# Mid Devon District Council: Three-Weekly Residual Waste Collections Carbon Emissions Analysis

**Date: 9th November 2021**

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## 1.0 Introduction

Eunomia calculated the reduction in carbon emissions achieved through the implementation of a three-weekly residual waste collection trial undertaken by Mid Devon District Council (MDDC).

The trial aimed to measure the impact of a reduced residual waste collection frequency in two types of area:

- rural, where recycling rates were already relatively high; and
- urban, where recycling rates were generally lower.

Two different sets of rules were trialled:

- a "wheeled bin" trial where residents were not allowed to present any residual waste outside their wheeled bin (a 'no side-waste' policy), placing a firm limit on capacity; and
- a "normal" trial where capacity restrictions did not apply, and residents could present any extra waste alongside their bin.

The calculations were based on residual waste and recycling arisings data collected from the trial period, (July to August), and baseline data captured in mid-2021 (May to June). We have applied specific carbon factors to the changes in residual waste arisings based on the type of material collected and the method of disposal, as well as calculating carbon emissions reductions from recycling.

## 2.0 Assumptions

The following assumptions were taken from Eunomia's recent carbon analysis for Devon County Council (DCC):

- the composition of residual waste;
- the disposal methods; and
- the compositional split of mixed plastics and cans.

It is important to note that the MDDC baseline data provided was collected during a Covid-19 lockdown, whilst the trial took place at a point when fewer restrictions were in place and residents likely produced less waste at home. MDDC therefore supplied additional data from 2019 so that a comparison of arisings could be made between periods of lockdown in 2021 ('Covid conditions') and normal circumstances ('non-Covid conditions'). This 2019 data was assumed to be representative of the non-Covid conditions in the trial areas. We have

compared the carbon emissions resulting from collections during the trial period against both a non-Covid baseline and Covid baseline. This allows MDDC to see both the actual differences between the baseline and trial period, and the difference that implementing three-weekly collections might make under non-Covid conditions.

# 3.0 Results

The areas modelled are described in Table 1. The number of households and the 2021 waste arisings baselines for residual and recycling waste are also shown.

### Table 1: Description of modelled areas

| Area | | Households | 2021 baseline fortnightly tonnage | |
|---|---|---|---|---|
| | | | Residual waste (weekly average) | Recycling (weekly average) |
| Urban | Wheeled Bin | 530 | 5.25 | 1.85 |
| | Normal | 581 | 3.23 | 2.00 |
| Rural | Wheeled Bin | 151 | 0.95 | 0.66 |
| | Normal | 151 | 0.66 | 0.68 |

Our analysis of the effects of the trial indicate that the trial brought about considerable carbon emissions reductions per week compared to the Covid baseline, especially in the urban trial area. The results of the modelling are presented in Tables 2 to 4. The total reductions per week for each trial period are presented in Figure 1, which compares the trial results to the non-Covid influenced baseline.

### Table 2: Residual waste arisings and carbon emissions reductions per week, tonnes CO2 per week

| Residual Waste | Area | Covid Baseline - Average tonnes of waste per week | Trial - Average tonnes of waste per week | Difference – tonnes of waste | Carbon Emissions reductions per week - Tonnes $CO_2eq$ |
|---|---|---|---|---|---|
| Urban | Wheeled Bin | 5.25 | 2.94 | -2.31 (-44%) | **-0.85** |
| | Normal | 3.23 | 2.45 | -0.78 (-24%) | **-0.28** |
| Rural | Wheeled Bin | 0.95 | 0.67 | -0.28 (-30%) | **-0.11** |
| | Normal | 0.66 | 0.62 | -0.04 (-6%) | **-0.02** |
| | | | **Total** | **-3.41 (-34%)** | **-1.25** |

Table 2 shows that the trial saw decreases in residual waste arisings in three of the four trial areas. The greatest decrease in residual waste collected was in the urban wheeled bin area

(-2.31 tonnes per week, or a 44% decrease) where side-waste was not allowed. This resulted in a carbon emissions reduction of roughly 0.85 tonnes of $CO_2$eq per week. The only area in which no real decrease was achieved was in the rural, normal area, where recycling performance was already good. This area saw a very slight decrease in residual arisings, although the figure (40 kgs per week) is so small that this is effectively "no change". The total carbon emissions reduction as a result of reduced residual waste arisings across all areas was 1.25 tonnes of $CO_2$eq per week.

### Table 3: Recycling material arisings and carbon emissions reductions per week, tonnes $CO_2$ per week

| Residual weeks | Area | Covid Baseline - Average tonnes of recycling per week | Trial - Average tonnes of recycling per week | Difference – tonnes of recycling | Carbon Emissions reductions per week - Tonnes $CO_2$eq |
|---|---|---|---|---|---|
| **Urban** | **Wheeled Bin** | 1.85 | 1.86 | 0.02 (1%) | **-0.14** |
| | **Normal** | 2.00 | 1.99 | -0.01 (-1%) | **0.07** |
| **Rural** | **Wheeled Bin** | 0.66 | 0.72 | 0.06 (9%) | **-0.01** |
| | **Normal** | 0.68 | 0.71 | 0.03 (5%) | **0.02** |
| | | | Total | **0.10 (2%)** | **-0.04** |

Table 3 shows that there were smaller increases in the amount of recyclable material collected per week in all areas apart from in the urban, normal area. Additional recycling results in carbon emissions reductions, as it reduces the need for carbon-intensive primary production of materials. The total carbon emissions reduction as a result of additional recycling across all areas was 0.1 tonnes of $CO_2$e per week.

Under lockdown, household residual waste in MDDC increased by 0.64%, leading to higher emissions. Additionally, the quantity of recycling increased substantially for all material types, apart from paper, which saw a 23% decrease. Notably, there was a substantial increase (+71%) in aluminium cans collected under lockdown conditions. Recycling aluminium brings the greatest carbon emissions reduction per tonne of any of the materials MDDC collects for recycling, because primary production is highly energy intensive while the secondary production of aluminium has a substantially (~95%) lower energy requirement.

### Table 4: Total carbon emissions reductions under Covid conditions versus non-Covid conditions, tonnes $CO_2$ per week

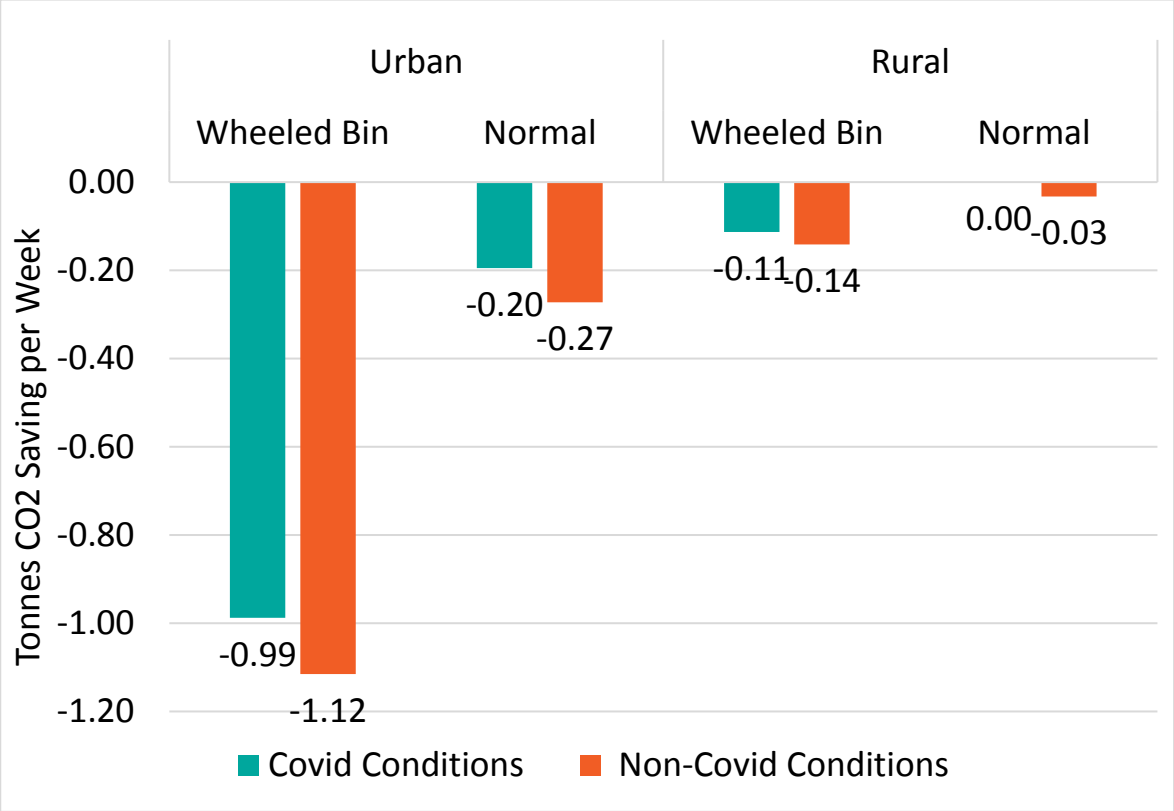
| Recycling + Residual weeks | | Total carbon emissions reductions, tonnes CO-2eq per week (Covid conditions) | Total carbon emissions reductions, tonnes CO-2eq per week (Non-Covid conditions) | Difference, tonnes CO2eq per week |
|---|---|---|---|---|
| **Urban** | **Wheeled Bin** | -0.99 | -1.12 | **0.13** |
| | **Normal** | -0.20 | -0.27 | **0.08** |

| | | | | |
|---|---|---|---|---|
| **Rural** | **Wheeled Bin** | -0.11 | -0.14 | **0.03** |
| | **Normal** | 0.00* | -0.03 | **0.03** |
| **Total** | | **-1.30** | **-1.56** | **0.26** |

***Note: *0.0002 tonnes CO2eq per week rounds down to 0.00***

Table 4 and Figure 1 show that the difference between Covid and non-Covid conditions means that when the data is compared against the Covid baseline, the carbon savings are lower (by 0.26 tonnes of $CO_2$ per week) than when compared against the non-Covid baseline. However, three-weekly collections result in a substantial decrease in carbon emissions per week, whichever baseline is chosen for comparison.

**Figure 1: Total carbon emissions reductions for trial areas under Covid versus non-Covid conditions, tonnes $CO_2$eq per week**




# 4.0 Conclusions

The results of the trial show that three-weekly collections resulted in a reduction in residual waste of 3.41 tonnes of waste (-34%) and an increase in recycling of 0.10 tonnes (+2%). It is unclear whether the 3.32 tonnes difference represents waste prevented or waste diverted to other disposal routes such as HWRCs.

The reduction in residual waste was greatest (44%) in the urban, wheeled bin trial area. This is likely to be because where side-waste is not allowed, there is a greater incentive for residents to decrease the amounts of material they put in the residual waste. There was no

reduction in residual waste in the rural, normal area, where recycling performance was high and side-waste was permitted. It is likely that in this area, residents were already making good use of their recycling containers and few people were meaningfully constrained by how much residual waste they could present.

There was an increase in recycling in all trial areas. The increase was greatest in the rural areas, increasing by 9% in the rural, wheeled bin area and 5% in the rural, normal area. There was no significant reduction in residual waste in the rural areas; this is less likely to be due to the space constraint imposed by the three-weekly collection trial than to the communications surrounding it. The increase in recycling in the two urban trial areas was very similar.

In total, the trial has saved MDDC's waste service 1.3 tonnes of $CO_2e$ per week. This is the equivalent of driving a standard car[1] to Spain (c.1000 miles) and back, 3 times each week.

Overall, the trial suggests that three-weekly collections, if rolled out across the district, would decrease residual waste and increase recycling, resulting in savings in $CO_2eq$ emissions and that the effect would be greatest if side-waste is not allowed.

[1] A standard car emits roughly 0.228 kg $CO_2$ / mile https://www.nimblefins.co.uk/average-co2-emissions-car-uk