating and disposing of Ocean2Earth compost

4.15. If the test results of Ocean2Earth compost do not meet the absolute maximum

concentrations set in Table 1 for microbiological parameters (attributes 15 to 19), the generator must either:

4.15.1. dispose of the Ocean2Earth compost at a facility that can lawfully receive it, or

4.15.2. reprocess the Ocean2Earth compost by subjecting the Ocean2Earth compost to additional pasteurisation stage/s, where the internal temperature of the whole mass reaches a minimum of 55°C for 3 consecutive days per stage. The generator must then resample by collecting a further 8 discrete samples from the entire batch and test the samples for attributes 15 to 20 listed in Table 1. The generator may only supply the reprocessed Ocean2Earth compost if all eight samples meet the absolute maximum concentrations for attributes 15 to 19 set in Table 1.

4.16. The generator must not segregate any Ocean2Earth compost if the absolute maximum concentration set in Table 1 is not met for any microbiological parameter in clause 4.15.

4.17. If the test results of Ocean2Earth compost do not meet the absolute maximum concentrations set in Table 1 for chemical or physical parameters (attributes 1 to 14), the generator must either:

4.17.1. dispose of the Ocean2Earth compost at a facility that can lawfully receive it, or

4.17.2. separate and lawfully dispose of the area of Ocean2Earth compost represented by the sample that does not meet absolute maximum concentration set in Table 1 via a process of segregation. The generator must then collect 5 discrete validation samples from the face of the Ocean2Earth compost pile where material has been segregated from and test the five samples for the parameter that did not meet the absolute maximum concentration set in Table 1. All 5 discrete samples must meet the absolute maximum concentration set in Table 1 for that given parameter for the lawful supply of the Ocean2Earth compost.

4.18. The generator must not reprocess any Ocean2Earth compost if the absolute maximum concentration set in Table 1 is not met for any chemical or physical parameter in clause 4.17.

Screening and further processing of Ocean2Earth compost

4.19. Once the generator produces Ocean2Earth compost that has met the absolute maximum concentrations set in Table 1, the generator may proceed to screen and further process the Ocean2Earth compost in accordance with clauses 4.19.1 to 4.19.3 below:

4.19.1. The generator may size separate Ocean2Earth compost by using a 10mm screen.

4.19.2. The generator may mechanically size-reduce the unblended Ocean2Earth compost through methods such as hammer milling, crushing or grinding. The generator must thoroughly clean the size-reducing equipment between batches of Ocean2Earth compost.

4.19.3. The generator may supply the unblended compost to the processor for blending with composted pine bark to generate potting mix.

Packaging of Ocean2Earth compost

4.20. The generator must only supply Ocean2Earth compost to any person who applies or intends to apply Ocean2Earth compost to land if the following

information is clearly and simply presented on the packaging of the Ocean2Earth compost:

4.20.1. instructions that explain that the consumer must incorporate 0.5-1kg of Ocean2Earth compost for every 1m^2 of topsoil at the time of land application (as per clause 6.3 of *The Ocean2Earth compost exemption June 2021*). Note this clause does not apply to the land application of potting mix.

4.20.2. instructions that explain how the consumer can avoid the generation, and prevent the migration, of leachate from the land application of Ocean2Earth compost (as per clause 6.4 of *The Ocean2Earth compost exemption June 2021*).

4.20.3. instructions that explain that any land application of Ocean2Earth compost must occur within a reasonable period of time after its receipt (see notes; as per clause 6.5 of The *Ocean2Earth compost exemption June 2021*).

4.20.4. instructions that explain that the consumer must not allow Ocean2Earth compost to be fed or come into contact with pigs or ruminants in accordance with clauses 37 and 38 of the *Biosecurity Regulation 2017* (as per clause 6.6 of *The Ocean2Earth compost exemption June 2021*).

Notification

4.21. On or before each transaction, the generator must either:

4.21.1. provide the following to each person who applies or intends to apply Ocean2Earth compost to land to whom the generator supplied Ocean2Earth compost; or

4.21.2. label the Ocean2Earth compost with instructions to access the Ocean2Earth website where the following documents can be found by the person who applies or intends to apply Ocean2Earth compost to land:

- a written statement of compliance certifying that all the requirements set out in this order have been met;
- a copy of 'The Ocean2Earth compost exemption June 2021'; and
- a copy of 'The Ocean2Earth compost order June 2021'.

Record keeping and reporting

4.22. The generator must keep a written record of the following for a period of six years:

- the sampling plan referred to under clause 4.7;
- all test results in relation to the Ocean2Earth compost supplied;
- documentation of the composting process; and
- the quantity of any Ocean2Earth compost supplied.

4.23. The generator must make information available to the consumer of the Ocean2Earth compost, on request by that party, on the latest test results of the Ocean2Earth compost.

4.24. The generator must provide all sampling and testing results from the first year of the duration period of The Ocean2Earth compost order June 2021 to the EPA's Resource Recovery Innovation team mailbox at waste.exemptions@epa.nsw.gov.au by 12 June 2022.

4.25. The generator must notify the EPA within seven days of becoming aware that it has not complied with any requirement in clause 4.1 to 4.20.

5. Processor requirements

The EPA imposes the following requirements on Corkhill Bros Pty Ltd who processes and supplies Ocean2Earth compost.

5.1. The processor must ensure that the composted pine bark does not contain asbestos, engineered wood products and preservative treated or coated wood residues.

Blending and packaging of Ocean2Earth compost

5.2. Once the generator supplies Ocean2Earth compost to the processor for blending, the processor may produce potting mix by mixing 1-part unblended compost with between 5 parts to 10 parts composted pine bark.

5.3. The processor must only supply Ocean2Earth compost to any person if the following information is clearly and simply presented on the packaging of the Ocean2Earth compost:

5.3.1. instructions that explain how the consumer can avoid the generation, and prevent the migration, of leachate from the land application of Ocean2Earth compost (as per clause 6.4 of *The Ocean2Earth compost exemption June 2021*).

5.3.2. instructions that explain that any land application of Ocean2Earth compost must occur within a reasonable period of time after its receipt (see notes; as per clause 6.5 of The *Ocean2Earth compost exemption June 2021*).

5.3.3. instructions that explain that the consumer must not allow Ocean2Earth compost to be fed or come into contact with pigs or ruminants in accordance with clauses 37 and 38 of the *Biosecurity Regulation 2017* (as per clause 6.6 of *The Ocean2Earth compost exemption June 2021*).

Notification

5.4. On or before each transaction, the processor must either:

5.4.1. provide the following to each person who applies or intends to apply Ocean2Earth compost to land to whom the processor supplied Ocean2Earth compost; or

5.4.2. label the Ocean2Earth compost with instructions to access the Ocean2Earth website where the following documents can be found by the person who applies or intends to apply Ocean2Earth compost to land:

- a written statement of compliance certifying that all the requirements set out in this order have been met;
- a copy of ‘The Ocean2Earth compost exemption June 2021’; and
- a copy of ‘The Ocean2Earth compost order June 2021’.

Record keeping and reporting

5.5. The processor must notify the EPA within seven days of becoming aware that it has not complied with any requirement in clause 5.1 to 5.3.

6. Definitions

In this order:

application or apply to land means applying to land by:

- spraying, spreading or depositing on the land; or

- ploughing, injecting or mixing into the land; or
- filling, raising, reclaiming or contouring the land.

composting means a process of managed biological transformation:

(a) to achieve pasteurisation, and

(b) for a period of not less than a total of 6 weeks of composting and curing at an adequate moisture level (>40 % by weight), and/or until an equivalent level of biological stability can be demonstrated.

Composting does not include drying or dehydration processes.

composted pine bark means raw bark sourced from a NSW timber mill that is ground, screened and composted by Corkhill Bros Sales Pty Ltd at Mugga Lane Resource Management Centre, Mugga Lane, Symonston, ACT.

consumer means a person who applies, or intends to apply, Ocean2Earth compost to land.

engineered wood products means engineered, painted, treated or composite wood products such as particleboard, oriented strand board, plywood, laminated veneer lumber, glulam or fibreboard that are manufactured with glues, resins, water repellents, fire retardants, fungal inhibitors and/or other chemicals.

forestry and sawmill residues are untreated and uncontaminated plant materials from forestry operations such as logging, silviculture and sawmilling. Forestry and sawmill residues include materials such as bark, woodchip, sawdust and wood fibre that are collected as a source separated material stream for processing.

generator means a person who generates or recovers Ocean2Earth compost. In this order, the generator is Ocean2Earth Pty Ltd (ABN 74631742151).

marine waste means any combination of fish frames, fish entrails and sea urchin spoil collected from dedicated Ocean2Earth waste bins at boat ramps and from commercial and aquaculture fish processing facilities.

mulch means plant material that by virtue of the nature and source of the material poses minimal risk of the presence of plant propagules, pathogens and other contaminants. Such materials may be shredded and/or screened to a preferred particle size grading for particular applications. Mulch only includes:

(a) horticultural barks, leaf mulch and wood chip mulch produced from forestry and sawmill residues, and urban wood residues; and

(b) branches, tree stumps and bark that are absent of leaves, flowers, fruit and plant propagules.

pasteurisation means a process to significantly reduce the numbers of plant and animal pathogens and plant propagules. Pasteurisation requires that the entire mass of organic material be subjected to either of the following:

(a) Appropriate turning of outer material to the inside of the windrow so that the whole mass is subjected to a minimum of 3 turns with the internal temperature reaching a minimum of 55°C for 3 consecutive days before each turn. Where materials with a higher risk of containing pathogens are present, including but not limited to manure and food waste, the core temperature of the material mass should be maintained at 55°C or higher for 15 days or longer, and during this period the windrow should be turned a minimum of 5 times.

(b) An alternative process that guarantees the same level of pathogen reduction, and the reduction of plant propagules as in (a). Any such alternative process must be clearly defined in writing and validated by a

suitably qualified person prior to claiming compliance with this exemption. A written record of the validation report must be kept for a minimum period of six years.

pine bark mulch means screened mulch sourced from the Eden log export yard that meets conditions of 'The mulch order 2016'.

potting mix means 1 part unblended compost mixed with between 5-10 parts composted pine bark.

preservative treated or coated wood residues means wood residues that are preservative treated with chemicals such as copper chrome arsenate (CCA), high temperature creosote (HTC), pigmented emulsified creosote (PEC) and light organic solvent preservative (LOSP) and/or coated with substances such as varnish or paint.

processor means a person who processes, mixes, blends, or otherwise incorporates Ocean2Earth compost into a material in its final form for supply to a consumer. The processor in this order is Corkhill Bros Sales Pty Ltd (ABN 44008467767).

ruminant means an animal that has a rumen including, but not limited to, alpacas, camels, cattle, deer, goats and sheep as defined in Clause 3(1) Part 1 of the *Biosecurity Regulation 2017*.

segregation means the identification and removal of any Ocean2Earth compost for disposal at a facility that can lawfully receive that waste. Segregation must be validated through the collection and testing of 5 additional samples for the contaminant that did not meet the absolute maximum concentration in Table 1, at the stockpile face where Ocean2Earth compost has been removed.

transaction means:

- in the case of a one-off supply, the supply of a batch, truckload or stockpile of compost that is not repeated,
- in the case where the supplier has an arrangement with the recipient for more than one supply of compost the first supply of compost as required under the arrangement.

unblended compost means composted waste produced from 1 part marine waste with 4 parts pine bark mulch.

urban wood residues means untreated, unpainted, and uncontaminated urban derived timber and wood material that is collected as a separate material stream for processing. Urban wood residues include materials such as off-cuts, saw dust, wood shavings, packaging crates and pallets.

10/6/21

Karen Marler

Director Environmental Solutions (Chemical, Land and Radiation)

Notes

The EPA may amend or revoke this order at any time. It is the responsibility of each of the generator and processor to ensure it complies with all relevant requirements of the most current order.

In gazetting or otherwise issuing this order, the EPA is not in any way endorsing the supply or use of this substance or guaranteeing that the substance will confer benefit.

The conditions set out in this order are designed to minimise the risk of potential harm to the environment, human health or agriculture, although neither this order nor the accompanying exemption guarantee that the environment, human health or agriculture will not be harmed.

Any person or entity which supplies Ocean2Earth compost should assess whether the material is fit for the purpose the material is proposed to be used for, and whether this use may cause harm. The supplier may need to seek expert engineering or technical advice.

Regardless of any exemption or order provided by the EPA, the person who causes or permits the application of the substance to land must ensure that the action is lawful and consistent with any other legislative requirements including, if applicable, any development consent(s) for managing operations on the site(s).

The supply of Ocean2Earth compost remains subject to other relevant environmental regulations in the POEO Act and Waste Regulation. For example, a person who pollutes land (s. 142A) or water (s. 120), or causes air pollution through the emission of odours (s. 126), or does not meet the special requirements for asbestos waste (Part 7 of the Waste Regulation), regardless of this order, is guilty of an offence and subject to prosecution.

Ocean2Earth compost that meets the conditions of this order should be applied to land by the consumer within 2 weeks of being received. Where there are extenuating circumstances the compost should be land applied within 4 weeks. The EPA considers that 6 weeks would be the absolute limit in all circumstances.

This order does not alter the requirements of any other relevant legislation that must be met in supplying this material, including for example, the need to prepare a Safety Data Sheet. Failure to comply with the conditions of this order constitutes an offence under clause 93 of the Waste Regulation.

Attachment 1 - Sampling Analysis Quality Plan (SAQP)

Sampling Analysis Quality Plan (SAQP)
for characterisation of Marine Waste Compost for Reuse

Prepared for
Ocean 2 Earth Australia Pty Ltd
1183 Princes Highway
Kiah, NSW, 2551

20 May 2021
Elgin Project Reference: JN19244

Elgin Associates Pty Ltd
ABN 59123488639

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INTRODUCTION

1 INTRODUCTION

Elgin Associates Pty Ltd (Elgin Associates) was engaged by Ocean2Earth Australia Pty Ltd (Ocean2Earth) to prepare this Sampling Analysis and Quality Plan (SAQP) that outlines the composting process and measures to ensure the marine waste compost product quality meets the requirements of EPA Resource Recovery Order (RRO) and Exemption for commercial sale.

Ocean2earth have been working with NSW EPA through a series of composting trials between 2019 to 2021 to develop and characterise a marine waste compost product for reuse and have optimised the composting process such that risks from pathogens potentially harmful to humans are low.

The marine waste compost comprises fish waste and pine bark mulch. Fish waste for reuse includes fish frames, fish entrails and sea urchin spoil sourced from dedicated waste bins at various boat ramps, and from commercial and aquaculture fish processing facilities in the Bega Valley Shire. The pine bark mulch is sourced from the Eden Log Export Yard and is screened prior to use.

The recovery of marine waste by Ocean2earth is for a beneficial reuse purpose where the material can be reused as a compost resource and also reduce the amount of marine waste going to landfill. Details can be found on the website: https://ocean2earth.com.au/

1.1 Characterisation Objectives

The objectives of characterising the marine waste compost is to inform on its physical and chemical composition (including potential contaminants) and associated environmental and commercial risks for its reuse. The characterisation also assists NSW EPA in their assessment of the waste for resource recovery and its potential approval/exemption for reuse under the applicable waste regulations.

1.2 SAQP Contents

This SAQP document provides an outline of the compost process, analytical test requirements, reporting and record-keeping, and quality assurance measures to be used by Ocean2earth staff and subcontractors.

This SAP includes the following components:

- Introduction, background and objectives;
- Legislative framework and relevant guidance;
- Sampling and Analysis, including:
    - Stockpiling;
    - Field sampling approach and method;
    - Sampling containers and storage;
- Laboratory analysis, including:

  - Proposed laboratory;
  - Parameters and methods;
  - Holding times.
- Data and Reporting, including:
  - Laboratory analytical certificates;
  - Data analysis
  - Reporting; and
  - Record keeping.
- Quality Assurance
  - Contingency plan that details steps to take in event of process or analytical test failure

2 LEGISLATIVE FRAMEWORK AND GUIDANCE

This SAQP has been prepared in reference to the key legislative instruments for regulation of waste in NSW which include:

- *Protection of the Environment Operations Act 1997 (POEO Act);*
- *Protection of the Environment Operations (Waste) Regulation 2014 (Waste Regulation).*

Key guidance for resource recovery (including characterisation) is the NSW EPA publication *Guidelines on Resource Recovery Orders and Exemptions* (2017) (Resource Recovery Guidelines, 2017).

Guidance on characterising the compost material was also provided in email correspondence from NSW EPA (emails from M. Rouillon 2019 to 2021), and has been drawn upon in this version of the SAQP.

- Inclusion of a sampling plan for collection of compost samples, with EPA review of a draft version prior to sampling;
- Outline of characterisation parameters for sampling the compost;
- Compost sampling considerations, including composite and individual grab samples, and laboratory holding times.
- QAQC measures including contingency in event of a process or analytical test failure

3 MARINE WASTE COMPOSTING AND STOCKPILING PROCESS

The proposed composting activity would convert marine waste and pine bark mulch into compost using an aerobic, turned composting method.

The following sections describe each stage of the process, noting that this has been developed through a series of composting trials and analytical testing to meet EPA requirements for Resource Recovery Order and Exemption.

3.1 Description of Waste

The marine waste for reuse includes fish frames, fish entrails and sea urchin spoil sourced from dedicated waste bins at various boat ramps, and from commercial and aquaculture fish processing facilities in the Bega Valley Shire Council Local Government Area. The marine waste is mixed with pine bark mulch which is sourced from the Eden Log Export Yard and is screened prior to use. O2E's collection run consists of fish frames from organics bins provided at boat ramps in the Bega Valley (small component of total waste ~10%) in addition to waste collected from local seafood suppliers and retailers (large component of total waste ~90%).

Following collection, these bins are transported to the licenced Merimbula Waste & Recycling Facility (**Figure 1**) where the marine waste is added to pine bark mulch for composting at a ratio of 1:4 marine waste to screened pine bark mulch (which meets the mulch order 2016).

Figure 1. Location of the Ocean 2 Earth composting activity at Merimbula Waste and Recycling facility.

COMPOSTING PROCESS

Photos below illustrate the compost process.

	
Fish waste collection bins	Typical fish waste deposited in collection bins

COMPOSTING PROCESS

	
Oversized material screened from previous pile used as a starting point for new pile. New fish waste added to pile	Raw marine waste then covered with pine bark mulch (1:4 ratio). Inoculant added at 1L per $10m^3$.

COMPOSTING PROCESS

	
Process repeated until desired pile volume is reached.	Process repeated until desired pile volume is reached.

COMPOSTING PROCESS

	
Process repeated until desired pile volume is reached.	Process repeated until desired pile volume is reached.

COMPOSTING PROCESS

	
Desired pile volume reached and pile closed off.	Water added as required.

COMPOSTING PROCESS

	
Pile temperature recorded daily until pasteurisation temperatures are reached across the entire pile profile.	Pile moved onto aerator and air cycle commenced.

COMPOSTING PROCESS

Freshest material laid along bottom of pile and covered by oldest part of pile.

Pile built back to original dimensions on the air.

COMPOSTING PROCESS

	
Temperatures recorded until 3 consecutive days over 55^{0}C achieved	Pile mixed at the end of each 3 day period over 55^{0}C (this temperature recording and mixing process is repeated 5 times so that 15 days total of temperatures over 55^{0}C and 5 mixes are achieved).

COMPOSTING PROCESS

	
Pile aged for 12 weeks (being mixed every 2 weeks for first 8 weeks) and then screened to -40mm	Pile re-screened to -10mm prior to bagging

3.2 Process Stages

The composting process comprises five key stages that include pile formation, pasteurisation, maturation, screening and testing. **Figure 2** presents a schematic outline of the process.

1. Compost pile formation stage

- Marine waste is emptied from the truck onto the ground in front of the pile, pine bark mulch applied at a 1:4 ratio to the waste (ratio measured using loader bucket). Waste and bark mixed with bucket and then added to pile and fully covered with bark to ensure no marine waste is exposed.
- Water (potable supply) is added to achieve desired moisture content (squeeze test). Water is added as needed throughout composting process.
- Inoculant is added at a rate of 1L per 10 m^3 of compost
- Pile is built to 2 – 3 m in height
- Process is continued until pile volume reaches between 150 – 180 m^3
- Pile is closed off when desired volume is reached. Pile 'close-off' simply refers to the building stage of the pile being finalised and the pasteurisation stage (i.e. heating and mixing process) can commence. Once pile is closed, no further inputs can be added to pile.

2. Pasteurisation stage (mixing and heating)

Pasteurisation is process of mixing the materials with intermittent aeration to achieve and maintain the necessary composting temperature of 55^{0}C for a total of 15 days or longer. Pasteurisation stage can take between 3 – 5 weeks for completion.

- Pile is aerated using aerator on a cycle (generally 15 minutes on / off) but adjusted to monitor temperature between 55 – 70 ^{0}C.
- Temperatures monitored regularly and recordings over 55^{0}C logged and documented. Pile temperature greater than or equal to 55 ^{0}C needs to be maintained over three consecutive days prior to next pile mix and aeration.
- Pile is subjected to a total of five mixes and pasteurisations such that the pile temperature of 55 ^{0}C has been maintained for 15 days or longer.

3. Maturation stage

- Once the pile has achieved pasteurisation, pile is left to age and mature for 12 weeks uncovered.
- Pile is mixed every 2 weeks for the first 8 weeks of maturation stage.
- Post 12-week period, pile is screened.

4. Screening and storage stage

- Following the 12-week maturation phase the pile is screened to -40mm. Oversized material is set aside and stockpiled for addition to future stockpiles and re-processing.
- Screened compost is stockpiled and stored uncovered at the Merimbula Waste and Recycling Facility.
- Compost is rescreened to -10 mm prior to bagging.

COMPOSTING PROCESS

5. Analytical testing stage

Each compost pile is required to undergo sampling and analytical testing to ensure compliance with EPA Resource Recovery Order and Exemption.

Sampling approach and analytical test parameters are described in the sections below.

COMPOSTING PROCESS

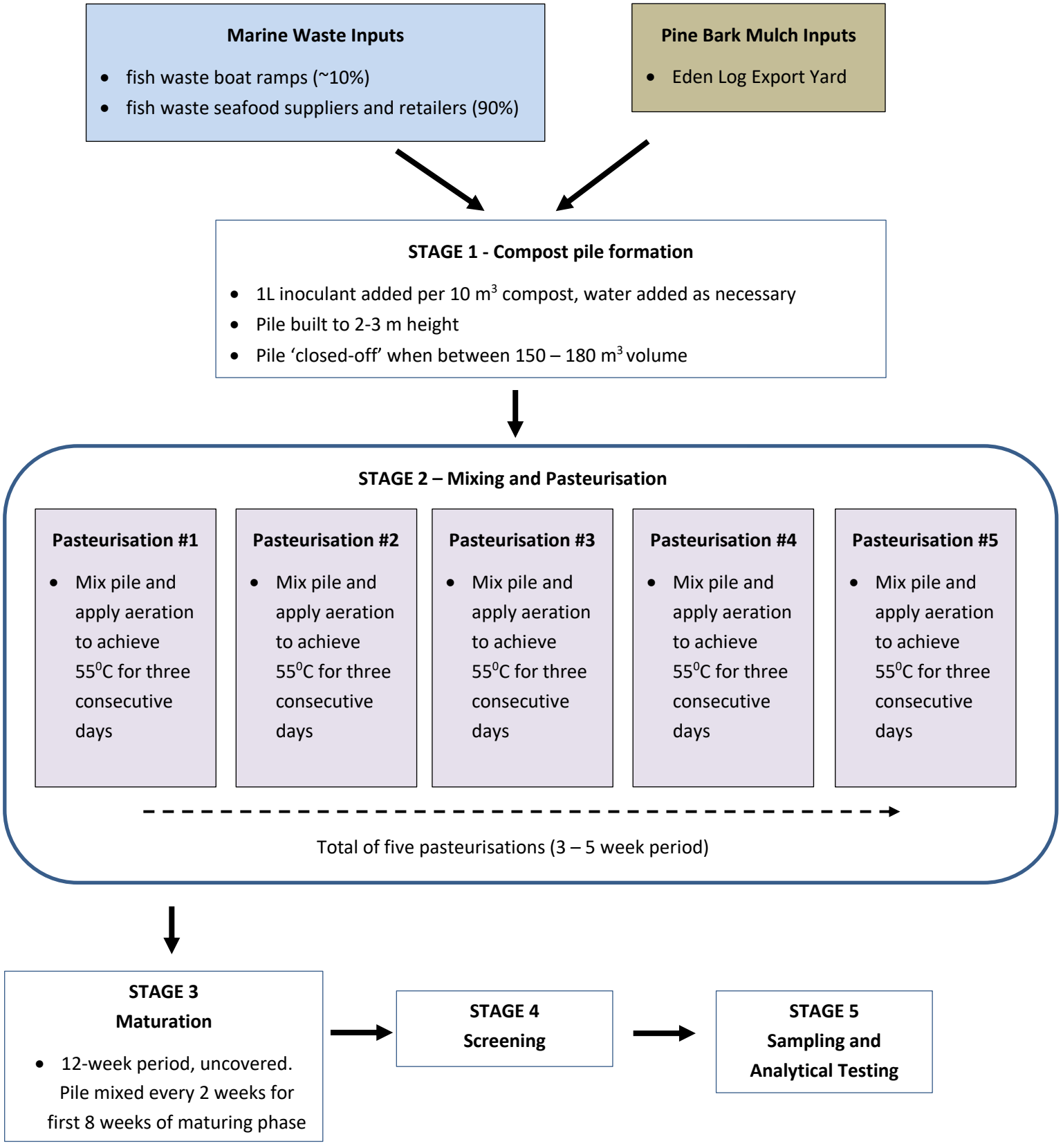

Figure 2. Schematic outline of composting process.

4 COMPOST SAMPLING APPROACH

Sampling would be undertaken from stockpiles that have completed Stages 1 to 4 of the composting process and stored at the Merimbula Waste and Recycling Facility.

Sampling conducted for previous testing has been based on relative size of the stockpile, with each stockpile divided into sampling domains of similar approximate volumes in order to obtain representative samples to characterise the entire compost pile. For instance, in November 2020, a 250 m^3 pile (14m x 6m x 3m) was divided into eight sample domains and each domain sampled for microbiological, chemical and physical parameters equivalent to the following indicative sample frequency rates:

- 1 composite sample per 30 m^3 for physical and chemical parameters
- 2 individual grab samples per 30 m^3 for microbiological parameters

Laboratory analytical results indicated the composting process involving regular mixing and aeration over 3 to 5 week period and a minimum 15-day pasteurisation resulted in a homogenous pile with majority of microbiological parameters reported below detection limits or at low levels that do not present a health concern. Physical and chemical characteristics of the compost meet the relevant compost guidelines.

4.1 Sample Frequency and Future Compost Piles

Given the compost process is now well developed, with marine waste and pine bark mulch inputs controlled at a 1:4 ratio, and previous lab test results providing evidence the process is effective at reducing potentially harmful pathogens and compost complies with Compost Order and Exemption 2016 and Australian Standard *AS4454-2012 Composts, Soil conditioners and Mulches*; future pile sampling is proposed at the following frequency:

- one composite sample per 45 m^3 for physical and chemical parameters
- two individual grab samples per 45 m^3 for microbiological parameters

To ensure a well-mixed pile, future compost piles will be constructed to between 150 to 180 m^3 with proposed sample numbers detailed in in **Table 1**, below:

Table 1. Approximate dimensions, volume and sample numbers of future compost pile sizes.

Pile	Pile Dimensions (L x W x H)	Approximate Volume (m^3)	Proposed # of Samples [1]	Test Parameters
Pile X	12 x 5 x 3	180	8	Microbiological
			4	Physical and chemical
			2	Metals, PCB, OCPs
Pile Y	12 x 6 x 2.5	150	8	Microbiological
			4	Physical and chemical
			2	Metals, PCBs, OCPs

Note

[1] Sample numbers based rate of one sample per 45 m^3 for physical and chemical parameters, and two samples per 45 m^3 for microbiological parameters, and one sample per 90 m3 for metals, PCBs and OCPs.

Based on previous sampling guidance and the size of future compost stockpiles is the following approach to obtain representative samples of the compost material:

- Stockpile would be divided into four sampling domains of similar approximate volumes ~45 m^3 and representative of the stockpile compost materials.
- Collection of a total of 4 composite samples for physical and chemical parameters (all 4 composite samples to be analysed for phys-chem and mercury parameters, 2 of the composite samples to also be analysed for metal suite, PCBs and OCPs), and 8 individual grab samples for microbiological parameters from across the four sampling domains;
- Domain sampling depth would alternate between 30 cm and 60 cm in order to capture potential variation to exist between shallower and deeper depths in the stockpiles (*i.e.* Domain 1 composite sub-samples collected at 30 cm, Domain 2 composite sub-samples collected at 60cm and so on, such that for each compost stockpile, half of all samples would collected from 30cm and the other half from 60cm depth).
- From within each domain, the following samples are to be collected (refer **Table 2**):
    - Five sub-samples of similar mass (nominally 500g each) which are added to a clean stainless-steel bowl for a 2.5 kg total and mixed to form a composite sample. From this bowl, two samples of 2 kg and 500 g each are transferred into laboratory supplied sample bags. From these composite samples the majority of laboratory analysis is to be performed, with the larger 2 kg bag used for physical and visible contaminants parameters and the 500 g bag used for chemical parameters.

- One individual grab sample collected from 30 cm depth and transferred into laboratory supplied sterile sample bag, for analysis of microbiological parameters.
- One individual grab sample collected from 60 cm depth and transferred into laboratory supplied sterile sample bag, for analysis of microbiological parameters.

A conceptual diagram aerial view of the proposed stockpile domains for sampling, including composite sub-sample and individual grab are shown in **Figure 3** below.

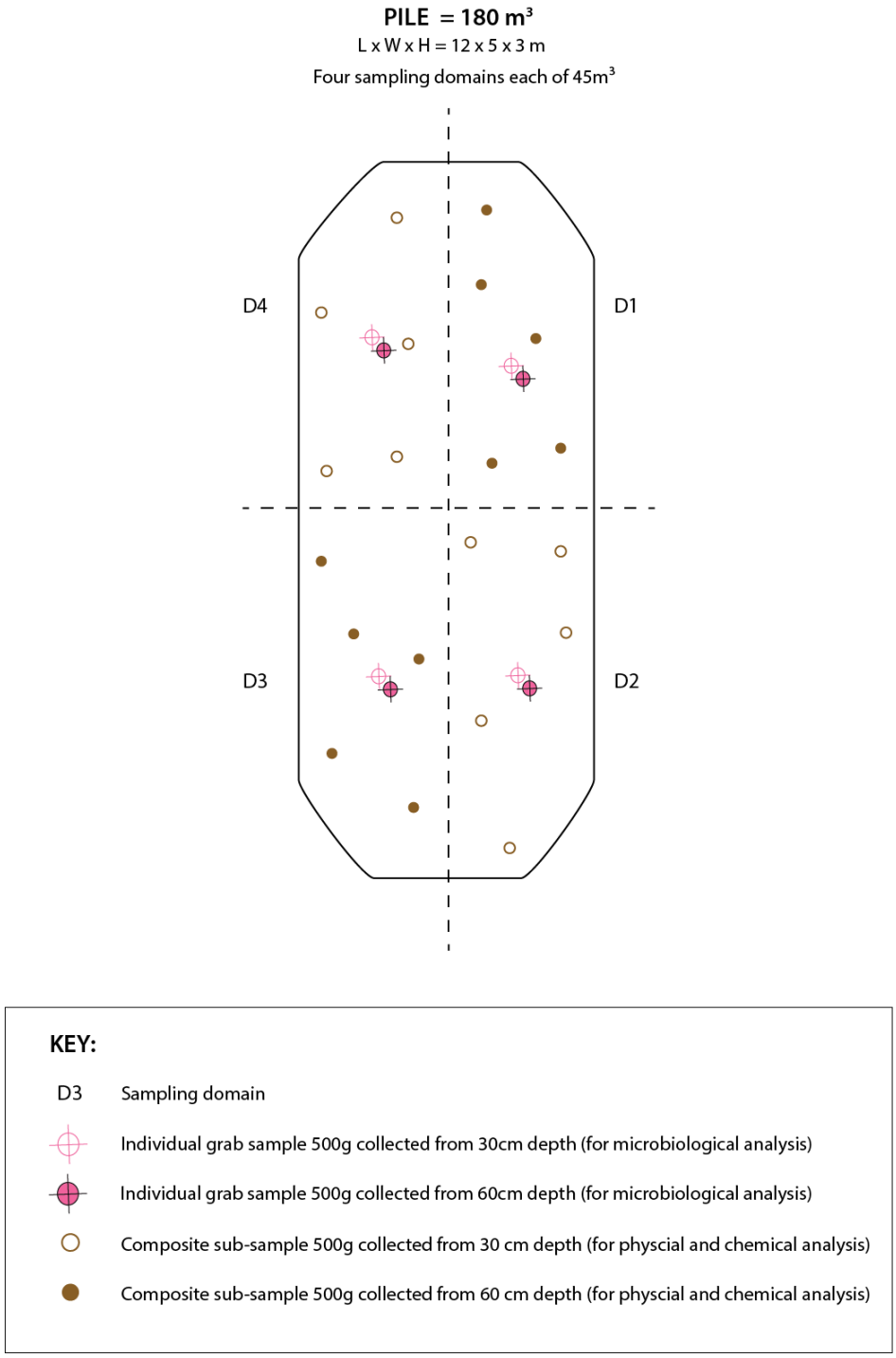

Figure 3. Conceptual Sampling Diagram – Sampling Domains.

SAMPLING AND ANALYSIS

The sampling approach above results in a total of four composite samples (for physical and chemical parameters) and eight individual grab samples (for the microbiological parameters), half taken from shallow 30cm depth and half from deeper 60cm depth, for a pile between 150 and 180 m^3.

This approach is consistent with the guidance from NSW EPA and with the Resource Recovery Guidelines (2017) on collection of composite and individual samples.

Table 2. Summary of stockpile sampling per alternating sampling domain for each compost stockpile.

Domain	Sample Type	Parameters	Shallow (30cm)	Deep (60cm)	Total Sample	Sample container/s
1	Composite sample (x5 sub-samples)	Physical and chemical	x5 500 g	-	2.5 kg	2kg & 500 lab supplied ziplock bag
	Individual grab sample	Microbiological	x1 500 g	-	500 g	Lab supplied ziplock bag
	Individual grab sample	Microbiological	-	x1 500 g	500 g	Lab supplied ziplock bag
2	Composite sample (x5 sub-samples)	Physical and chemical	-	x5 500 g	2.5 kg	2kg & 500g lab supplied ziplock bag
	Individual grab sample	Microbiological	x1 500 g	-	500 g	Lab supplied ziplock bag
	Individual grab sample	Microbiological	-	x1 500 g	500 g	Lab supplied ziplock bag

4.2 Compost Sampling Method

The sampling method employed for the marine waste compost stockpile(s) would include:

- Sampling personnel shall wear disposable nitrile gloves dedicated to each sampling location.
- For each sampling domain, a clean stainless-steel (SS) trowel or SS shovel shall be used to retrieve the grab sample and composite sub-samples from the stockpile.
    - Equipment is to be sterilised and cleaned prior to sample collection at each domain following decontamination and sterilising procedures outlined in **Section 4.3**.
    - Grab samples for microbiological testing shall be collected first, followed by composite sub-samples for physical and chemical contaminant testing.
- Collected composite sub-samples shall be transferred directly into a clean SS bowl. Once the composite sample has been formed from the five sub-samples, composite samples shall be transferred into laboratory supplied sterile sample bags.
- Collected individual grab samples shall be transferred directly into sterile sampling bags for microbiological parameters.
- Each sample bag shall be labelled with sample ID, date and time of sampling, project number and sampling personnel.
- Samples are to be transferred directly into chilled eskies for storage under chain of custody documentation.

Once sampling is completed, chilled sample eskies would be couriered same day on overnight service to proposed laboratories under chain of custody (**Appendix B**) in order to meet sample analysis holding times. Further details regarding proposed laboratories is provided below.

4.3 Sampling Equipment Decontamination and Sterilisation

Prior to sample collection from each domain, the following decontamination and sterilisation procedures are to be adopted.

Using a clean, contaminant-free work surface (i.e. portable table dedicated to sample collection), all reusable sampling equipment (stainless steel shovel, trowel and bowl) is to be decontaminated and sterilised.

Sampling personnel shall wear a new set of disposable nitrile gloves dedicated to each sampling location and during decontamination and sterilisation procedures.

1. Decontamination - Wash equipment using a dilute phosphate free detergent wash (such Liquinox), followed by a potable water rinse, followed by a distilled water rinse.

2. Sterilisation – Following decontamination, equipment is to be wiped down using isopropyl-alcohol and allowed to air dry. Avoid using paper towel for drying as this could introduce contamination.

4.4 Laboratory Analysis

Two laboratories will be used to achieve the required sample analysis, including:

- Environmental Analysis Laboratory (EAL) at Southern Cross University, Lismore, NSW (lab NATA accreditation No. 14960)
- Symbio Laboratories, Lane Cove West, Sydney NSW.

The proposed analytical suite is summarised in **Table 3**, below, and is based on guidance provided in the Resource Recovery Guidelines (2017) and email correspondence from NSW EPA**.**

Table 3 also includes details on test code and method, NATA accreditation (if applicable) and holding times. It is noted the shortest holding time is 48 hours chilled, and timing for sampling and courier to the laboratory will need to take this into account so that these holding times can be met.

Table 5. Laboratory Analytical Suite.

Parameter No.	Parameter	Absolute maximum concentration (mg/kg 'dry weight')	Test Code	Basis of Test Method	Holding Time
1	Cadmium	1	RA PACK 010 - Metals	Total Metals - EPA equivalent method used. Reported mg/kg. NATA code W32	5 working days
2	Lead	75			
3	Arsenic	10			
4	Chromium (total)	50			
5	Copper	75			
6	Nickel	30			
7	Zinc	150			
8	PCBs	n/a [d]	ENV146	PCBs - EPA equivalent method used. Gas Chromatograph coupled with Electron Capture Detector. Reported mg/kg.	7 working days
9	OCPs	n/a [d]	ENV104s-1	OCPs - EPA equivalent method used. Gas Chromatograph coupled with Mass Spectrometer. Reported mg/kg.	7 working days
10	Mercury	1	RA PACK 010 - Metals	Total Metals - EPA equivalent method used. Reported mg/kg. NATA code W32	5 working days
11	pH	5.0 – 8.0	SS-PACK-010 [a]	pH (4A1) EPA Method used. NATA code S1	5 working days

SAMPLING AND ANALYSIS

Parameter No.	Parameter	Absolute maximum concentration (mg/kg 'dry weight')	Test Code	Basis of Test Method	Holding Time
12	Electrical Conductivity	4 dS/m		EC (3A1) EPA Method used. NATA code S1	5 working days
13	Glass, metal and rigid plastics >2mm	0.5%	SS-SING-122 [a]	Visible Contaminants (Australian Standard AS4454-2012 - Appendix I) EPA Method used	5 working days
14	Plastics – light, flexible or film >5mm	0.05%			
15	*Salmonella* spp	Absent in 50g [e]	M16.1 [b]	*Salmonella* (M16.4 - AOAC 071101) Presence/Absence /25g	48 hours chilled
16	*Escherichia coli* (*E. coli*)	<100 MPN/g [c]	M8.3.3 [b]	*E. coli* (Colilert-18 IDEXX - Quanti-Tray/2000) MPN/g	48 hours chilled
17	Thermotolerant coliforms	<1000 MPN/g [c]	M8.3.2 [b]	Thermotolerant coliforms (Colilert-18 IDEXX - Quanti-Tray/2000) MPN/g	48 hours chilled
18	*Vibrio parahaemolyticus*	Absent in 50g [e]	M19.2.3 [b]	<3 MPN/ g	48 hours chilled
19	*Bacillus cereus*	<100 CFU [d]	M5.1.1 [b]	*Bacillus cereus* Report as CFU/g	48 hours chilled
20	*Clostridium perfringens* (vegetative cells)	n/a [d]	M7.1 [b]	*Clostridium perfingens* Report as CFU/g	48 hours chilled

Note

[a] Environmental Analysis Laboratory (EAL) at Southern Cross University, Lismore, NSW (lab NATA accreditation No. 14960)

[b] Symbio Laboratories, Lane Cove West, Sydney, NSW

[c] MPN = most probable number

[d] While an absolute maximum concentration limit is not specified for *Clostridium perfringens*, PCBs or OCPs, these must be tested in each sample and records kept of the results.

[e] 50g laboratory subsample collected from the grab sample that is submitted for microbiology analysis as per AS5013.10-2009

5 QUALITY ASSURANCE

Ocean2earth quality assurance is based on accurate record keeping and reporting that also includes a contingency plan that details steps that shall be implemented in the event of a process failure (i.e. insufficient temperatures obtained for effective pasteurisation) and / or analytical test failure.

5.1 Contingency Plan in Event of Process or Analytical Test Failure

5.1.1 Process failure

A process failure is most likely to occur during Stage 2 mixing and pasteurisation where the pile does not achieve the minimum 15-day pasteurisation of continuous temperature measurements above 55 ^{0}C. In event of this type of process failure, the following steps shall be undertaken:

Step 1 – Pasteurisation is undertaken in five 3-day blocks. All temperature measurements in a 3-day block must be above 55 ^{0}C. The minimum temperature taken from the pile needs to be above 55 ^{0}C, not the average. If one or more 3-day blocks falls below 55^{0}C, then that block or number of 3-day blocks shall be repeated to ensure 15-day continuous temperature >55^{0}C is logged.

Step 2 – Record the process failure and document the steps adopted to ensure the pile meets all process requirements prior to sampling for analytical testing.

5.1.2 Analytical test failure

Analytical test failure may indicate that at least one or more sampling domains fails to meet the physical, chemical or microbiological characteristics expected for a typical pile that has achieved 15-day pasteurisation based on previous test results.

- **Microbiological**

In event that test results do not meet the absolute maximum concentrations for microbiological parameters 15 to 19 (refer **Table 5**), the following options can be undertaken:

Option 1 – Dispose the compost pile to a facility that can lawfully receive it and document in records; or

Option 2 - Reprocess by subjecting the pile to additional pasteurisation stages, where the internal temperature of the whole pile mass reaches a minimum 55 ^{0}C for three consecutive days per stage. The number of additional pasteurisation stages deemed necessary may vary depending on the severity of the analytical test failure.

Following reprocessing, the entire pile shall be resampled by collecting eight (8) discrete grab samples and submitted to laboratory for re-test of all microbiological parameters 15 to 20 (**Table 5**).

The pile can be provided for supply should the test results of all eight samples meet the absolute maximum concentrations in **Table 5**.

Document and keep records of all reprocessing and testing.

- **Chemical or Physical**

In event that test results do not meet the absolute maximum concentrations for chemical and physical parameters 1 to 14 (refer **Table 5**), the following options can be undertaken:

Option 1 – Dispose the compost pile to a facility that can lawfully receive it and document in records; or

Option 2 - Segregate and lawfully dispose of the affected pile domain/s.

In order to validate the remaining pile meets all conditions of the RRO, five (5) discrete samples shall be collected from the face of the pile from the where the domains were segregated. Samples shall be submitted for laboratory re-test of the parameter/s that did not meet the absolute maximum concentration limit in **Table 5**.

The pile can be provided for supply should the test results of all five samples meet the absolute maximum concentrations in **Table 5** for the retest parameters.

Document and keep records of all reprocessing and testing.

6 DATA AND REPORTING

6.1 Laboratory Analytical Certificates

Results from the laboratory analysis is to be reported in NATA stamped analytical certificates from EAL and Symbio. The analytical request to EAL and Symbio is also to include a request for provision of quality control data to accompany the results. Laboratory analytical certificates (COA, QC reports, SRN and COC) received over the duration of the RRO will be collated to accompany reporting to EPA as required.

6.2 Data Analysis

The analytical data from the laboratory is to be analysed and tabulated in results tables, and include presentation of the following:

- Minimum and maximum values;
- Standard deviation;
- Median;
- Arithmetic mean.

6.3 Reporting

Where findings of the SAQP are to be reported, it is recommended as a minimum that this comprises a factual letter report that includes:

- Details of sampling, including sampling dates and times, location, personnel, sampling approach and methods;
- Laboratory analytical certificates, quality control reports and chain of custody records;
- Results tables and data analysis;
- Map(s) showing stockpile sampling locations and dimensions.
- Photographs of stockpiles and samples collected.

Reporting would be required at the conclusion of each RRO period (typically at one or two-year intervals depending on the RRO duration specificied by EPA).

6.4 Record Keeping

Records from sampling and analysis under this SAQP are to be maintained and backed up in files that contain all relevant documents and sampling results for a minimum of six years, including:

- Analytical laboratory results, field observation log records (**Appendix A**) and site photographs;
- This Sampling and Analysis Plan;
- Reports and Documentation of the composting process;
- Quantities of compost supplied;
- Name and address of each person to whom compost (pile batch) was supplied; and
- Correspondence records.

7 LIMITATIONS

Elgin Associates Pty Ltd has prepared this SAQP for the sole use of Ocean 2 Earth Australia Pty Ltd in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The methodology adopted and sources of information used by Elgin Associates are outlined in this report. Elgin Associates has made no independent verification of this information beyond the agreed scope of works and Elgin Associates assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to Elgin Associates was false.

This SAQP was initially prepared in March 2021 and updated in May 2021 is based on the conditions encountered and information reviewed during that period up to the time of preparation. Elgin Associates disclaims responsibility for any changes that may have occurred after this time. Opinions and recommendations contained in this report are based upon information gained during desktop study and fieldwork and information provided from government authorities' records and other third parties. The information in this report is considered to be accurate at the date of issue and reflects at the Site at the dates sampled. This document and the information contained herein should only be regarded as validly representing the Site conditions at the time of the fieldwork unless otherwise explicitly stated in a preceding section of this report.

This report should be read in full together with all other reports referenced by this report. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

8 REFERENCES

Protection of the Environment Operations Act 1997 (POEO Act)

Protection of the Environment Operations (Waste) Regulation 2014 (Waste Regulation)

NSW EPA (2017). *Guidelines on Resource Recovery Orders and Exemptions*

Vic EPA (2009). *IWRG702 Soil Sampling*

Ocean2Earth (2019). Fish waste collection data and compost log data

APPENDIX A

Compost Field Sampling Log

www.ocean2earth.com.au

COMPOST SAMPLING LOG

Purpose: Characterisation of Marine Waste Compost

COMPOST PILE	SAMPLE ID	DATE	TIME	SAMPLE PHOTO	2 KG BAG	500g bag
				☐	☐	☐
				☐	☐	☐
				☐	☐	☐
				☐	☐	☐
				☐	☐	☐
				☐	☐	☐
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				☐	☐	☐

All details completed? YES / NO

Sign-off: ____________________

APPENDIX B

Laboratory Chain of Custody

- **EAL**
- **Symbio**

Sample Submission Form (SSF) - Chain of Custody (COC)

PO Box 157 (Military Road)
LISMORE NSW 2480
T: 02 6620 3678 E: eal@scu.edu.au W: www.scu.edu.au

Submitting Client Details

Quote Id: EALQ5643
Job Ref:
Company: Ocean2earth Australia Pty Ltd
Contact: Kyran Crane
Phone:
Mobile: 0429225573
Email: Kyran@ocean2earth.com.au
Postal address: PO Box 249 Coffs Harbour

Billing Client Details

Y Tick if same as submitting details
ABN: 74631742151
Company:
Contact:
Phone:
Mobile:
Email:
Postal address:

Payment Method:

□ Purchase Order
□ Cheque
□ Credit/Debit Card (EAL staff will phone for details)
□ Invoice (prior approval)

Relinquished Time/Date:
Received: Time/Date:

Preservation: none - freezer bricks - ice - acidified - filtered - other
Condition on receipt: ambient - cool - frozen - other

Please note compositing or mixing of samples MUST be written on the Sample Submission Form. Otherwise, each sample listed will be analysed and charged seperately.

In submitting samples, the Client agrees to the EAL Laboratory Services Terms and Conditions. These Terms and Conditions are available on the EAL website: scu.edu.au/eal, or on request.

Comments:

Likelihood and nature of Hazardous material:

Lab ID	Sample ID	Sample Depth	Sampling Date	Sampler	Your Client	Pile ID	Sample Type (e.g. water, leaf, soil)	**Total number of samples**	**Sample Analysis Request** Price list code (e.g. SW-PACK-06)						
									RA PACK 010 - Metals (Cd, Pb, As, Crtotal, Cu, Ni, Zn, Hg)	SS-Pack-010 pH and EC	SS-SING-122 Vis. Contam.				

Comments:

Likelihood and nature of Hazardous material:

Lab ID	Sample ID	Sample Depth	Sampling Date	Sampler	Your Client	Pile ID	Sample Type (e.g. water, leaf, soil)	**Total number of samples**	**Sample Analysis Request** Price list code (e.g. SW-PACK-06)						
									RA PACK 010 - Metals (Cd, Pb, As, Crtotal, Cu, Ni, Zn, Hg)	SS-Pack-010 pH and EC	SS-SING-122 Vis. Contam.				

CHAIN OF CUSTODY

Symbio LABORATORIES Proudly AUSTRALIAN

Symbio Laboratories 2 Sirius Road Lane Cove West NSW 2066 | P: 1300 703 166 | F: 07 3219 0333

CLIENT COMPANY NAME:	Ocean2Earth	**CLIENT EMAIL:**	ocean2earthaustralia@gmail.com; kyran@ocean2earth.com.au		
COMPANY ADDRESS:	1183 Princess Highway, Kiah, 2551 NSW	**ADDITIONAL EMAILS:**			
CLIENT CONTACT:	Kyran Crane	**FREIGHT CON NOTE/ ESKY CONDITION:**		**ACCELERATED TURNAROUND?** Nominate: Same Day, 1 Day, 2 Day or 3 Day Accelerated Turnaround *Surcharges will apply	
SITE:	Merimbula Waste and Recycling Facility				
SAMPLED BY:		**DUE DATE:**	STANDARD TAT	**CLIENT PURCHASE ORDER NUMBER:**	
PHONE:	0429 225 573	**SAMPLE TEMP:**		**QUOTE#:**	Analytical Services

SPECIAL INSTRUCTIONS:

Please contact lab manager to confirm special instructions for login and testing

SAMPLES SUBMITTED WITHOUT THIS COMPLETED FORM WILL BE DESTROYED 48 HOURS AFTER RECEIPT OF SAMPLE.

Ensure contact details are correct above. Enter the sample details below & place a tick in the column corresponding to the tests required.

SAMPLE ID	SAMPLE DATE	SAMPLE TIME	ANALYSIS REQUIRED (PLEASE TICK THE CORRESPONDING COLUMN TO THE TEST REQUIRED)										Comments & Temperature observations
			C. Perfringens w/o heat treatment (Vegetative cells)	Vibrio para enumeration <3 MPN/g	Thermotolerant Coliforms & E. Coli - MPN	Salmonella - AS 25g	Bacillus cereus spread plate	Polychlorinated biphenyls (PCBs) by GC-ECD	OC Pesticides				
			M7.1	M19.2.3	M8.3.2 & M8.3.3	M16.1	M5.1.1	ENV146	ENV104s-1				

If a quotation number has been provided, please ensure it is detailed on this submission form. Tests that are outside the scope of Symbio Laboratories Pty Ltd will be subcontracted to our approved consultant laboratories. Your signature on this form is taken as acceptance of this condition.

Please note: Your signature acknowledges receipt of liability for costs associated with analysis of the sample(s) described above. Bottle Codes: Please see Symbio Laboratories Sample Collection Bottle Guide for all Bottle Codes.

RELINQUISHED BY:		***SIGNATURE:***			
RECEIVED BY:		***SIGNATURE:***		***DATE:***	

CLIENT REFERENCES

Quote #	
EXO Ref:	
LIMS Ref:	

OFFICE USE ONLY