Project Idea Note

Project name

Zero to Landfill Organics Composting

Project Developer:

Kitchen Compost cc t/a Zero to Landfill Organics
Registration No: 2008/047408/23

Project Proponent:

Kitchen Compost cc t/a Zero to Landfill Organics
Registration No: 2008/047408/23

Carbon Registry and Standard:

Credible Carbon (Pty) Ltd
Registration number: 2016/027710/07

PIN prepared by:

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Contents

1. Description of Project

Zero to Landfill Organics (ZTL Organics) is a private waste management business established in 2009 with the mission to divert organic waste from landfills. By composting this waste valuable nutrients are recovered and the emission of methane, a harmful greenhouse gas, is reduced.

ZTL Organics collects and processes organic waste from commercial customers and converts it to compost through thermophilic composting in open windrows. Organic waste streams processed include food waste, green (garden) waste, paper towel, animal mortalities and fat trap waste (fats, oil and grease – F.O.G.). Waste generators (27 in total), in and around the City of Cape Town, contract ZTL Organics to collect organic waste, while six waste logistics companies pay ZTL Organics a gate fee to process organic waste collected from their own clients.

85 litre bins or 50 litre sealable drums are used to collect food waste while paper towel and garden waste is collected in hessian, plastic or reusable bulk bags.

- Fat trap waste or F.O.G. (Fats, Oil and Grease) is delivered to the composting facility in both small volumes using 25 litre containers and larger volumes delivered in 2 500 litre – 10 000 litre tanker trucks. This liquid waste is drained from sumps in the drainage systems of hotel and restaurant kitchens and contains food and fat particles. Fat trap waste is captured in compost wells where the solid fraction is separated from the liquid fraction. The compost is then turned so the microbes in the compost can break down the fat molecules releasing CO_2 and water vapour. No special licence or permission is required to process F.O.G. waste through composting.

- Collected food waste is mixed with garden waste and mature compost using a front-end loader to create windrows where active thermophilic composting can take place. Compost produced is sold in bulk to landscapers, farmers or community organisations participating in urban agriculture.

ZTL Organics operates as a closed corporation with two members: Melanie Ludwig and Llew Jones. There are currently 7 employees: 2 collection staff, 1 part-time administrative staff member, 3 composting facility assistants, 1 facility and business manager. Employees stand to benefit from 50% of the net carbon revenue generated by this project.

2. Carbon Credit Ownership & Distribution

Zero to Landfill Organics is the project developer and owner of any carbon credits generated by the project, as described in the registration agreement between ZTL Organics and Credible Carbon Pty Ltd. The organic waste generators and purchasers and users of compost have been made aware that Zero to Landfill Organics has claimed ownership of any carbon credits arising from this process. By registering with Credible Carbon with the intention to earn carbon credits ZTL Organics will be able to assist its staff in becoming more financially secure and providing education and other support for their children. The income earned through the carbon credits will also ensure that the business has the resources it needs to expand and meet its objective of diverting organic waste from landfill and reducing greenhouse gas emissions.

3. Project Boundary

Spatial Boundary

The project is located in the suburb of Philippi in the City of Cape Town in the Western Cape Province of South Africa. Geographic coordinates of the composting site:-34.015618, 18.561343 and -34.010354, 18.603466

Figure 3-1: Location of the project - Cape Town, South Africa

From January 2014 until July 2024 the project was located at Geduld Farm, Weltevreden Road, Philippi, Cape Town. In July 2024 the operation relocated to a new composting facility located at the Philippi Economic Development Initiative (PEDI) corner of Market Road and Stock Road, Philippi, Cape Town where the project is currently operating.

Figure 3-2 Aerial view of the ZTL Organics Weltevreden Road Composting Site January 2014 – July 2024 -34.015618S, 18.561343E

Figure 3-3 Aerial view of the ZTL Organics PEDI Composting Facility July 2024 – present -34.010354S, 18.603466E

Temporal boundary:

Accounting period:

- Start date: 1st April 2022.
- End date: The project will run for an initial period of 3 years after which the baseline will be reassessed.
- Provided the project methodology remains active and relevant in South Africa the project could run for 21 years.

Trading period:

- Starting date (first vintage): 1st April 2022
- End date: 31st March 2025

4. Data Collection

4.1 Organic Waste Composted

Food and garden waste, along with waste from animal mortalities, is co-composted with liquid waste consisting of fats, oils and grease (F.O.G). The means of measuring the different organic waste streams vary (see Table 1), but all the waste streams are measured by mass.

Table 4.1: Data collection methods for waste processed

	Food Waste	Garden waste	Fat trap waste water	Animal Mortalities
Measurement method	Measured using a hanging/platform scale in kg	A density of 300kg/m3 is used and multiplied by the m3 waste collected to determine kg	Each 1000l measured is considered to be 1000kg (density = 1kg/litre)	Measured using a hanging scale in kg

The following tonnages were recorded for the three years 1st April 2022 – 31st March 2025

Table 4.2: Mass of organic waste composted - 1st April 2022 until 31st March 2025

Date	Unit	Food waste	Garden waste	Animal mortalities	Fat trap
1 April 2022/ 31 March 2023	tonnes	667	370	157	305
1 April 2023/ 31 March 2024	tonnes	697	305	19	314

1 April 2024/ 31 March 2025	tonnes	683	330	0	802
Total		**2 047**	**1 005**	**176**	**1 421**

5. Methodology:

This project is based on the following methodologies:

AMS-III.F. Small-scale methodology Avoidance of methane emissions through composting – Version 12.0.

This methodology comprises measures to avoid the emissions of methane to the atmosphere from biomass or other organic matter that would have otherwise been left to decay anaerobically in a solid waste disposal site (SWDS), or in an animal waste management system (AWMS), or in a wastewater treatment system (WWTS). In the project activity, controlled aerobic treatment by composting of biomass is introduced.

AMS-III.H. Methane Recovery in Wastewater Treatment

This methodology was used to determine the avoided emissions of the fat trap waste that was composted by the project. As the sludge from wastewater treatment works is land applied in the City of Cape Town, these emissions were not included in the calculations for eCO_2.

5.1 Baseline Emissions

The baseline emissions are the amount of methane emitted from the decay of the degradable organic carbon in the biomass solid waste. When wastewater is co-composted, baseline emissions include emissions from wastewater co-composted in the project activity.

$BE_y = BE_{\mathrm{CH4},SWDS,y} + BE_{ww,y} - MD_{y,reg} \times GWP_{\mathrm{CH4}}$

Where:

- BEy = Baseline emissions in the year y (tCO2e)
- $\boldsymbol{BE}$**CH4,SW**$\boldsymbol{DS}$**y** = Yearly methane generation potential of the solid waste composted by the project activity during the years x from the beginning of the project activity (x=1) up to the year y estimated as per the latest version of the methodological tool “Emissions from solid waste disposal sites” (tCO2e). The tool may be used with the factor “f=0.1” taking into account the

methane oxidation effect by the upper layer of the landfill. With the definition of year x as 'the year since the project activity started diverting wastes from landfill disposal, x runs from the first year of crediting period (x=1) to the year for which emissions are calculated (x=y)'

- MDy, = Amount of methane that would have to be captured and combusted in the year y to comply with the prevailing regulations (tonne)
- $BEww$, = Where applicable, baseline emissions from the wastewater co-composted, calculated as per the procedures in AMS-III.H (tCO_2e)
- GWP**CH4** = Global Warming Potential for CH4 applicable to the crediting period (t CO_2e/t CH4)

5.2 Estimated CO_2 reduction schedule

According to methodology AMS-III.F. emission reductions are calculated as follows:

In the case of construction of new composting facilities or expansion of capacity of existing composting facilities, the emission reduction achieved by the project activity will be measured as the difference between the baseline emission and the sum of the project emission and leakage.

$$ERy = BEy - (PEy + LEy) \qquad \text{Equation (2)}$$

Where:

- ERy = Emission reduction in the year y (tCO_2e)
- PEy = Project emissions in the year y (tCO_2e)
- LEy = Leakage emissions in year y (tCO_2e)

6. Additionality

The Credible Carbon standard relies on regulatory surplus as the proof for additionality. There is no law in South Africa requiring the composting of organic waste and Greencape evidence suggests that majority of organic waste ends up in landfill. There is, however a 100% organic waste landfill ban coming into effect in 2027 in the Western Cape which would drive the diversion of organic waste from landfill and the growth of organic waste processing facilities.

7. Leakages

7.1. Fossil Fuel Consumption

Diesel and petrol use in the transport vehicles and owned loader is recorded using purchase receipts while diesel used to power the rented loader has been calculated as 2 litres diesel 50pp per hour.

Receipt slips and bank statements were used to determine the amount of petrol and diesel used by the collection vehicles to collect the food and garden waste composter. Fuel usage per hour of use was estimated at 2 litres of diesel per hour for the rented loader and receipts slips for the owned loader.

Table 7.1: Summary of fossil fuel use

	Rented loader diesel	**Owned loader diesel**	**Diesel vehicle**	**Petrol vehicle**
Litres of fuel consumed 1st April 2022 – 31st March 2025	654	1 874	6 132	1 421

Total fuel combustion in vehicles over the period amounted to 8,007 litres of diesel and 1,421 litres of petrol.

Leakages from fossil fuel combustion in vehicles amounted to a total of **27 tCO_2e**, (calculation in Appendix A).

7.2. Emissions generated by the project

The project emissions have been calculated as **379 tCO2e**, (calculations in appendix A).

Table 7.2: Project emissions

Project emissions (PE)	**tonnes CO_2e**	**379**
Fossil fuel project emissions (PE_{FC})	tonnes CO_2e	27,0
Composting methane project emissions (PE_{CH4})	tonnes CO_2e	180,8
Composting nitrous oxide project emissions (PE_{N2O})	tonnes CO_2e	171,1

8. Emissions reduction calculation

The emission reduction has been calculated using the sum of the solid waste and wastewater baseline emissions less the project emissions. A net emission reduction of **5 500 tonnes of CO_2e** has been calculated from the project data between 1 April 2022 – 31 March 2025, (calculations in appendix A).

Table 8.1: Emission reduction calculations

Emission reduction (ER)	**tonnes CO_2e**	**5 500**

Baseline emissions (BE)	**tonnes CO_2e**	**5 879**
Baseline solid waste emissions ($BE_{CH4,SWDS}$)	tonnes CO_2e	5 827
Baseline wastewater emissions (BE_{WW})	tonnes CO_2e	52
Project emissions (PE)	**tonnes CO_2e**	**379**
Fossil fuel project emissions (PE_{FC})	tonnes CO_2e	27,0
Composting methane project emissions (PE_{CH4})	tonnes CO_2e	180,8
Composting nitrous oxide project emissions (PE_{N2O})	tonnes CO_2e	171,1

9. Poverty Alleviation Impacts

The project currently employs 7 staff members, helping to support a total of 22 family members. In line with Credible carbon guidelines, 50% of the net carbon new revenue paid to the project will be transferred to the 7 staff members in the form of education and financial support.

The project contributes to the following SDGs:

Table 9.1: Sustainability Development Goals

	The carbon credits generated through Zero to Landfill Organics will provide sustainable employment for employees assisting them with feeding and educating their children thereby alleviating poverty.
	The project produces compost which can improve crop yields and contributes to food security
	The project ensures low-income individuals can access quality education for their children helping to secure the next generation's future.
	Zero to Landfill Organics provides decent work close to underprivileged areas reducing the costs of traveling far distances to access work opportunities. It also brings economic growth to an underdeveloped area.

	
	Composting of organic waste is a sustainable waste management system for cities and the compost produced enables surrounding communities to benefit from eating food grown locally and greening the area.
	The project reduces greenhouse gas emissions by diverting organic waste from landfills and reducing methane generation

10. Monitoring plan

The Credible Carbon registry requires each monitoring exercise by third-party auditors to answer the following four questions:

1. Is the project real?
2. Is the described technology in place and functioning in accordance with its design specifications?
3. Are the estimates of greenhouse gas emissions reduction reasonable in terms of 'accepted international standards' and unbiased towards buyer or seller?
4. Is there a discernible impact on poverty?

Key aspects of the monitoring plan include:

1. Data generated by the weighing of waste processed and invoices generated for customers of waste collection services. This data is recorded on numbered waste manifest documents and waste record sheets and then summarised in an Excel spreadsheet. Invoices are issued monthly to customers for both waste collected and processed and compost sold.
2. Third-Party Audits: Audits, conducted at a frequency determined by the project, serve as a systematic check to verify the project's adherence to standards.

Appendix A: Detailed calculations for project emissions savings

Composting data

Composted waste

	Units	Food waste	Garden waste	Animal mortalities	Fat trap wastewater
Year 1	m^3		1 233		305
Year 2	m^3		1 017		314
Year 3	m^3		1 100		802
Year 4	m^3				
Year 5	m^3				
Year 6	m^3				
Year 7	m^3				
Year 8	m^3				
Year 9	m^3				
Year 10	m^3				
Density	tonnes solids/m^3		0,30		1,00
Year 1	tonnes	667	370	157	305
Year 2	tonnes	697	305	19	314
Year 3	tonnes	683	330	0	802
Year 4	tonnes		0		0
Year 5	tonnes		0		0
Year 6	tonnes		0		0
Year 7	tonnes		0		0
Year 8	tonnes		0		0
Year 9	tonnes		0		0
Year 10	tonnes		0		0
Total wet mass	tonnes	2 047	1 005	176	1 421

Energy

	Units	Rented loader	Owned loader	Diesel bakkie	Petrol bakkie
Days	number	945	517	1 187	275
Total hours	hours	327,0	[redacted]	[redacted]	[redacted]
Fuel consumption	L/hour	2	[redacted]	[redacted]	[redacted]
Diesel	L	654	1 874	6 132	[redacted]
Petrol	L	[redacted]	[redacted]	[redacted]	1 421
Total diesel	L	8 007			

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Calculation of applicable credits

Summary

Carbon credits are calculated in accordance with CDM *AMS-III.F: Avoidance of methane emissions through composting* , as well as Verra's *Clarifications to AMS-III.F: Avoidance of methane emissions through composting, 2025*

	Units		Comment
Emission reduction (ER)	**tonnes CO_2e**	**5 500**	CDM AMS-III.F: Avoidance of methane emissions through composting: Equation 2
Baseline emissions (BE)	**tonnes CO_2e**	**5 879**	CDM AMS-III.F: Avoidance of methane emissions through composting: Equation 1
Baseline solid waste emissions ($BE_{CH4,SWDS}$)	tonnes CO_2e	5 827	***Based on total methane generation potential (i.e. total methane emissions that will occur over 100-years)***
Baseline wastewater emissions (BE_{WW})	tonnes CO_2e	52	
Project emissions (PE)	**tonnes CO_2e**	**379**	CDM TOOL13 Project and leakage emissions from composting: Equation 1
Fossil fuel project emissions (PE_{FC})	tonnes CO_2e	27,0	
Composting methane project emissions (PE_{CH4})	tonnes CO_2e	180,8	
Composting nitrous oxide project emissions (PE_{N2O})	tonnes CO_2e	171,1	
No leakage as compost is not anaerobically stored or disposed of to landfill			
Global warming potential			
Methane	kg CO_2e/kg	28,0	AR5 - In accordance with Verra *VCS Standard, 2024*
Nitrous oxide	kg CO_2e/kg	265,0	AR5 - In accordance with Verra *VCS Standard, 2024*

Solid waste ($BE_{CH4,SWDS}$)

Calculated in accordance with CDM *TOOL04: Emissions from solid waste disposal sites*

Using updated *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 2* guidance

	Units	Food waste	Garden waste	Animal mortalities	Comment
Dry matter fraction	%	40%	40%	40%	**Food & garden waste**: 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 2: Table 2.4; **Animal mortality waste**: https://www.in.gov/boah/files/Composting_Cattle_WSU_20151.pdf
Degradable organic carbon fraction (DOC)	% of dry mass	38%	49%	62%	**Food & garden waste**: 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 2: Table 2.4; **Animal mortality waste:** 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 2: Table 2.6 (based on total carbon content, as clinical waste in IPCC includes non-degradable carbon items, such as plastics)
Degradable organic carbon fraction that decomposes (DOC_f)	%	70%	70%	70%	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 2: Table 3.0
Methane correction factor (MCF)	%	100%	100%	100%	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 2: Table 3.1 (Managed aerobic landfill, as for CCT municipal and private landfill site)
Half life ($t_{1/2}$)	years	12,0	14,0	14,0	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 2: Table 3.14 (Dry temperature climate as for Cape Town)
Methane fraction of landfill gas (F)	%	50%	50%	50%	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 2: Section 3.2.3
Oxidation factor (OX)	%	0%	0%	0%	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 2: Table 3.2 (As for CCCT municipal and private landfill site)

Mass of decomposable DOC deposited ($DDOC_m$)					2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 2: Equation 3.2
Year 1	tonnes	71,0	50,8	27,1	
Year 2	tonnes	74,2	41,8	3,3	
Year 3	tonnes	72,7	45,3	0,0	
Year 4	tonnes	0,0	0,0	0,0	
Year 5	tonnes	0,0	0,0	0,0	
Year 6	tonnes	0,0	0,0	0,0	
Year 7	tonnes	0,0	0,0	0,0	
Year 8	tonnes	0,0	0,0	0,0	
Year 9	tonnes	0,0	0,0	0,0	
Year 10	tonnes	0,0	0,0	0,0	
Methane generated	tonnes CH_4	144,7	91,2	20,1	See first order decay calculations (FOD) below
Methane emissions	tonnes CH_4	144,7	91,2	20,1	Assuming no methane recovery as for Vissershok private landfill site in Cape Town
Model correction factor					
Factor a	%	2%			CDM TOOL04: Emissions from solid waste disposal sites: Table 3
Factor b	%	10%			CDM TOOL04: Emissions from solid waste disposal sites: Table 3
Factor c	%	5%			CDM TOOL04: Emissions from solid waste disposal sites: Table 3
Factor d	%	0%			CDM TOOL04: Emissions from solid waste disposal sites: Table 3
Factor e	%	0%			CDM TOOL04: Emissions from solid waste disposal sites: Table 3
Factor g	%	20%			CDM TOOL04: Emissions from solid waste disposal sites: Table 3
Model correction factor	%	81%			
Overall methane, incl. correction	tonnes CH_4	117,6	74,2	16,3	**Based on total methane generation potential over 100-year period - Correction according to TOOL04 Equation 1**

Wastewater (BE_{WW})

Calculated in accordance with CDM *AMS-III.H: Methane recovery in wastewater treatment*

Using updated *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 6* guidance

	Units	Fat trap wastewater	Comment
Chemical oxygen demand (COD)	g/L	138	Conservative value based on Lopez et al. (2014) High rate anaerobic digestion of wastewater separated from grease trap waste & Tang et al. (2024) Physicochemical characteristics of grease-trap wastewater with different potential mechanisms of FOG solid formation, separation, and accumulation inside grease traps
COD to sludge	%	12%	CCT 2023 GHG inventory data for City operated WWTPs
COD removal efficiency	%	85%	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 6: Table 6.6B
Methane production potential (B_O)	kg CH_4/kg COD	0,25	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 6: Table 6.2
Methane correction factor (MCF) - Wastewater treatment	%	3%	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 6: Table 6.3 - Wastewater treatment in aerobic WWTP specialising in domestic wastewater (as for CCT WWTPs)
Methane correction factor (MCF) - Effluent	%	11%	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 6: Table 6.3 - Discharge to aquatic environment
Model correction factor	%	89%	CDM AMS-III.H: Methane recovery in wastewater treatment: Equation 2
Incoming COD	tonnes COD	196,1	
Methane emissions from treatment	tonnes CH_4	1,3	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 6: Equation 6.1
Outflow COD in effluent	tonnes COD	29,4	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 6: Equation 6.3D
Methane emissions from treatment	tonnes CH_4	0,8	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 5, Chapter 6: Equation 6.1
Methane emissions, incl. correction	tonnes CH_4	1,9	
No nitrous oxide emissions from fats and grease			
No emissions from sludge, as CCT sludge is applied to land			

Project emissions (PE)			
Calculated in accordance with CDM *TOOL13 Project and leakage emissions from composting*			
	Units		Comment
Diesel - Off-road	kg CO_2e/L	2,90	DFFE (2022) Methodological Guidelines for Quantification of Greenhouse Gas Emissions (calorific values); 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 2, Chapter 3
Diesel - On-road	kg CO_2e/L	2,67	DFFE (2022) Methodological Guidelines for Quantification of Greenhouse Gas Emissions (calorific values); 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 2, Chapter 3
Petrol - On-road	kg CO_2e/L	2,30	DFFE (2022) Methodological Guidelines for Quantification of Greenhouse Gas Emissions (calorific values); 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 2, Chapter 3
Composting methane emissions	tonnes CH_4/tonne	2,00E-03	CDM TOOL13 Project and leakage emissions from composting: Table 2
Composting nitrous oxide emissions	tonnes N_2O/tonne	2,00E-04	CDM TOOL13 Project and leakage emissions from composting: Table 3
No electricity consumption emissions			
Fossil fuel project emissions (PE_{FC})	tonnes CO_2e	27,0	CDM TOOL13 Project and leakage emissions from composting: Equation 4
Composting methane project emissions (PE_{CH4})	tonnes CH_4	6,5	CDM TOOL13 Project and leakage emissions from composting: Equation 5
Composting nitrous oxide project emissions (PE_{N2O})	tonnes N_2O	0,6	CDM TOOL13 Project and leakage emissions from composting: Equation 7
No wastewater run-off emissions as all wastewater contained within container (i.e. no escape to natural environment)			

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First-order decay							
		DDOC accumulated: Equation 3.4			DDOC decomposed: Equation 3.5		
	Units	Food waste	Garden waste	Animal mortalities	Food waste	Garden waste	Animal mortalities
Year 1	tonnes	71,0	50,8	27,1	0,0	0,0	0,0
Year 2	tonnes	141,1	90,2	29,0	4,0	2,5	1,3
Year 3	tonnes	205,9	131,1	27,6	7,9	4,4	1,4
Year 4	tonnes	194,3	124,7	26,3	11,6	6,3	1,3
Year 5	tonnes	183,4	118,7	25,0	10,9	6,0	1,3
Year 6	tonnes	173,1	113,0	23,8	10,3	5,7	1,2
Year 7	tonnes	163,4	107,5	22,7	9,7	5,5	1,1
Year 8	tonnes	154,2	102,3	21,6	9,2	5,2	1,1
Year 9	tonnes	145,6	97,4	20,5	8,7	4,9	1,0
Year 10	tonnes	137,4	92,7	19,5	8,2	4,7	1,0
Year 11	tonnes	129,7	88,2	18,6	7,7	4,5	0,9
Year 12	tonnes	122,4	83,9	17,7	7,3	4,3	0,9
Year 13	tonnes	115,6	79,9	16,8	6,9	4,1	0,9
Year 14	tonnes	109,1	76,0	16,0	6,5	3,9	0,8
Year 15	tonnes	102,9	72,4	15,2	6,1	3,7	0,8
Year 16	tonnes	97,2	68,9	14,5	5,8	3,5	0,7
Year 17	tonnes	91,7	65,5	13,8	5,5	3,3	0,7
Year 18	tonnes	86,6	62,4	13,1	5,1	3,2	0,7
Year 19	tonnes	81,7	59,4	12,5	4,9	3,0	0,6
Year 20	tonnes	77,1	56,5	11,9	4,6	2,9	0,6
Year 21	tonnes	72,8	53,8	11,3	4,3	2,7	0,6
Year 22	tonnes	68,7	51,2	10,8	4,1	2,6	0,5
Year 23	tonnes	64,9	48,7	10,3	3,9	2,5	0,5
Year 24	tonnes	61,2	46,3	9,8	3,6	2,4	0,5
Year 25	tonnes	57,8	44,1	9,3	3,4	2,2	0,5
Year 26	tonnes	54,5	42,0	8,8	3,2	2,1	0,4
Year 27	tonnes	51,5	39,9	8,4	3,1	2,0	0,4
Year 28	tonnes	48,6	38,0	8,0	2,9	1,9	0,4
Year 29	tonnes	45,9	36,2	7,6	2,7	1,8	0,4
Year 30	tonnes	43,3	34,4	7,3	2,6	1,7	0,4
Year 31	tonnes	40,9	32,8	6,9	2,4	1,7	0,4
Year 32	tonnes	38,6	31,2	6,6	2,3	1,6	0,3
Year 33	tonnes	36,4	29,7	6,3	2,2	1,5	0,3
Year 34	tonnes	34,4	28,2	6,0	2,0	1,4	0,3
Year 35	tonnes	32,4	26,9	5,7	1,9	1,4	0,3
Year 36	tonnes	30,6	25,6	5,4	1,8	1,3	0,3
Year 37	tonnes	28,9	24,3	5,1	1,7	1,2	0,3
Year 38	tonnes	27,3	23,2	4,9	1,6	1,2	0,2
Year 39	tonnes	25,7	22,1	4,6	1,5	1,1	0,2
Year 40	tonnes	24,3	21,0	4,4	1,4	1,1	0,2
Year 41	tonnes	22,9	20,0	4,2	1,4	1,0	0,2
Year 42	tonnes	21,6	19,0	4,0	1,3	1,0	0,2
Year 43	tonnes	20,4	18,1	3,8	1,2	0,9	0,2
Year 44	tonnes	19,3	17,2	3,6	1,1	0,9	0,2
Year 45	tonnes	18,2	16,4	3,5	1,1	0,8	0,2
Year 46	tonnes	17,2	15,6	3,3	1,0	0,8	0,2
Year 47	tonnes	16,2	14,8	3,1	1,0	0,8	0,2
Year 48	tonnes	15,3	14,1	3,0	0,9	0,7	0,2
Year 49	tonnes	14,4	13,4	2,8	0,9	0,7	0,1
Year 50	tonnes	13,6	12,8	2,7	0,8	0,6	0,1
Year 51	tonnes	12,9	12,2	2,6	0,8	0,6	0,1
Year 52	tonnes	12,1	11,6	2,4	0,7	0,6	0,1
Year 53	tonnes	11,5	11,0	2,3	0,7	0,6	0,1
Year 54	tonnes	10,8	10,5	2,2	0,6	0,5	0,1
Year 55	tonnes	10,2	10,0	2,1	0,6	0,5	0,1
Year 56	tonnes	9,6	9,5	2,0	0,6	0,5	0,1
Year 57	tonnes	9,1	9,0	1,9	0,5	0,5	0,1
Year 58	tonnes	8,6	8,6	1,8	0,5	0,4	0,1
Year 59	tonnes	8,1	8,2	1,7	0,5	0,4	0,1
Year 60	tonnes	7,7	7,8	1,6	0,5	0,4	0,1
Year 61	tonnes	7,2	7,4	1,6	0,4	0,4	0,1
Year 62	tonnes	6,8	7,1	1,5	0,4	0,4	0,1
Year 63	tonnes	6,4	6,7	1,4	0,4	0,3	0,1
Year 64	tonnes	6,1	6,4	1,3	0,4	0,3	0,1
Year 65	tonnes	5,7	6,1	1,3	0,3	0,3	0,1
Year 66	tonnes	5,4	5,8	1,2	0,3	0,3	0,1
Year 67	tonnes	5,1	5,5	1,2	0,3	0,3	0,1
Year 68	tonnes	4,8	5,2	1,1	0,3	0,3	0,1
Year 69	tonnes	4,5	5,0	1,1	0,3	0,3	0,1
Year 70	tonnes	4,3	4,8	1,0	0,3	0,2	0,1
Year 71	tonnes	4,1	4,5	1,0	0,2	0,2	0,0
Year 72	tonnes	3,8	4,3	0,9	0,2	0,2	0,0
Year 73	tonnes	3,6	4,1	0,9	0,2	0,2	0,0
Year 74	tonnes	3,4	3,9	0,8	0,2	0,2	0,0
Year 75	tonnes	3,2	3,7	0,8	0,2	0,2	0,0
Year 76	tonnes	3,0	3,5	0,7	0,2	0,2	0,0
Year 77	tonnes	2,9	3,4	0,7	0,2	0,2	0,0
Year 78	tonnes	2,7	3,2	0,7	0,2	0,2	0,0
Year 79	tonnes	2,6	3,0	0,6	0,2	0,2	0,0
Year 80	tonnes	2,4	2,9	0,6	0,1	0,1	0,0
Year 81	tonnes	2,3	2,8	0,6	0,1	0,1	0,0
Year 82	tonnes	2,1	2,6	0,6	0,1	0,1	0,0
Year 83	tonnes	2,0	2,5	0,5	0,1	0,1	0,0
Year 84	tonnes	1,9	2,4	0,5	0,1	0,1	0,0
Year 85	tonnes	1,8	2,3	0,5	0,1	0,1	0,0
Year 86	tonnes	1,7	2,2	0,5	0,1	0,1	0,0
Year 87	tonnes	1,6	2,0	0,4	0,1	0,1	0,0
Year 88	tonnes	1,5	1,9	0,4	0,1	0,1	0,0
Year 89	tonnes	1,4	1,9	0,4	0,1	0,1	0,0
Year 90	tonnes	1,4	1,8	0,4	0,1	0,1	0,0
Year 91	tonnes	1,3	1,7	0,4	0,1	0,1	0,0
Year 92	tonnes	1,2	1,6	0,3	0,1	0,1	0,0
Year 93	tonnes	1,1	1,5	0,3	0,1	0,1	0,0
Year 94	tonnes	1,1	1,4	0,3	0,1	0,1	0,0
Year 95	tonnes	1,0	1,4	0,3	0,1	0,1	0,0
Year 96	tonnes	1,0	1,3	0,3	0,1	0,1	0,0
Year 97	tonnes	0,9	1,2	0,3	0,1	0,1	0,0
Year 98	tonnes	0,9	1,2	0,3	0,1	0,1	0,0
Year 99	tonnes	0,8	1,1	0,2	0,0	0,1	0,0
Year 100	tonnes	0,8	1,1	0,2	0,0	0,1	0,0
Year 101	tonnes	0,7	1,0	0,2	0,0	0,1	0,0
Year 102	tonnes	0,7	1,0	0,2	0,0	0,0	0,0
Year 103	tonnes	0,6	0,9	0,2	0,0	0,0	0,0
Year 104	tonnes	0,6	0,9	0,2	0,0	0,0	0,0
Year 105	tonnes	0,6	0,8	0,2	0,0	0,0	0,0
Year 106	tonnes	0,5	0,8	0,2	0,0	0,0	0,0
Year 107	tonnes	0,5	0,8	0,2	0,0	0,0	0,0
Year 108	tonnes	0,5	0,7	0,2	0,0	0,0	0,0
Year 109	tonnes	0,5	0,7	0,1	0,0	0,0	0,0
Year 110	tonnes	0,4	0,7	0,1	0,0	0,0	0,0

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