



Flexible Plastic Fund FlexCollect Project

Interim report

Produced on
behalf of the

Flexible
**Plastic
Fund**



The Flexible Plastic Fund FlexCollect Project is funded by:



Brands supporting the Flexible Plastic Fund:



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Executive summary

Flexible plastic packaging – from bread bags to crisp packets, confectionery wrapping and food pouches – is currently not commonly collected by local authorities in the UK. However, the revised UK Packaging Extended Producer Responsibility (pEPR), Simpler Recycling for England and similar proposals for the Devolved Authorities require the collection of these packaging types by March 2027.

Current estimates show that over 215 billion items of flexible plastic packaging, equalling 895 thousand tonnes, is placed on the market each year in the UK. Less than 15% of all waste collection authorities **collect flexible plastic packaging**¹ (FPP) and those who do predominantly offer a limited service.

A project consortium, including SUEZ recycling and recovery UK, WRAP, RECOUP and Ecosurety, have joined forces to trial the kerbside collection of flexible plastic packaging across nine waste collection authorities over three years.

This innovative project will help industry and government understand how a flexible plastic packaging collection service can be implemented across a range of collection systems, population densities and socio-demographics.

This project is funded by both industry and government, with contributions from the Flexible Plastic Fund, Defra, UK Research and Innovation's Smart Sustainable Plastic Packaging Challenge delivered by Innovate UK, and Zero Waste Scotland.

The Fund was established in May 2021 by five founding partners: Mars UK, Mondelēz International, Nestlé, PepsiCo and Unilever. Partners of the Fund now include Abel and Cole, Eat Real, Ella's Kitchen, Kiddylicious, Koninklijke Douwe Egberts, KP Snacks, Lotus Bakeries, McCain Foods, Natural Balance Foods, Ocado Retail, pladis, Proper Snacks, The Collective, Vitaflo and Yeo Valley Organic.

This report shares the project findings at the midpoint of the trial. At the time of writing, seven waste collection authorities have launched the trial collection service for flexible plastic packaging across a subset of houses.

¹ <https://www.recoup.org/research-and-reports/uk-household-plastic-packaging-collection-survey-2022>

Figure one • Summary of waste collection authority pilots

Pilot and launch date	Area type	Pilot size (households)	Service type	Material collected	Collection method
Cheltenham October 2022	Urban, low deprivation	3,154	Fortnightly source segregated	All flex	Clear/blue printed collection bags in with rigid plastic and cans / any container
South Gloucestershire October 2022	Suburban, mixed low deprivation	1,955	Weekly source segregated	PE and PP only	Clear/blue printed collection bags in with rigid plastic and cans
Maldon January 2023	Rural, low deprivation	7,719	Fortnightly twin stream, glass separate	All flex	Purple printed collection bags, collected on separate vehicle
Somerset May 2023	Rural, medium deprivation	3,641	Weekly source segregated	PE and PP only	Blue printed collection bags collected alongside cans and plastic
Newcastle City June 2023	Urban, high deprivation	7,232	Fortnightly twin stream (240l wheeled bin with insert for glass)	PE and PP only	Blue printed bags collected alongside plastics, cans and fibre in blue wheeled bin via split back refuse collection vehicle (RCV)
Re3 – Reading September 2023	Urban, low deprivation	4,100	Fortnightly comingled (240l wheeled bin), bring bank glass	PE and PP only	Blue printed bags collected alongside plastics, cans and fibre in red wheeled bin via single compartment refuse collection vehicle (RCV)
North Herts November 2023	Suburban, low deprivation	2,174	Fortnightly twin stream with paper separate in a box	PE and PP only	Blue collection bags presented in, on top of or next to their paper box

Key findings

A consistent set of data and method of collection has been implemented across all pilot authorities. In all instances, the trial has provided participating households with a bag to collect the flexible plastic packaging. The bag enables granularity of data and facilitates the separation and consolidation once collected.

In all cases, flexible plastic packaging collections have been added seamlessly to existing collection services.

Although flexible plastic packaging is voluminous, the collection bags are able to withstand significant compaction and there have been no reported capacity issues in refuse collection vehicles or resource recovery vehicles.

A key point to explore in the second half of the trial is whether collections can be moved away from bags in some collection systems.

Figure two • Operational data key findings

Parameter	Data
Average weight presented by participating households per collection bag across all pilots	291g
Average weight collected per household per week across all pilots ²	84g
Bags collected per household per week across all pilots	0.29
Bags collected per household per week for weekly collections	0.46
Bags collected per household per week for fortnightly collections	0.17
Industry standard participation across monitored pilots	60%
Industry standard participation across weekly collection pilots	64%
Industry standard participation across fortnightly collection pilots	47%

² Average weight collected per household per week across all pilots is a measure including all households within the trial area who are eligible to participate, not just those who are participating.

Doorstep research

Doorstep research was conducted to understand resident awareness of and satisfaction with the trial service and associated communications.

A combination of effective communications and availability of collection bags are essential to achieving and maintaining good participation and performance levels. The distribution of both communications and collection bags has to be comprehensive for services to achieve good performance levels. The availability of bags and the ease of obtaining more are also key determinants of good long-term performance.

Further work into the frequency of communications and bag replenishment is required to make further conclusions.

The findings of the doorstep research are summarised here.

Figure three • Doorstep research key findings (%)

	South Gloucestershire	Newcastle	Cheltenham	Maldon
Aware of pilot	95	89	76	68
Received comms	93	77	73	56
Received bags	95	91	43	75
Received comms and bags	91	76	41	54
Recycling 1+ item in pilot (all households)	81	65	42	42
Recycling 1+ item in pilot (received comms and bags)	85	74	93	71
Very / fairly satisfied with pilot (those participating)	96	95	96	89
Service very / fairly well communicated (those receiving all comms)	91	89	98	85

Composition and end markets

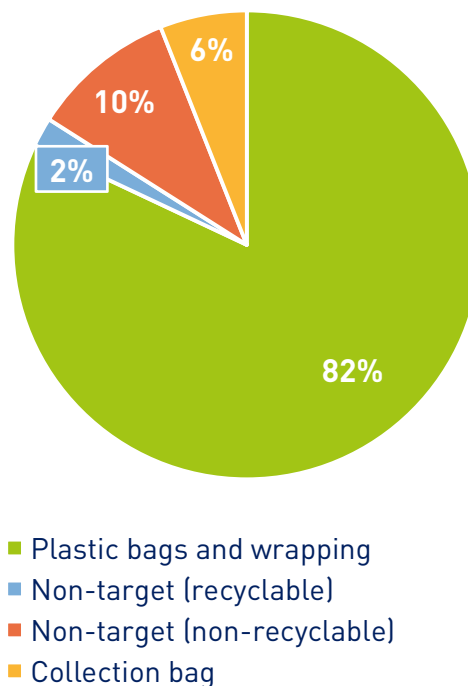
Material composition was analysed across each pilot authority collection area. The overriding observation across all analyses is that the flexible plastic packaging material collected is largely target material and is predominantly clean. The overall composition of the flexible plastic packaging is shown here in figure four.

The availability of effective sorting infrastructure is currently a barrier to widespread collection and reprocessing of flexible plastic packaging. This is a known challenge related to the current lack of collections and reprocessing infrastructure

Reprocessing trials have started with encouraging results but have been limited by the amount of material collected. The pace of this project will increase with the expansion of the pilots and more material being collected enabling more expansive sorting and recycling trials.

As collections, sorting and recycling trials are still being undertaken and the process 'industrialised', we have chosen not to include costs in this report at this time. Costs for different collection and sorting options are a key area of work for the second half of the project.

Figure four • Flexible plastic packaging composition (%)



Next steps

A further two pilot authorities are set to join the project in early 2024. Following these, the focus will be on expanding the trials within each pilot authority to representative communities. As it stands, all pilots are set to expand from a few thousand households to tens of thousands, bringing collections and sorting learning at scale.

Additional rounds of data collection will commence across the expanded trials and further composition work will be undertaken.

As more material is collected, further end market options will be tested and the project will begin to establish the framework for understanding cost per tonne of collections, sorting and reprocessing.

Introduction

It's estimated that over 215 billion items of flexible plastic packaging are placed on the market in the UK each year, amounting to **around 895,000 tonnes**³. Less than 15% of UK waste collection authorities collect any form of **flexible plastic packaging (FPP)**⁴ and many only collect a very small subset of the range of packaging types available.

The Flexible Packaging Consortium⁵ estimated the following breakdown of packaging materials, items and tonnes.

Figure five • Packaging items, materials and tonnes

Type	Tonnes	Number of packs	Share of materials
PE mono	~430,000	~105 billion	48%
PP mono	180,000	~42 billion	20%
PE/PP mix	~15,000	~4 billion	2%
Metalised layer with plastic	~60,000	13 billion	7%
Aluminium layer with plastic	~120,000	31 billion	13%
All other forms of flexible plastic packaging	90,000	20 billion	10%

UK Government has proposed a new Packaging Extended Producer Responsibility (pEPR) system and Simpler Recycling which will require a target list of packaging items to be collected from households and businesses. This list includes a range of flexible plastic packaging items which must be collected at kerbside by March 2027.

³ www.suez.co.uk/en-gb/news/210219-leading-household-brands-join-forces-to-tackle-flexible-plastic-packaging-recycling-in-the-uk

⁴ www.recoup.org/research-and-reports/uk-household-plastic-packaging-collection-survey-2022

⁵ www.suez.co.uk/en-gb/news/210219-leading-household-brands-join-forces-to-tackle-flexible-plastic-packaging-recycling-in-the-uk

In a number of European Countries, flexible plastic packaging is commonly collected, sorted and recycled. In these countries, the value chain supporting collection and sorting has developed and matured and the system is working effectively.

In contrast, in the UK, there is a lack of collections of flexible plastic packaging and the value chain is immature. There is also limited information on how effectively households could separate these items for collection for recycling, and how the value chain would need to develop to accommodate the sorting and treatment of flexible plastic packaging items.

Trials are intended to push boundaries to see where failures do or might occur and the learnings from challenges experienced during the trials will be harnessed to optimise the future widespread roll out of collections of flexible plastic packaging for recycling.

Project partner roles and responsibilities

Flexible Plastic Fund

Majority project funder.

SUEZ recycling and recovery UK

Project delivery, recruitment of waste collection authorities, work programmes, project management and data collation.

Recoup

In-kind funding contribution, materials testing and end markets.

WRAP

In-kind funding contribution, design and management of householder communications of the trial services, data collection, validation and local authority selection.

Ecosurety

Part-funder, managing Flexible Plastic Fund funding, the Innovate UK project, external project communications and payments to pilot authorities for services delivered.

Defra, UK Research and Innovation's Smart Sustainable Plastic Packaging Challenge Fund, delivered by Innovate UK (UKRI SSPP) and Zero Waste Scotland

Funders.

Defra, Zero Waste Scotland, and the stakeholder panel (including CIWM, ESA, LARAC and others from across the sector)

Review progress and data, provide feedback and guidance to the project team.

Pilot waste collection authorities and their contractors

Work with SUEZ, Recoup and WRAP to design and deliver kerbside collections of flexible plastic packaging, to offer insights on trial data using their skills and knowledge, and to provide peer support to other authorities.

Pilot waste collection authorities

- + Cheltenham Borough Council
- + South Gloucestershire Council
- + Maldon District Council
- + Newcastle City Council
- + Somerset Council
- + Reading Borough Council
- + North and East Hertfordshire Council
- + Bracknell Forest Council

Waste collection and disposal contractors supporting the local authority pilots

- + SUEZ recycling and recovery UK
- + J&B Recycling
- + FCC Environment
- + Pearce Recycling
- + Urbaser
- + Essex Reclamation

Brands supporting the Flexible Plastic Fund

Abel & Cole
Easy Organic Everything

Eat Real

Ella's
kitchen

JDE
JACOBS DOUWE EGBERTS

KIDDYLICIOUS

KP Snacks

Lotus
Since 1932

MARS
Tomorrow starts today

McCain
We are family

Mondelez International
SNACKING MADE RIGHT

natural balance foods
WHOLEFOOD WONDERS

Nestlé

Cocado

PEPSICO

pladis

PROPER

COLLECT FIVE

Unilever

VitaFlo
Enhancing Lives Together

Yeo Valley ORGANIC

Objectives

With the volume of flexible plastic packaging placed on the market and the limited collections currently undertaken, the Flexible Plastic Fund approached SUEZ to design a trial to deliver the following outcomes:

- + Determine arisings per household that could regularly be put out for recycling.
- + Determine likely participation rates across a range of different local authority types, taking into account population density and socio-economic factors.
- + Determine how to effectively communicate to households the types and range of flexible plastic packaging that can be collected.
- + Determine options for the co-collection of flexible plastic packaging with other packaging formats and material types.
- + Experiment at an approximate 5% of household level before expanding participation in selected waste collection authorities, using the learnings from the experimental stage to scale up collections.
- + Use the weight of collected items to determine likely volumes arising from different household types and to identify socio-economic factors that may impact on collection and putout rates.
- + Collect sufficient materials for sorting and recycling trials (both mechanical and chemical recycling) to provide evidence of the opportunities and challenges that may arise when collections are rolled out nationally.
- + Provide information on costs for collecting, sorting and recycling to inform the modulation of packaging cost profiles and the design of an efficient and effective extended producer responsibility system.

The scope of the project was discussed and refined with Defra, WRAP and Recoup before an application was made to UK Research and Innovation's Smart Sustainable Plastic Packaging Challenge Fund for funding support. Approximately two thirds of the costs of the FlexCollect project are supported by the Flexible Plastic Fund and the remaining third by funding from Innovate UK, Defra and Zero Waste Scotland.

The original three-year project timeline was designed to integrate with the then proposed commencement of extended producer responsibility funding in early 2025. The impact of delays to the commencement of the packaging extended producer responsibility funding system on the project are currently being analysed at the time of writing this report.

Data gathering

Methodology

A consistent methodology for generating and gathering data was established across the pilot authorities to create consistency of data whilst accommodating the resources and capabilities of individual authorities. There have been some disruptions to data collection due to adverse weather, operational issues and industrial action.

The goal was to achieve Defra data standard requirements, in order to calculate data on participation across three consecutive collection cycles twice per year. To achieve this, bags were collected at each depot over a collection cycle and compared to the number of houses in the trial area.

As pilot authorities commence the trial service at approximately 5% of households, all bags collected across the collection cycle were counted. As trials expand the number of households involved, the counts will move towards representative subsets rather than the whole number.

Where possible, materials were isolated for each cycle and by round so that comparisons between the different housing types and socio-demographic groups could be made.

This was not possible on all trials due to operational constraints, such as space limitations or the requirement to bulk material at a transfer station prior to removing the bags.

Participation

As a proxy for participation and to complement actual participation surveys, a weekly set-out rate monitoring system has been established. This applies the total number of bags collected over the collection cycle to the number of households in the trial area. For example, if 40 bags were collected from 100 properties then the proxy calculation would indicate a 40% participation rate for that cycle.

This proxy for participation accounted for different collection cycles. For example, a household with an opportunity to present weekly and who presents once every two weeks (or three depending on the cycle) would be classed as participating in the same way as a two-weekly cycle household presenting each fortnight.

Figure six • Data gathering methodology

Collection frequency	Bags presented	Presentation frequency	Participation proxy
Weekly	1	Weekly	1
Weekly	1	Fortnightly	0.5
Fortnightly	1	Fortnightly	0.5
Fortnightly	2	Fortnightly	1

The limitation of this methodology is that it does not account for households presenting multiple bags per cycle. Similarly, participation is defined as presentation of material once within three collection cycles, therefore the data gathered at the depot can only be applied to a single collection cycle.

To mitigate these limitations, the additional collection of participation data to Defra's standards was conducted at the kerbside in partnership with Resource Futures. Kerbside presentation was monitored in South Gloucestershire, Somerset and Maldon. The teams monitored participating households over three consecutive collection cycles. 1,589 properties were monitored in South Gloucestershire, 1,610 in Somerset and 3,361 in Maldon.

Further kerbside monitoring is planned in 2024, however this will be limited to the areas where flexible plastic packaging is presented external to co-mingled collection containers. Where bags are presented inside co-mingled collection containers, kerbside monitoring is not possible.

Weight

Bag weights were monitored at the same time as bag counts were undertaken. Calibrated scales were supplied to each trial to determine the total weight of bags. The total weight was then divided by the number of bags counted, to calculate an average bag weight and an average weight of material presented per household (participating or not).

Volume

The volume of collected flexible plastic packaging material was not measured consistently across the pilots due to variations in the approach to collection and compaction. However, the volume of an individual bag was measured as 15 litres or 0.015m³ (weighing approximately 300g).

To make a 500kg bale, approximately 1,650 bags are required (assuming an average bag weight of 300g). Uncompacted, this quantity of bags would take up approximately 25m³, roughly equivalent to the capacity of a 35-yard skip.

The ability of collection bags to be compacted is significant. There have been no reported capacity issues in refuse collection vehicles or Romaquips, as bags compact in both vehicles.

Some trials are able to increase the capacity of holding skips by compacting bags with heavy machinery (loading shoves, grabs, etc). For example, for Newcastle's material, J&B Recycling have compacted ~4 tonne of material into a 35-yard skip, producing eight bales weighing approximately 500kg. These figures will include some water weight where the skip is stored outside prior to baling.

Further work is required over the remainder of the project to effectively account for the impact of operational sites on the volume of material required to be stored before baling can occur. The key conclusion at this stage is that significant space is expected to be required to store collected material prior to baling.

Costs

A clear budgetary monitoring framework was established for each pilot authority, allowing costs at each stage of the trial to be understood.

Costs for the trials covering 5% and 25% of households were expected to be higher per bag or per tonne collected, than for a universal service. Although consolidation bags have been used in all collections so far, the cost of bags and alternative consolidation methods are being considered in the scale up process, to see if trials of loose collections may be possible.

One limitation to this change is the lack of sorting infrastructure in the UK, which was anticipated given flexible plastic packaging items have not and are not currently targeted for collection, sorting, or recycling. This has and continues to be a clear limitation for the trial to experiment with other collection techniques.

Similarly, end market tests for sorting and recycling have been limited by access to appropriate facilities in the UK and the generation of available tonnage for large scale tests. As more trials have commenced and the number of households involved increases, it has been possible to send 20 tonne sample sets to operators for trials and as more trials expand, it is anticipated that larger sorting and recycling trials will be possible.

Costs for trials of materials require operators to implement non-standard procedures at their sites and, as such, costs incurred are not those expected for long-term standard operating costs for sorting and processing flexible plastic packaging materials.

Given the early stage and limited scale trials underway at the time of writing, no sorting and recycling costs have been included. These will be presented in the project final report.



Pilot overview

More than 50 waste collection authorities contacted SUEZ expressing interest in participating in the project.

Each waste collection authority was taken through a review process that comprised:

- + An assessment of their demographic profiles, their current dry recycling collection methodology and the potential to expand a trial in accordance with the expected expansion targets.
- + Dialogue with their operational partners (in-house or contracted) on collections, roll out, sorting and handling of the materials collected.
- + Discussions around the cost of delivery and expansion.

Based on these discussions, a shortlist of waste collection authorities was agreed by the project partners for rollout. Each waste collection authority was contracted to deliver their components of the trial and to receive payments and support for delivery.

The current set of pilot authorities is listed in figure seven together with the headline determinants of their demography, their collection system, chosen target material and planned expansion profile. It was originally intended to recruit nine waste collection authorities in three distinct phases, the first (pioneer) with the intent to operate for three years and expand participation each year, the second and third (industrialisers) would also expand but to a lesser extent than the first phase.

In a number of instances, trials did not proceed due to insufficient capacity at the transfer or sorting stations. One area where the trial has developed understanding, is the amount of space the uncompacted collected flexible plastic packaging materials occupy and the amount of flexible plastic packaging required to make one bale of material. Space for storage pre-baling is a key aspect of operational learning that will be a focus for expansion and a design matter for rollout at a national level.

Local authority selection

Following initial screening of interested waste collection authorities, appointment was determined by a combination of their demographics and their collection service type.

The trial aimed to accommodate a representative range of demographics and service types to create an evidence base that would be relevant to most waste collection authorities for learning and good practice.

Coverage was achieved across a range of urban, rural and suburban waste collection authorities, with deprivations (for the selected trial areas in each waste collection authority) ranging from low, through medium to high.

Collection methods varied from source segregated on a weekly or fortnightly basis to multi-mingled and fully co-mingled.

Operational considerations

Details of collections

At the approximate 5% of households level, collections are being made using plastic bags provided to each participating household. Each bag is specifically labelled for the trial and most are blue in colour for ease of recognition. Where blue is not used, this has been particular to a pilot authority where similar blue bags were already in use. Gauge (thickness) of bag was determined by collection method, with the thickest bags generally used in co-mingled collections where compaction of collected materials was undertaken. When undertaking compositional or weight testing, the presence or weight of the bag was taken into account.

Material type

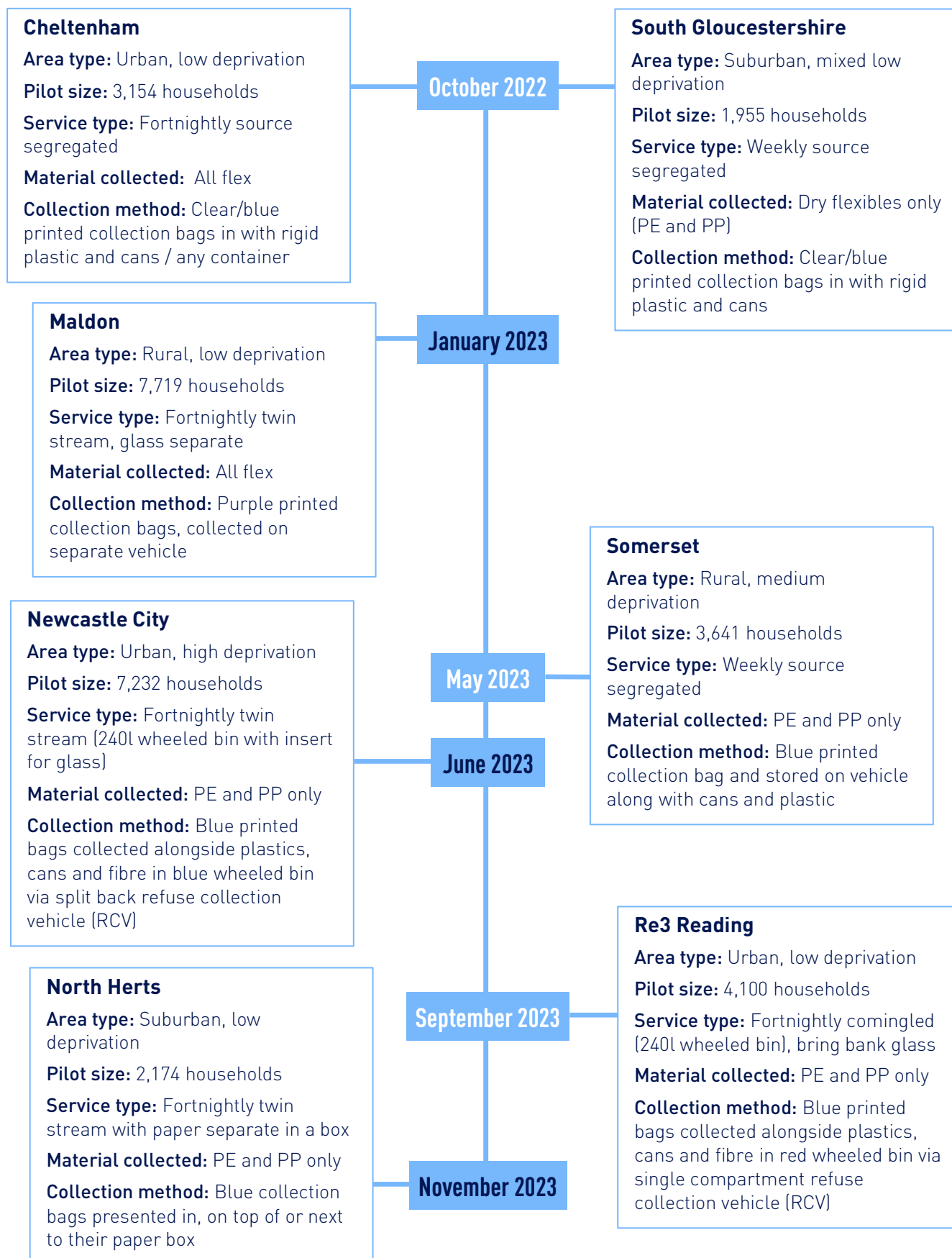
Householders were asked to present one of two sets of materials:

- ⊕ All flexible plastic packaging (two trials currently, with one further planned).
- ⊕ Flexible plastic packaging comprised of PE and PP polymer types (the remainder of the trials).

In both instances, householder communications sought to identify the packaging types (bread bag, etc) using simple and commonly known language and groupings (e.g. confectionery wrappers). Compositional analysis was used to check compliance with the material specification.

Details of pilots selected

Figure seven • Waste collection authority pilots



Cheltenham Borough Council

The trial launched in October 2022 with 2,072 households. Residents were provided with a clear collection bag and asked to present it alongside their recycling in an existing recycling box. The bags were collected by crews in the top compartment of the Romaquip vehicle, together with plastics and aluminium and steel cans. Additional compartments were also trialled, including the paper compartment (using hessian sacks to divide) and the locker compartment. Both were found to have limited capacity for the flexible plastic packaging.

At the depot, trucks tip the mixed plastics, cans and flexible plastic packaging in a separate bay. The material is then batch processed with bags removed over a processing line. Flexible plastic packaging material is stored in a skip on site until enough is collected to bale. In September 2023, the trial was expanded, taking the total to 3,156 households. For the expansion, blue bags were used to aid the sorting process.

South Gloucestershire Council

The trial launched in October 2022 with 1,995 households. Similar to Cheltenham, residents were provided with a clear collection bag and asked to present in an existing recycling box. The bags were collected in the top compartment of the Romaquip with plastic and cans and tipped in a separate bay at the depot. The trial later switched to blue bags to aid sorting.

There is no processing line at the depot, so the flexible plastic packaging material is removed manually by operatives using litter picking equipment. On expansion, the mingled cans, plastics and flexible plastic packaging material will be bulked at the depot and picked at the materials recycling facility.

Maldon District Council

The trial launched in January 2023 with 7,817 households. Residents were provided with a purple collection bag and asked to present flexible plastic packaging material alongside their other recyclables. Maldon collect co-mingled material (excluding glass) in a disposable pink bag.

A separate pass collection was tested in Maldon, using a two-person crew and cage tipper vehicle. Although collected separately, bags are presented on the same day as other recycling collections to give flexibility to collect the bags alongside other materials in the future.

Material is tipped separately at the materials recycling facility and baled. Flexible plastic packaging collections will be collected in the refuse collection vehicle when the project expands in 2024.

Newcastle City Council

The trial launched in June 2023 with 5,036 properties in the eastern part of the city. Households were provided with a collection bag and asked to present this inside their co-mingled bin for later separation at the materials recycling facility. Material from the trial routes is tipped and bulked separately at the transfer station, allowing it to be batch processed at the J&B Recycling materials recycling facility in Hartlepool.

The trial expanded in October 2023 to a new total of 7,676 properties, maximising the capacity of the bulk transport between the transfer station in Newcastle and the materials recycling facility in Hartlepool.

Somerset Council

The trial launched across six collection routes in Frome in May 2023, totalling 3,641 households. Similar to the other source segregated collections, bagged flexible plastic packaging is collected alongside cans and plastics in the Romaquip and later removed over a processing line at the depot in Evercreech.

Reading Borough Council

Reading Borough Council commenced collection in September 2023, with 4,100 households in the city centre being asked to present bagged flexible plastic packaging in their co-mingled bin. The collection bags are later removed over a processing line at the re3 materials recycling facility operated by FCC Environment.

North and East Hertfordshire Council

The North and East Hertfordshire service launched on 14 November 2023 with 2,174 households in the village of Knebworth.

Three routes from Knebworth were selected for their proximity to the Pearce Recycling materials recycling facility in St Albans, allowing material to be direct delivered and isolated through the process. Bagged flexible plastic packaging is collected alongside paper in the split-back vehicles and removed manually on site. Bags will also be trialled in the cans, plastics, cardboard and glass compartment of the vehicle.

Bracknell Forest Council

The service in Bracknell is scheduled to launch in Q1 2024 with up to 10,000 households. The bagged flexible plastic packaging will be collected in the co-mingled bin and later removed at the re3 / FCC Environment materials recycling facility.

Pilot authority 9

Planning and development work for the ninth and final trial is underway and it is expected to launch in Q1 2024.

Initial findings

Cheltenham

Two distinct housing areas were selected to be part of the project, the Benhall estate and the Wymans Brook estate. Several Romaquip vehicles carry out the collections in each estate, though not all the households visited by those vehicles are included in the trial, so the two distinct areas were compared rather than the rounds.

Benhall is a suburbanite residential estate consisting of detached houses and bungalows, whereas Wymans Brook features more urbanite and hard-pressed living properties, featuring smaller, semi-detached two and three-bed family homes. As a result, participation was expected to be higher among Benhall Residents. This is reflected in the data here, with the average participation rate for Benhall at 32%, compared to Wymans Brook’s 17%.

Cheltenham is currently undertaking a second phase of data collection to coincide with a small expansion in households from 2,072 to 3,156.

Using census data, SUEZ mapped the individual rounds and participating households against ONS datasets⁶ for very local social demographics. This analysis will provide deeper insight to participation by demographic characteristics and conclusions will be analysed later in the project.

Figure eight • Total bags collected, Cheltenham

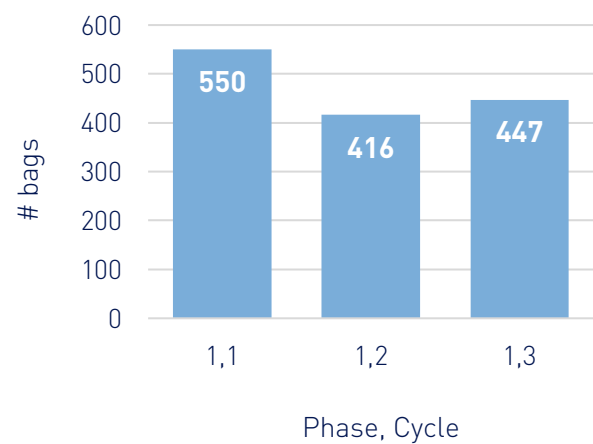


Figure nine • Bags collected per area, Cheltenham

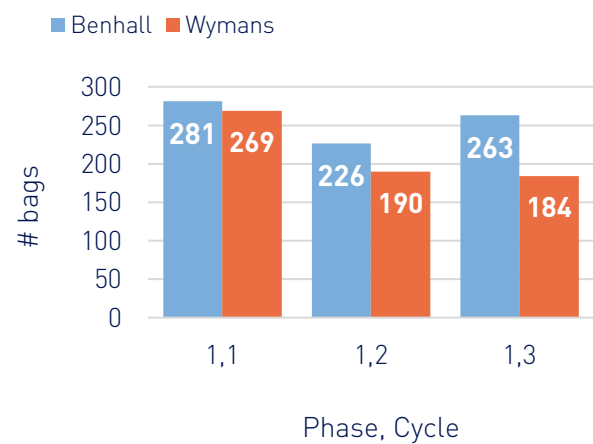
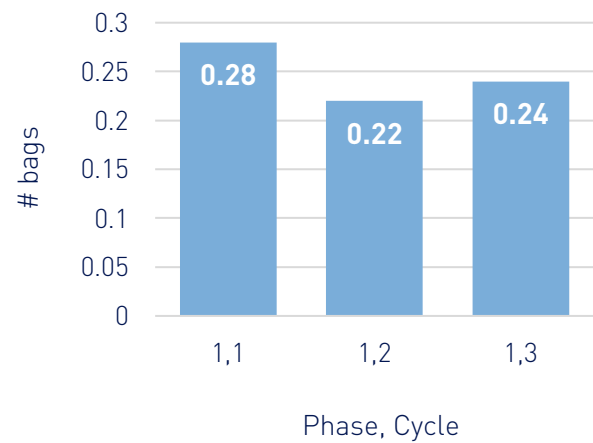


Figure 10 • Average bags collected per household, Cheltenham



⁶ <https://data.cdrc.ac.uk/dataset/output-area-classification-2011>

Figure 11 • Average bags collected per household per area, Cheltenham

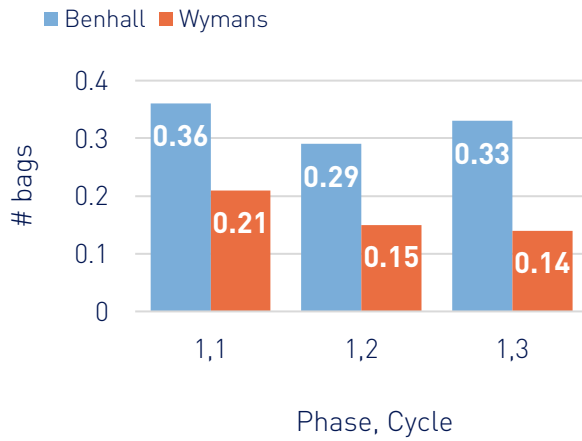


Figure 14 • Average bag weight (g), Cheltenham

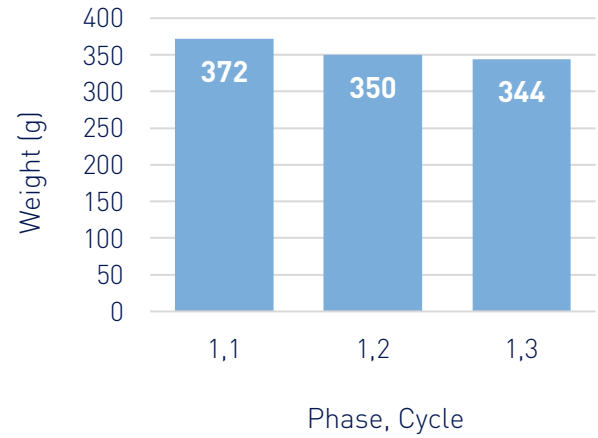


Figure 12 • Total weight collected (kg), Cheltenham

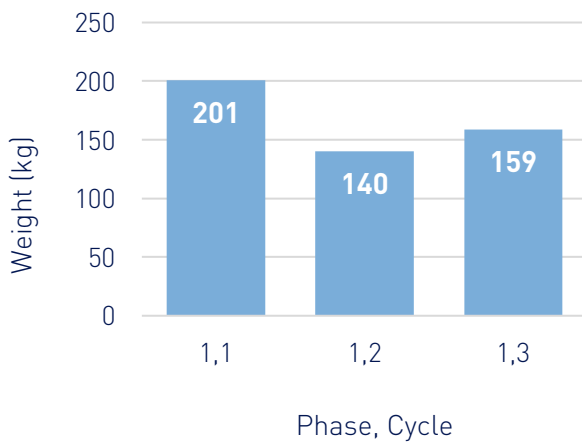


Figure 15 • Average bag weight per area (g), Cheltenham

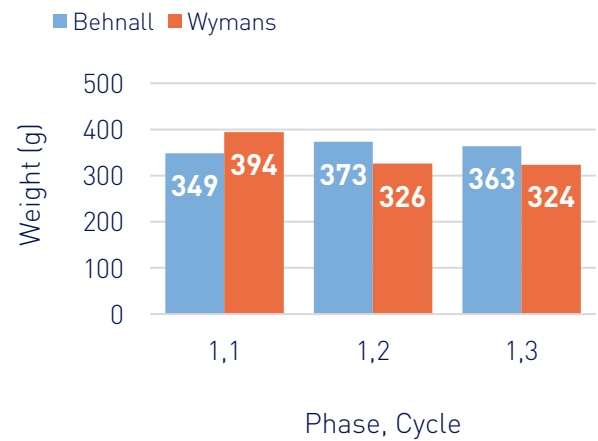


Figure 13 • Total weight collected per area (kg), Cheltenham

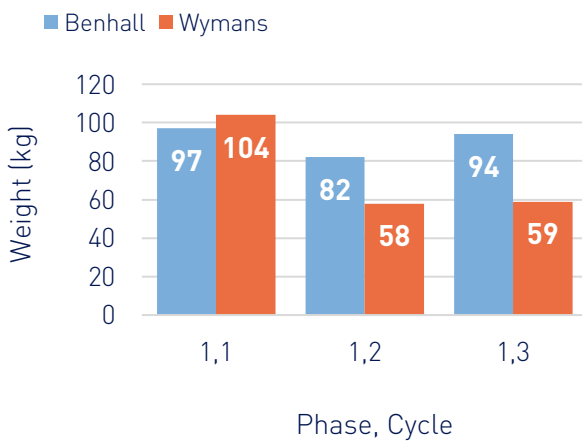
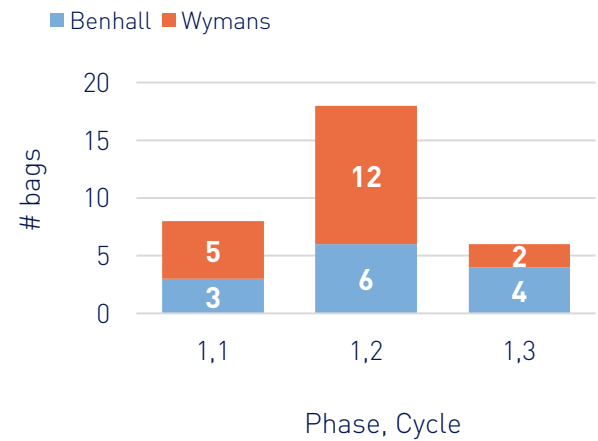


Figure 16 • Contaminated bags rejected at processing per area, Cheltenham



South Gloucestershire

Two phases of data collection have been completed with a consistent participation rate of 42%. There are three distinct trial routes, selected to provide a good representation of the wider district:

- + YK9 Thursday is based in and around the village of Olveston. Properties are classified as predominantly suburbanites (46%), followed by rural residents (33%) and hard-pressed living (21%).
- + YK9 Friday is based in Chipping Sodbury. Properties are classified as suburbanites (99%).
- + YK11 Friday is based in Bradley Stoke, north Bristol, and features 100% urbanite properties.

Participation rates are comparable across the three routes, with 44% across both YK9 Thursday and Friday. Overall participation across the YK11 Friday route was 38%. However, this route was the only one to see an increase in participation across the two phases (6% increase).

Individual socio-demographic categorisations have been taken from the census and combined with local data to understand whether different socio-demographic groups participate more or less with the trial.

An initial analysis has been carried out, though more detailed work is underway and conclusions will be analysed later in the project.

Figure 17 • Total bags collected, South Gloucestershire

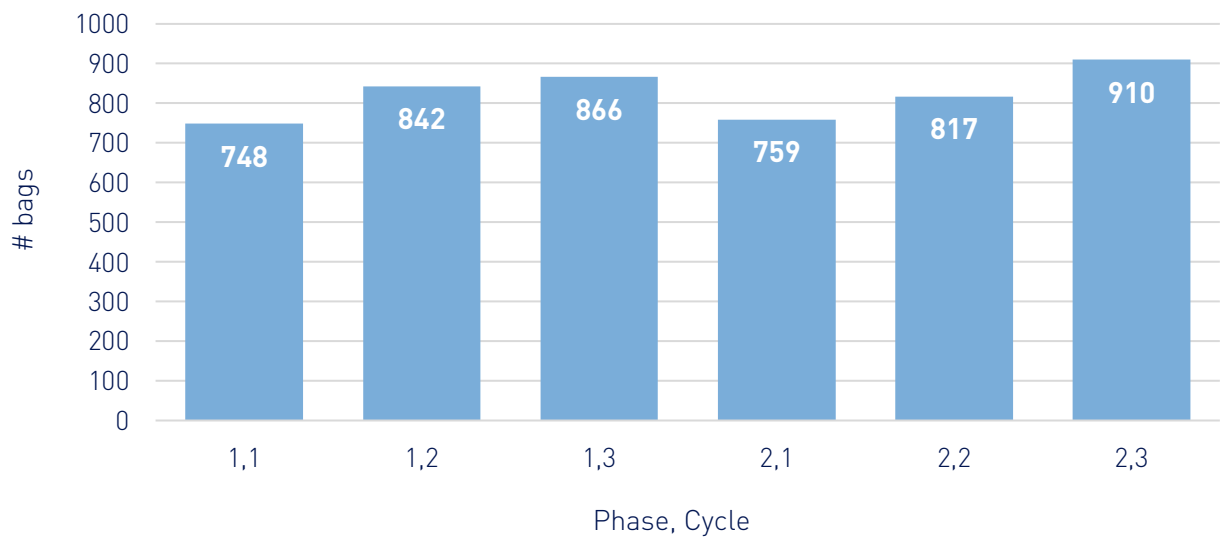


Figure 18 • Bags collected per route, South Gloucestershire

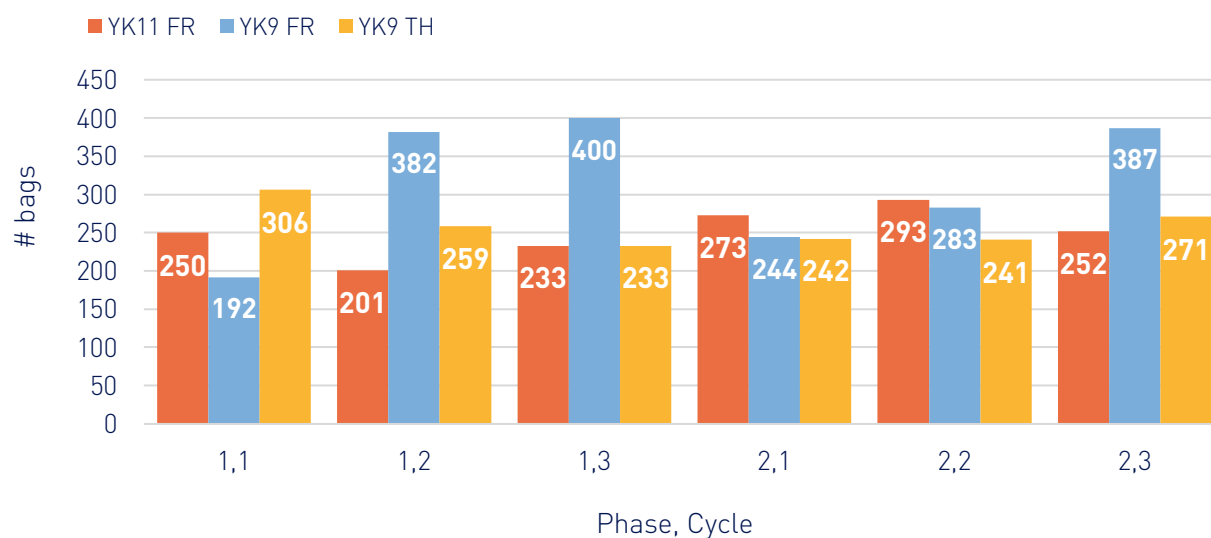


Figure 19 • Average bags collected per household, South Gloucestershire

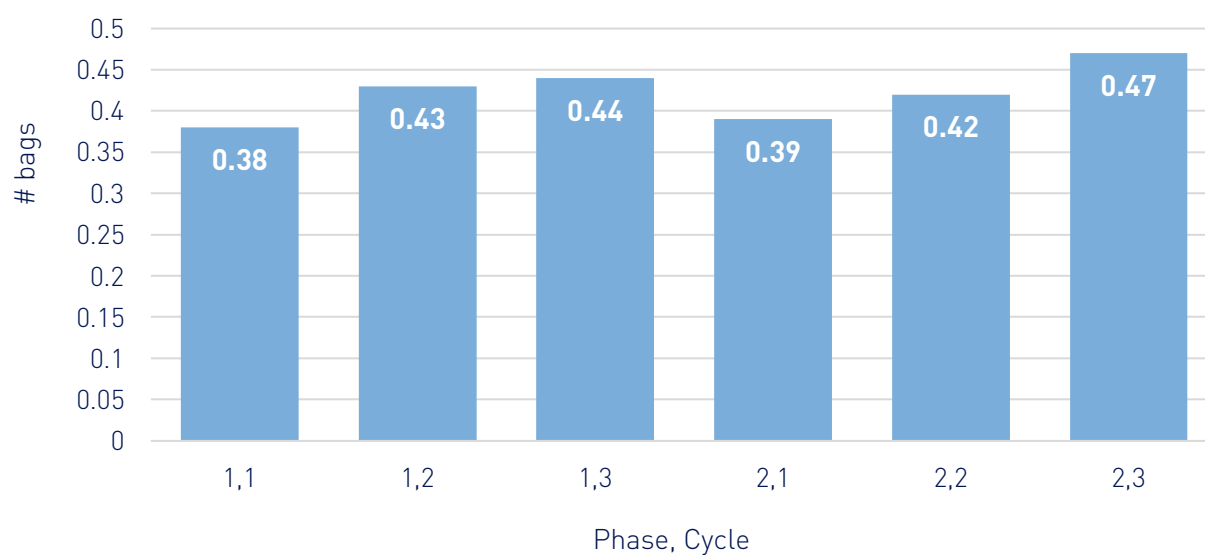


Figure 20 • Average bags collected per household per route, South Gloucestershire

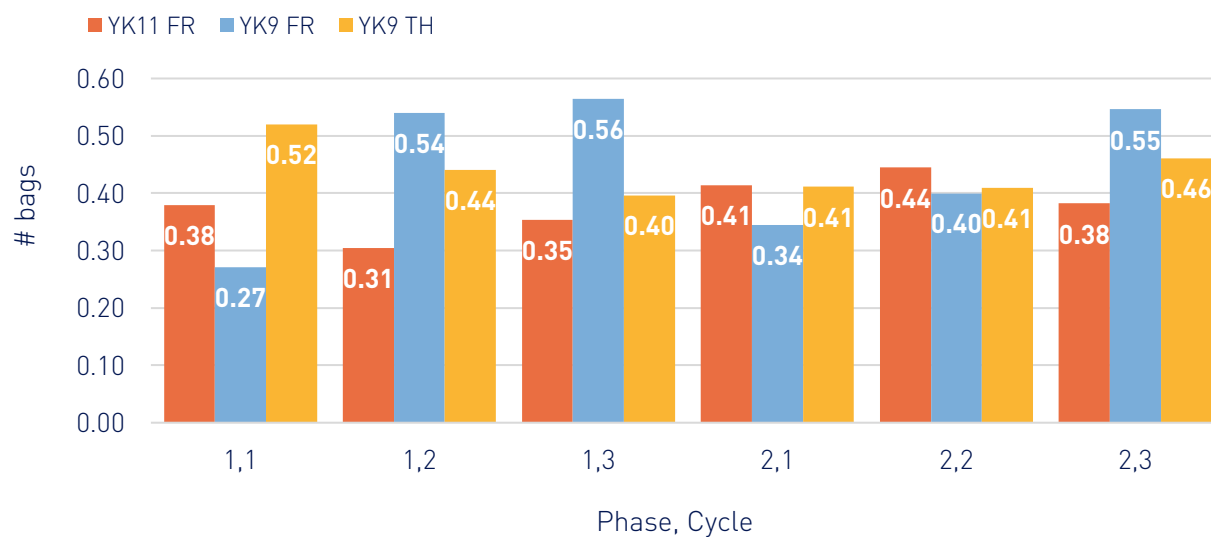


Figure 21 • Total weight collected (kg), South Gloucestershire

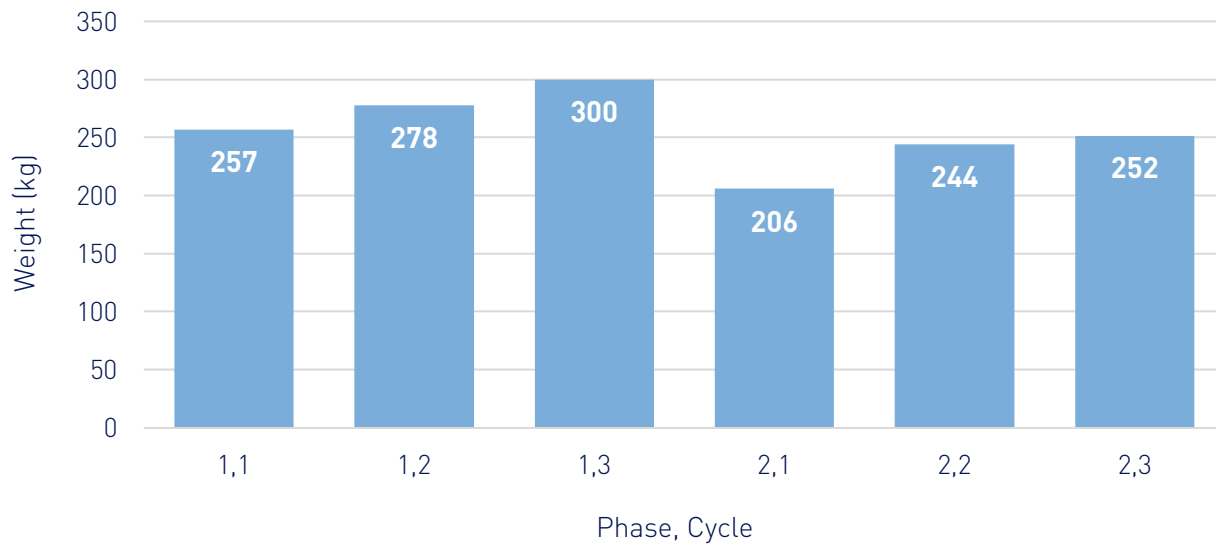


Figure 22 • Total weight collected per route (kg), South Gloucestershire

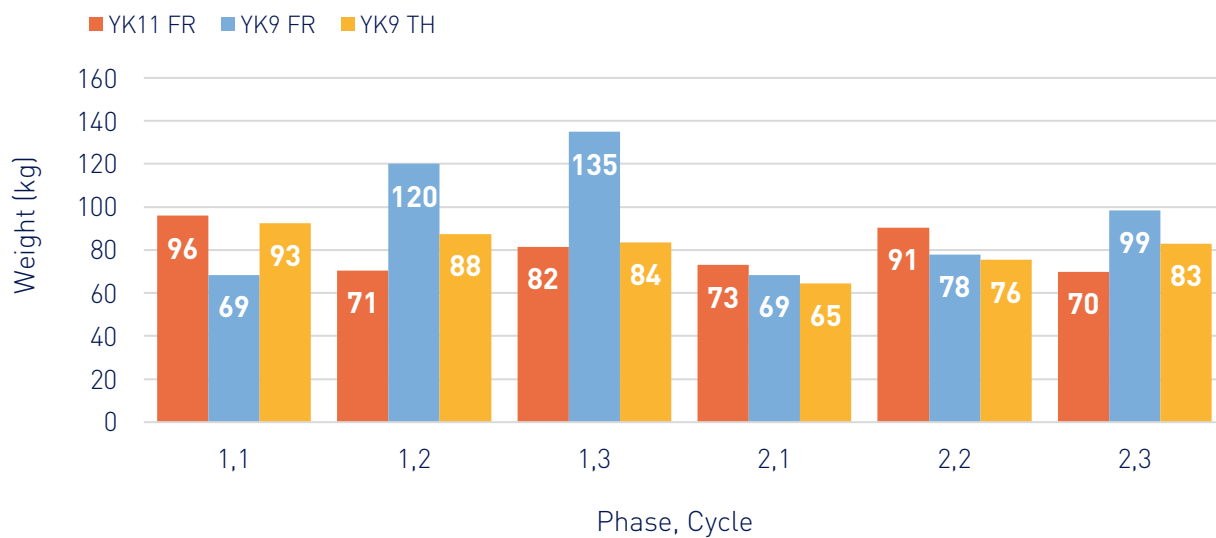


Figure 23 • Average bag weight (g), South Gloucestershire

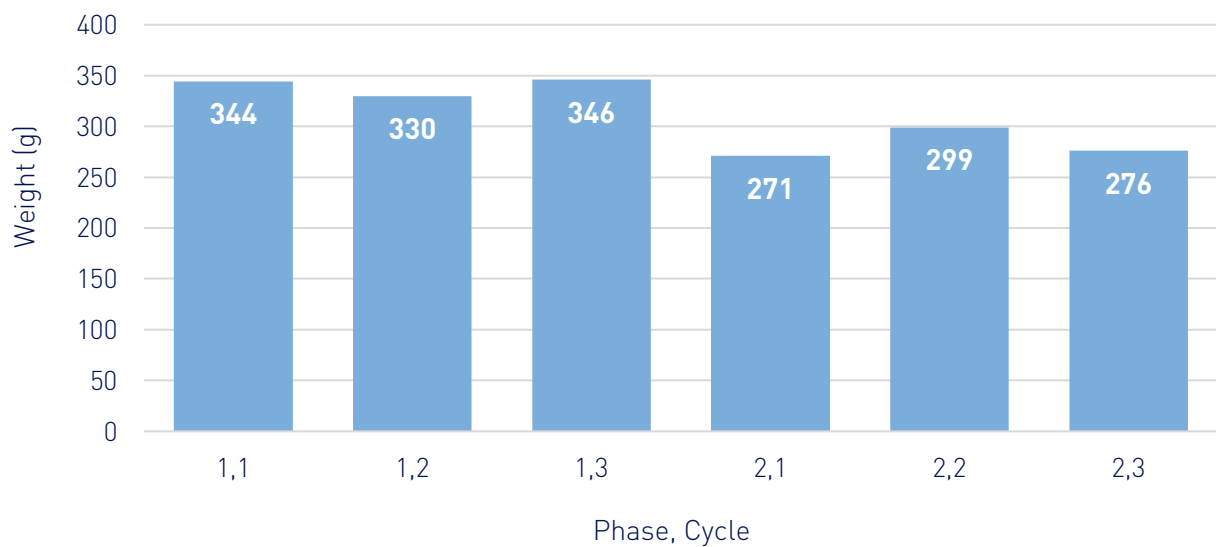


Figure 24 • Average bag weight per route (g), South Gloucestershire

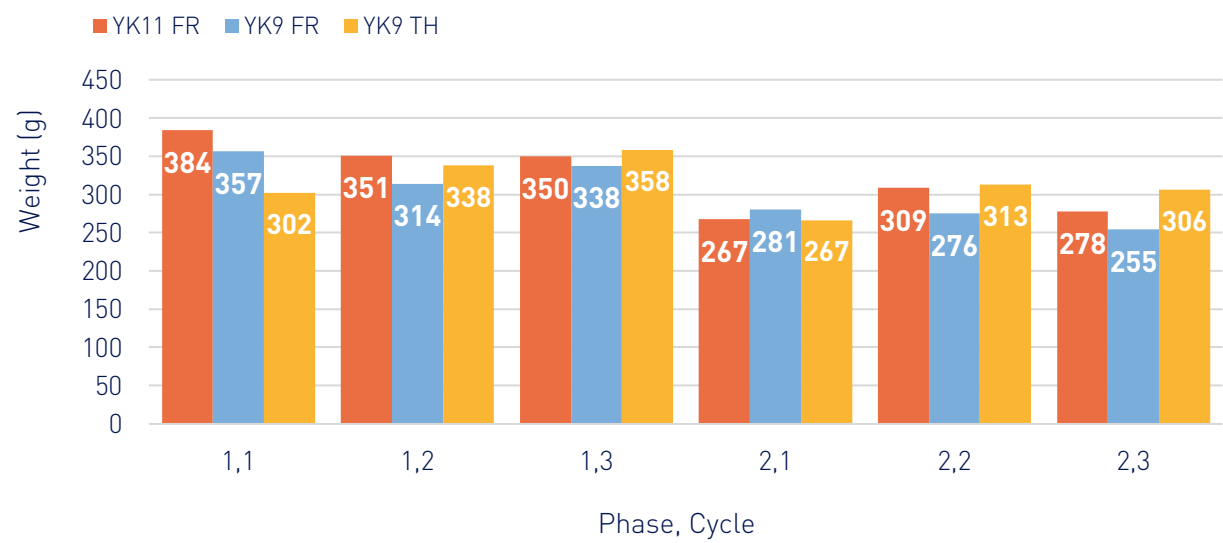
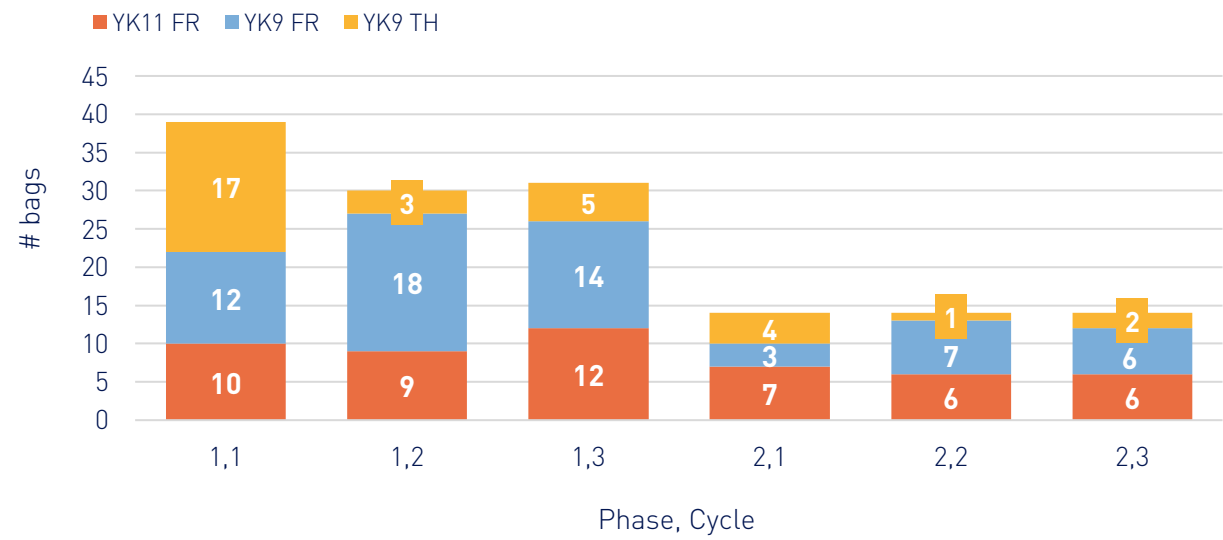


Figure 25 • Contaminated bags rejected at processing per route, South Gloucestershire



Maldon

Maldon’s separate pass collection combined with the high starting property count provides more granular data. Two phases of data collection have been completed, with combined figures demonstrating a 10% increase in participation between Q1 and Q3 2023.

The routes across Maldon vary considerably in terms of demographics and rurality, but the data gathered broadly aligns with the expectations for each area. For example, the suburban, low-deprivation areas of Maldon have produced a higher participation rate than the more deprived areas of Southminster and Burnham. This insight has enabled the Council to target interventions in lower performing areas.

The arisings from the Heybridge route are considerably lower than in other areas. This is because there are only 100 properties included from this route, which received communications in error.

Due to the small number of properties, a decision was made to retain them in the pilot rather than communicate the error.

All areas of Maldon received an additional pack of bags in August along with a thank you letter. The second phase of data collection coincided with the completion of this task, suggesting that follow up communications and additional bags deliveries will result in increased participation. This level of intervention is unlikely to be sustainable as projects expand past the initial phase.

Individual socio-demographic categorisations have been taken from the census and combined with local data to seek to understand at a granular level whether different socio-demographic groups participate more or less with the trial. This more detailed work is underway and conclusions will be analysed later in the project.

Figure 26 • Total bags collected, Maldon

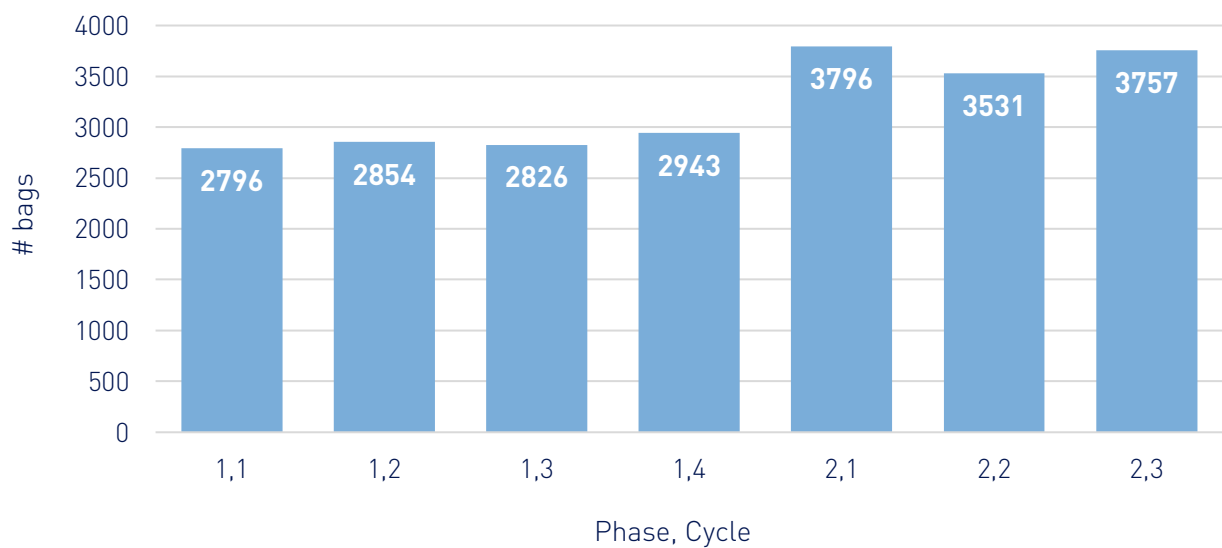


Figure 27 • Bags collected per route, Maldon

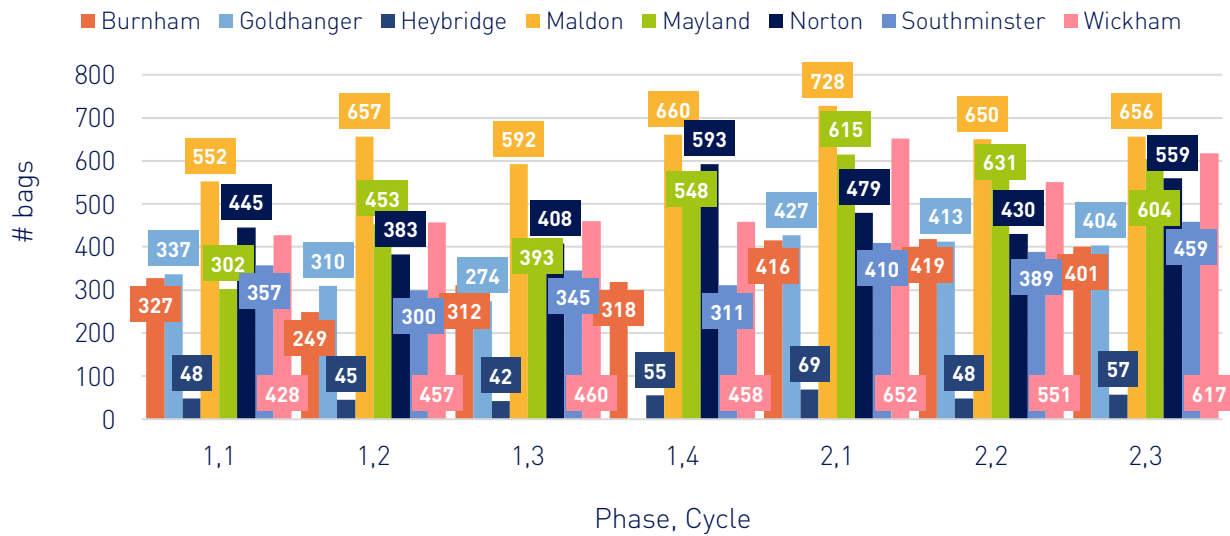


Figure 28 • Average bags collected per household, Maldon



Figure 29 • Average bags collected per household per route, Maldon

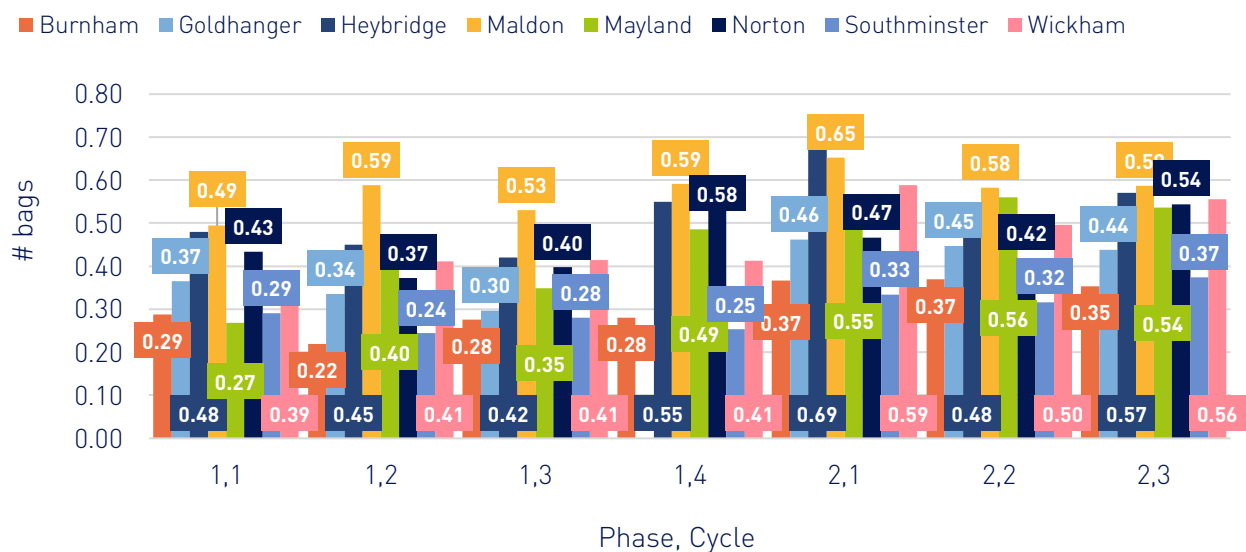


Figure 30 • Total weight collected (kg), Maldon

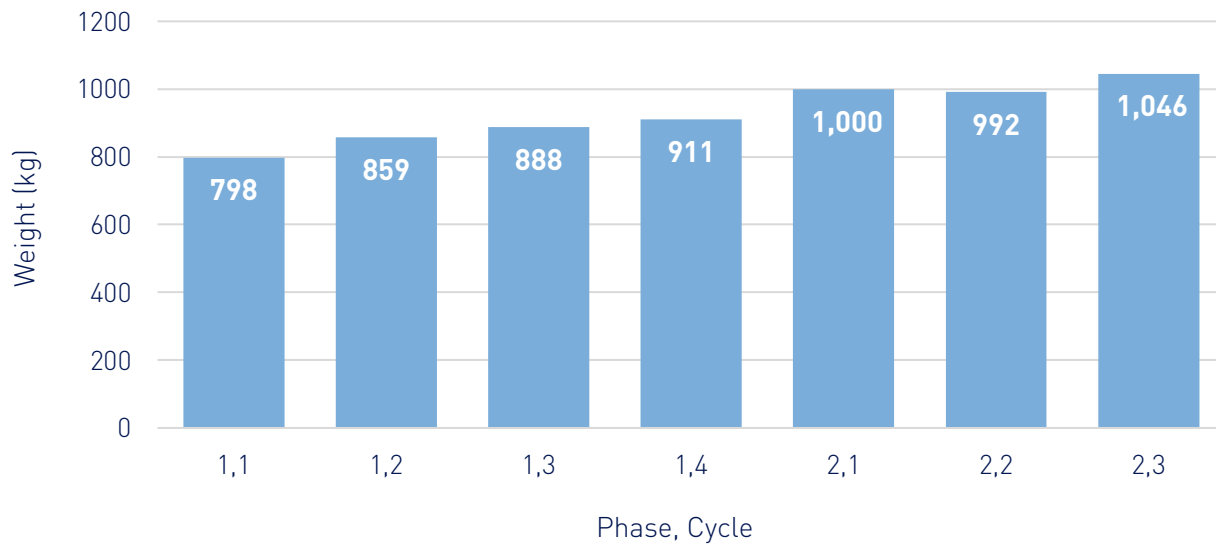


Figure 31 • Total weight collected per route (kg), Maldon

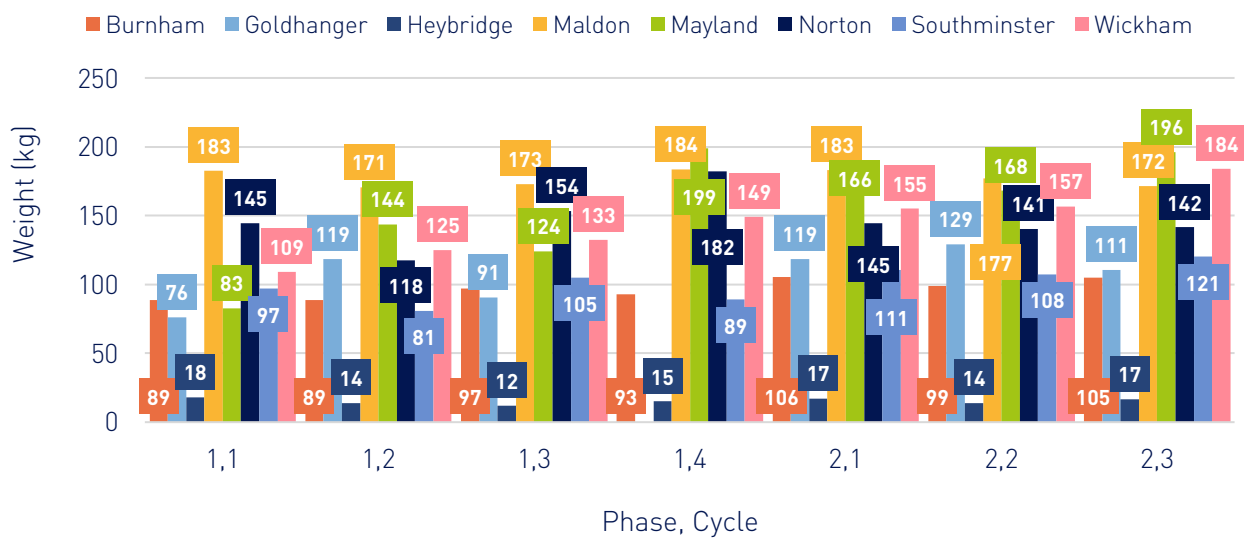


Figure 32 • Average bag weight (g), Maldon

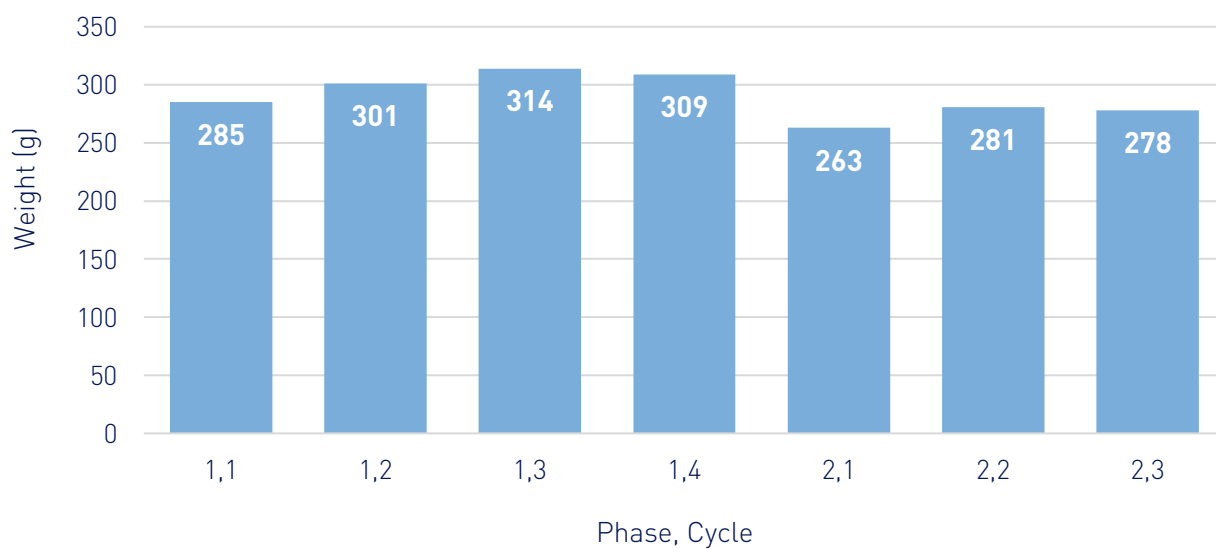


Figure 33 • Average bag weight per route (g), Maldon

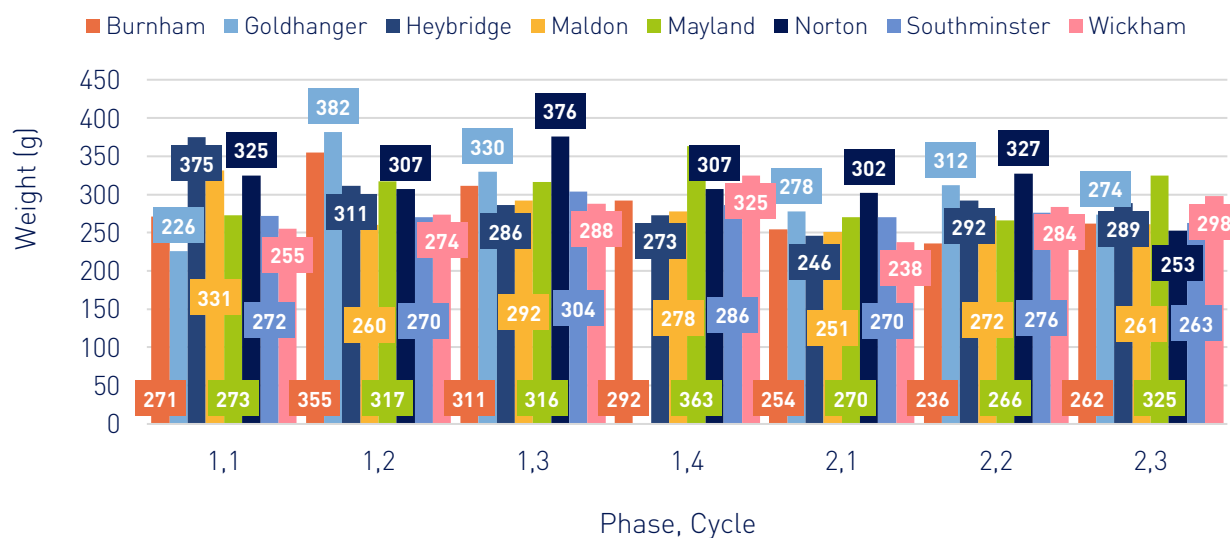
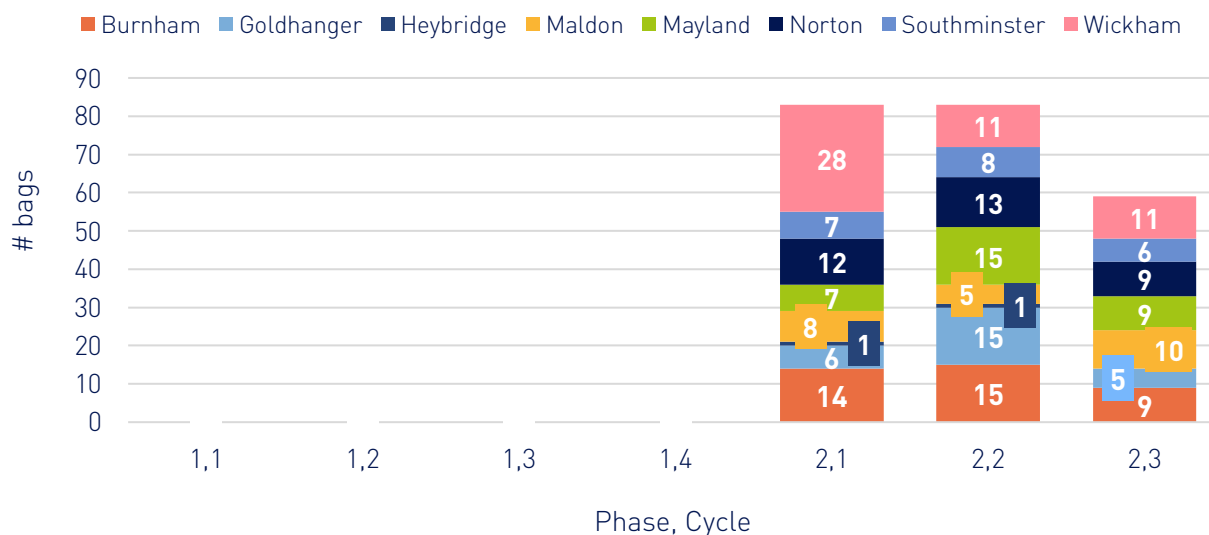


Figure 34 • Contaminated bags rejected at processing per route, Maldon



Somerset

Unlike other pilot authorities, Somerset does not have the capacity to gather data per route due to space limitations at the depot. A bag count and total weight was taken for the full trial area (six routes) each week over three consecutive cycles.

The pilot has generated the highest baseline participation rate to date, with 52% of households presenting one bag each week across the monitoring period. A small decrease of 3% occurred when the data collection was repeated in September, however the phase two figure was still higher than in other areas.

The trial area is predominantly suburbanites (51%), followed by urbanites (23%) and rural residents (20%), all with low levels of deprivation.

The average bag weight in Somerset is 221g, over 70g less than the overall project average of 291g.

It should be noted that the volume of rejected bags is very small compared to the total bags being collected, amounting to around 1%.

Individual socio-demographic categorisations have been taken from the census and combined with local data to understand whether different socio-demographic groups participate more or less with the trial. This more detailed work is underway and conclusions will be analysed later in the project.

Figure 35 • Total bags collected, Somerset

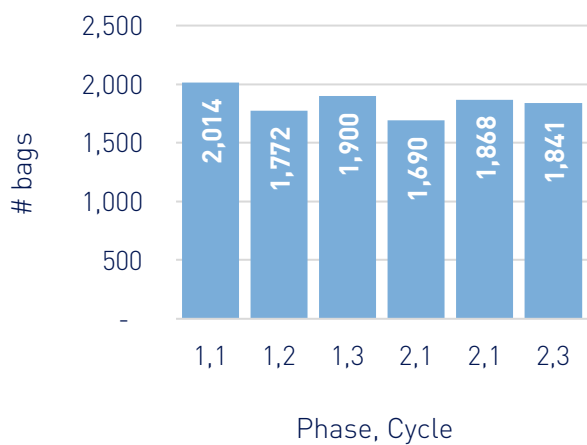


Figure 36 • Average bags collected per household, Somerset

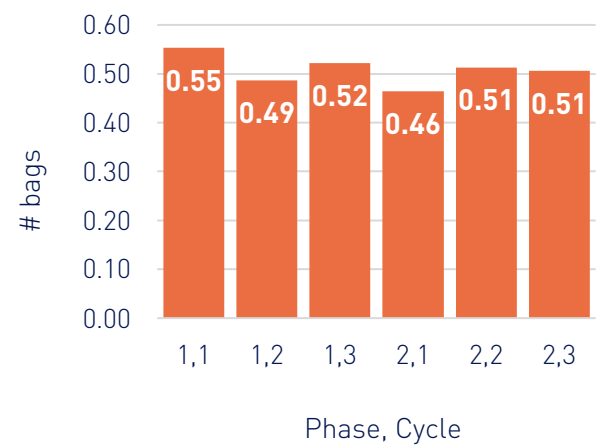


Figure 37 • Total weight collected (kg), Somerset

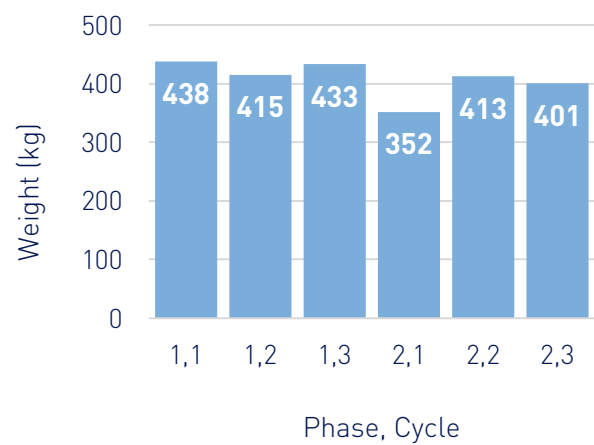


Figure 38 • Average bag weight (g), Somerset

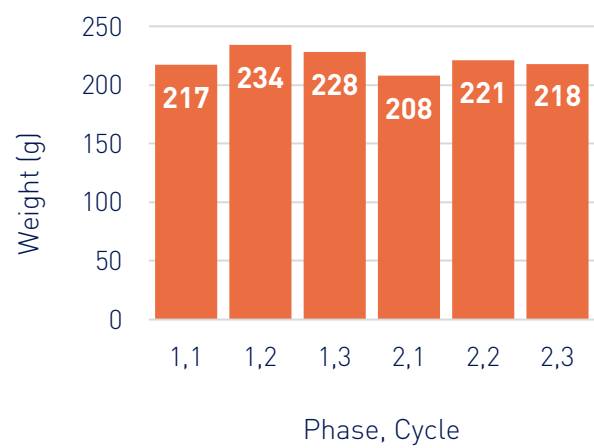
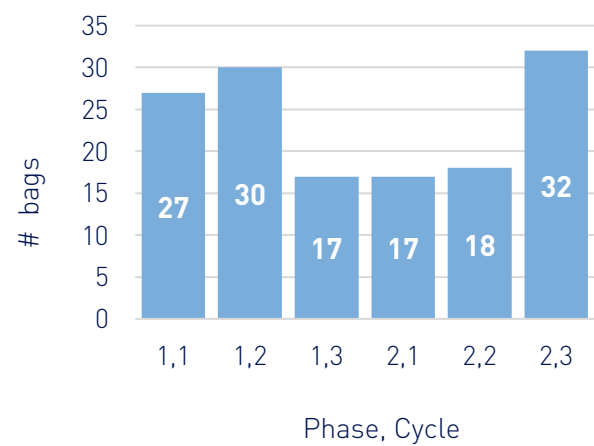


Figure 39 • Contaminated bags rejected at processing, Somerset



Newcastle

Granularity of data is limited to the collection week, as bags are bulked up and processed on a weekly basis. The original four trial routes included predominantly urbanite and suburbanite properties. The two additional routes which joined in October 2023 are similar in demographics, but include more cosmopolitan and hard-pressed living neighbourhoods.

Average participation levels for the first phase of data collection were in line with other project areas. This demonstrates that participation and demand for the service remains high even in densely populated cities. However, due to the requirement for vehicles to tip at a different depot, the geography of the initial rollout included mainly properties from affluent communities, which likely contributes to the participation rate. Although an important part of the City's population, these mostly affluent neighbourhoods are unlikely to be representative of Newcastle as a whole.

Phase two data collection included properties from the small expansion in October and saw a small decline in participation across the project area.

It has not been possible to generate data at individual route level due to bulking material at the transfer station. However, it can be inferred that the reduction could be the result of an expansion into the cosmopolitan, hard-pressed and student neighbourhoods.

These early results suggest that there is a difference in performance between socio-demographic groupings, but further work is needed to understand this. Monitoring will continue to understand what learnings can be gathered to inform the project.

In the second cycle of data collection (phase one), one of the two R03 collection vehicles tipped in the wrong bay at the transfer station and the trial material could not be recovered. This was due to staff absences and the use of a cover driver who tipped in the normal bay at the transfer station in error, rather than the dedicated FlexCollect bay.

Measures have been put in place to minimise the risk of this occurring again. The household numbers which contribute to the average calculations in the data have been reduced to reflect these missing properties.

Individual socio-demographic categorisations have been taken from the census and combined with local data to understand at a granular level whether different socio-demographic groups participate more or less with the trial. This more detailed work is underway and conclusions will be analysed later in the project.

Figure 40 • Total bags collected, Newcastle

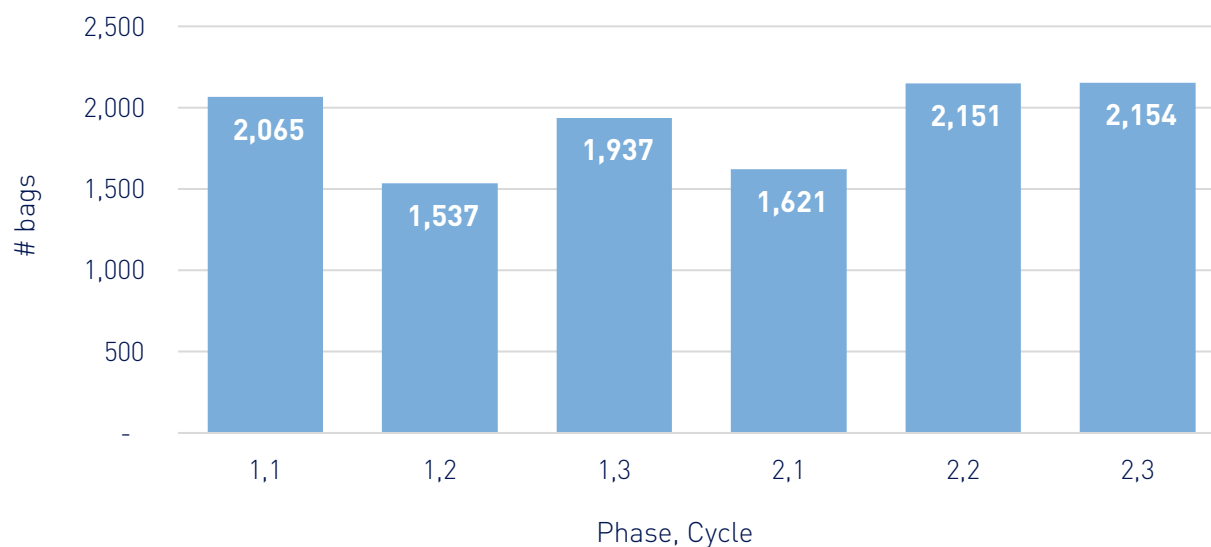


Figure 41 • Bags collected per route, Newcastle

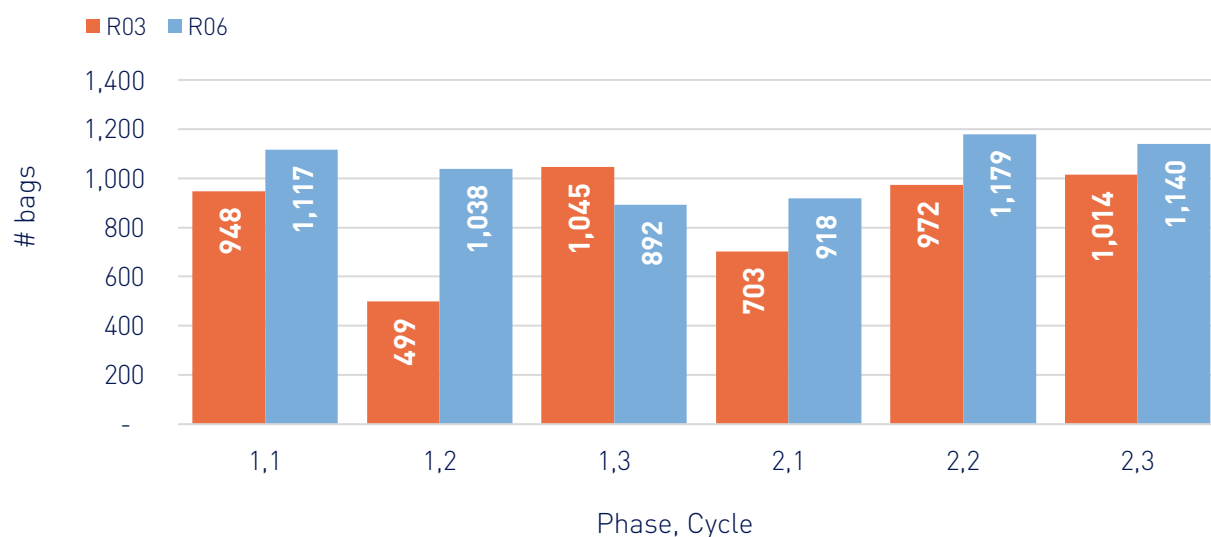


Figure 42 • Average bags collected per household, Newcastle

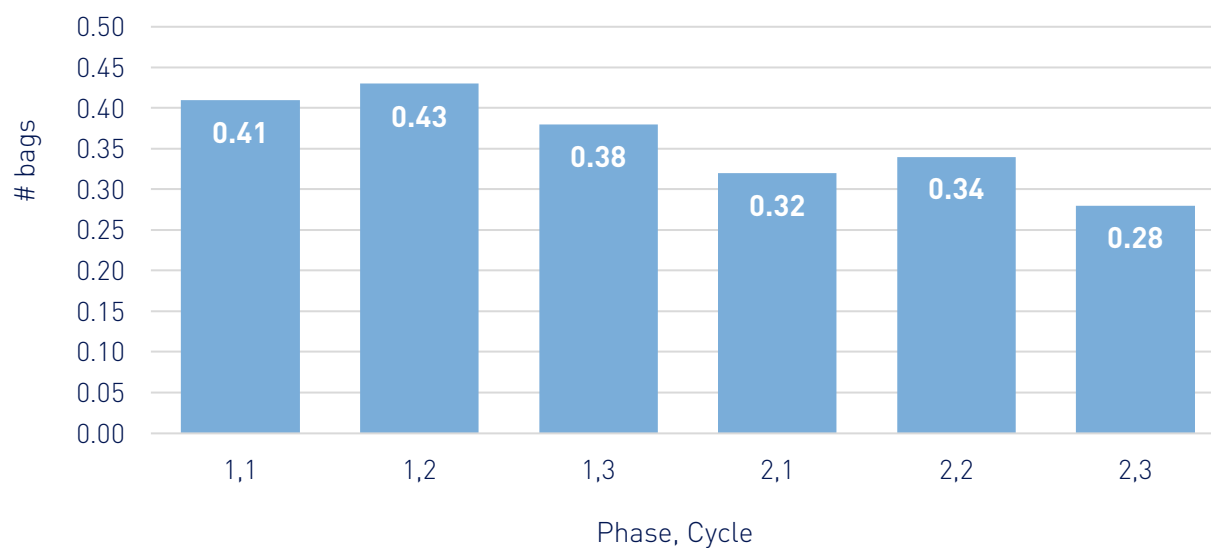


Figure 43 • Average bags collected per household per route, Newcastle

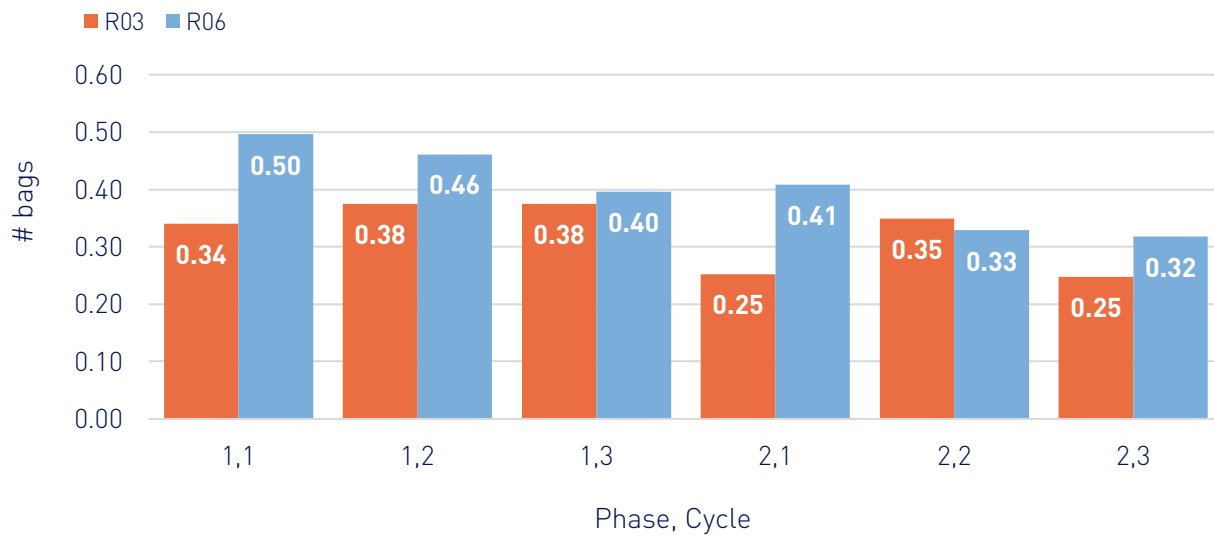


Figure 44 • Total weight collected (kg), Newcastle

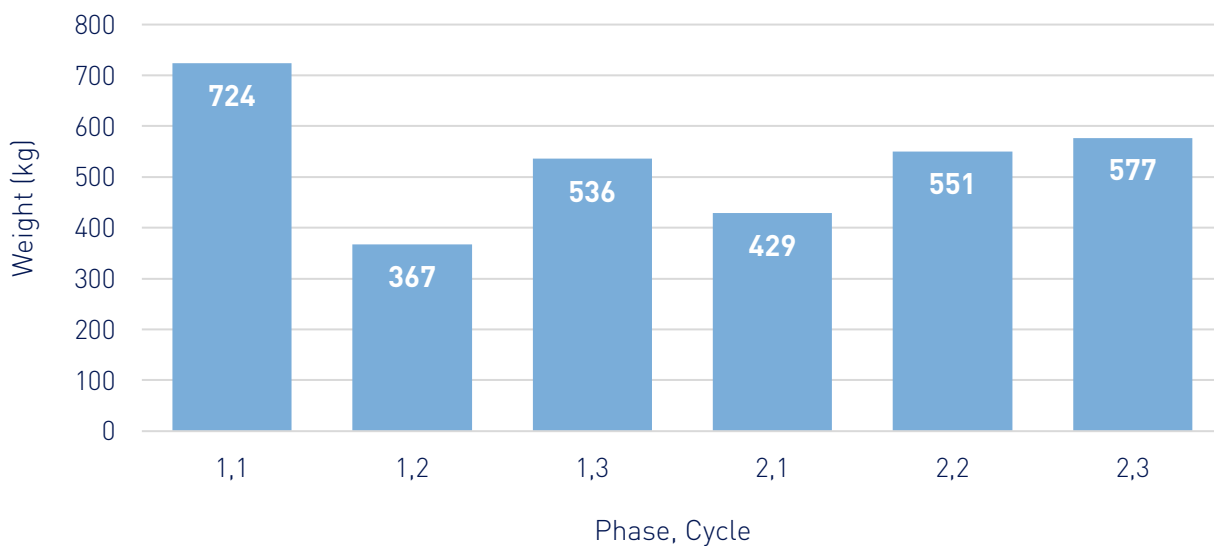


Figure 45 • Total weight collected per route (kg), Newcastle

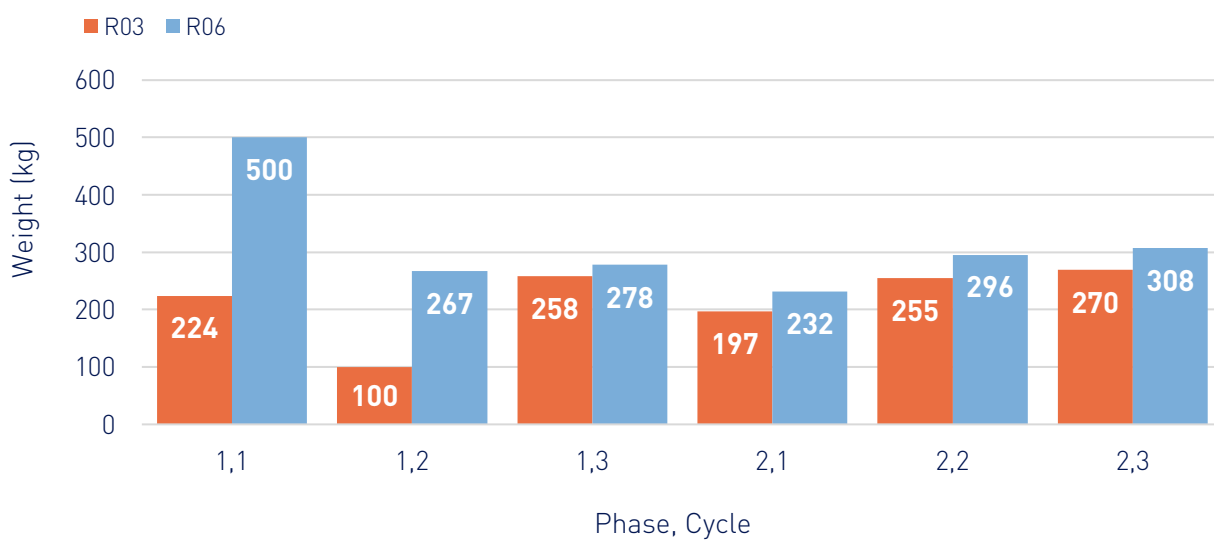


Figure 46 • Average bag weight (g), Newcastle

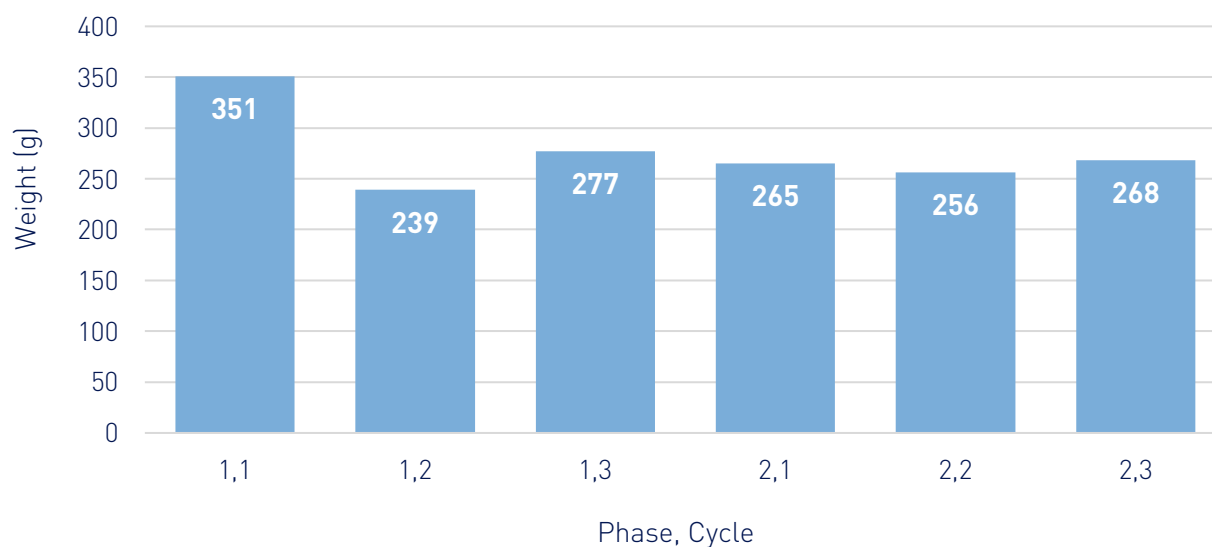


Figure 47 • Average bag weight per route (g), Newcastle

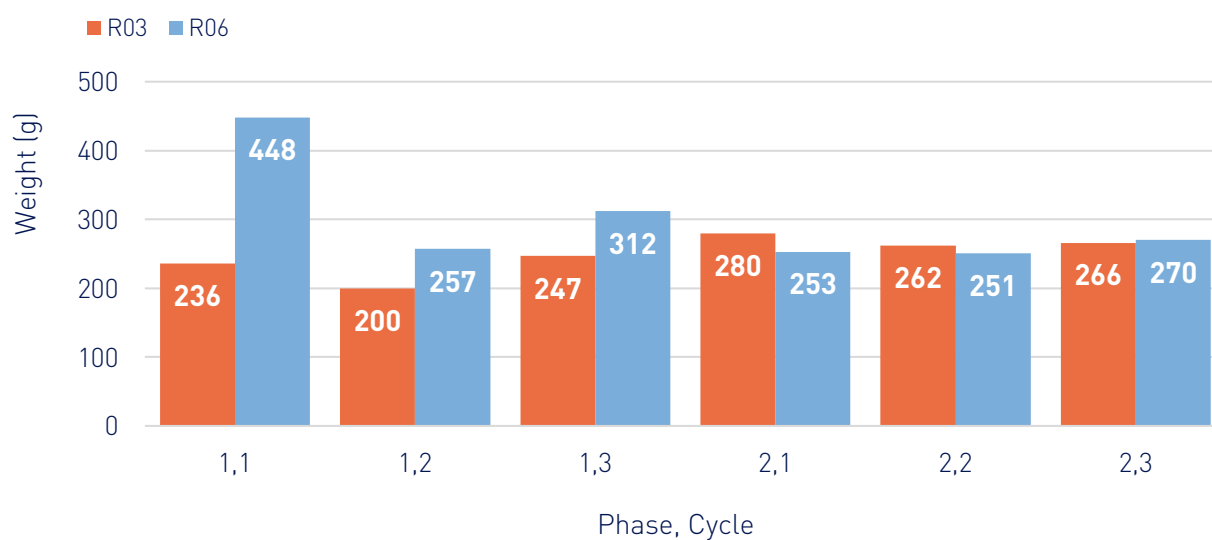
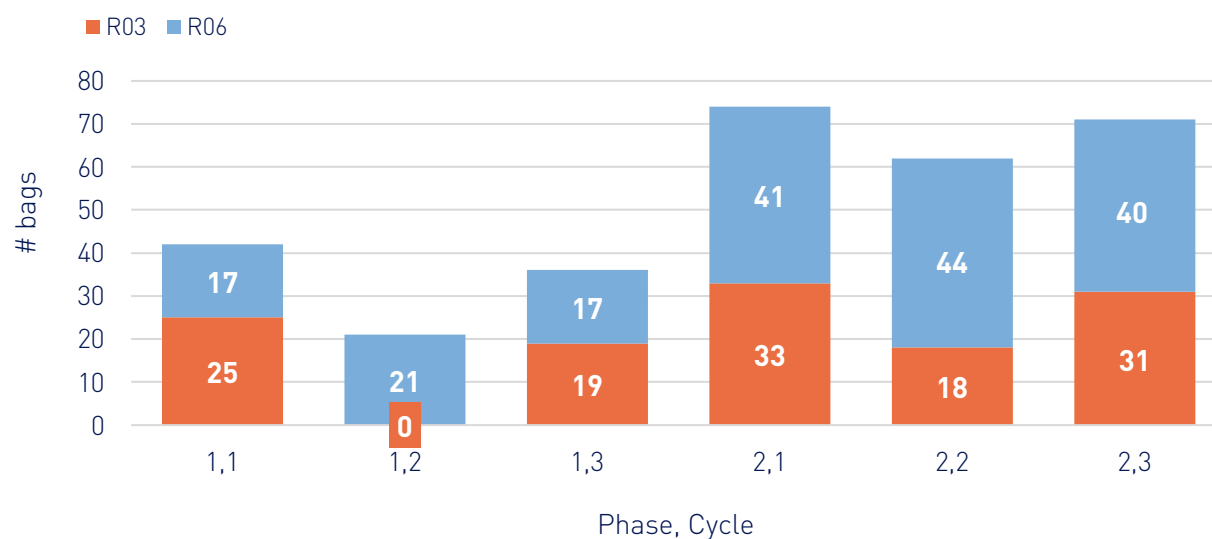


Figure 48 • Contaminated bags rejected at processing per route, Newcastle



Reading and North Hertfordshire

Data from the most recent trials to commence, Reading and North Hertfordshire, is not available at the time of writing. This, together with the data from the trial yet to start and new data generated from the ongoing trials, will be compiled for the final project report.

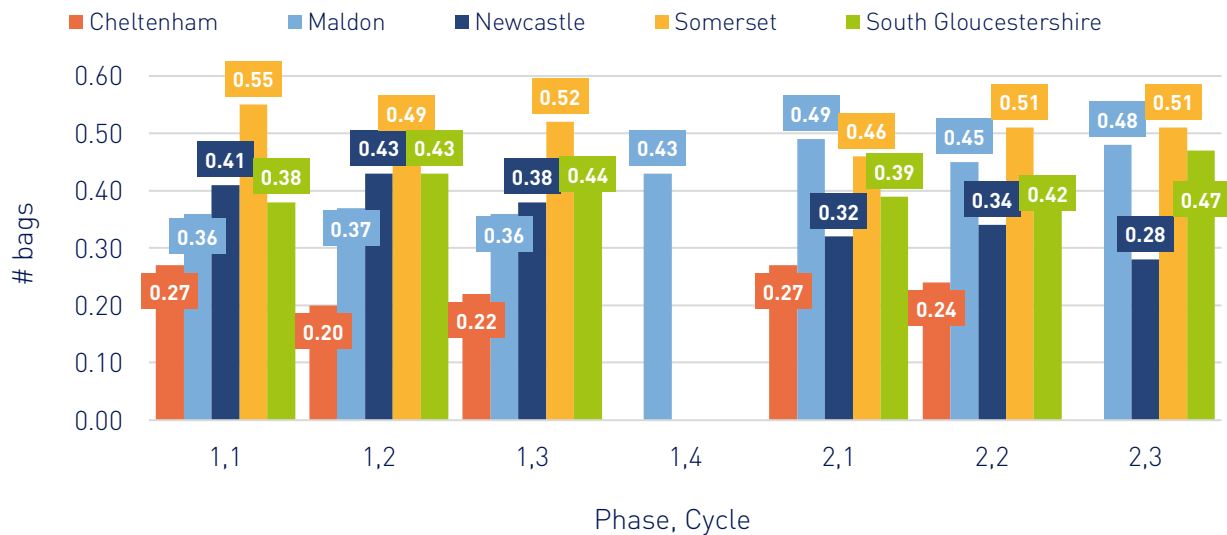


Learnings to date

Bags presented

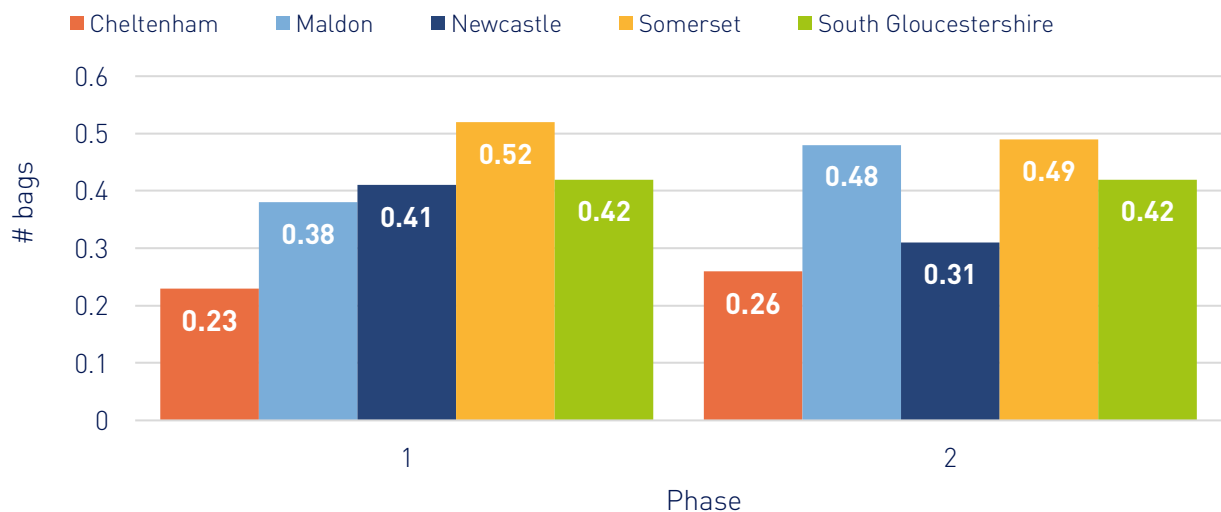
Average bags presented per household is shown here in figure 49. Each cycle is a collection cycle and each column represents the number of bags presented per household passed on the collection round. To date, two phases of data collection have been completed.

Figure 49 • Average bags collected per household



The overall average per collection cycle is 0.39 bags per household passed. Therefore two bags are presented for every five households who have the opportunity to participate in the trial.

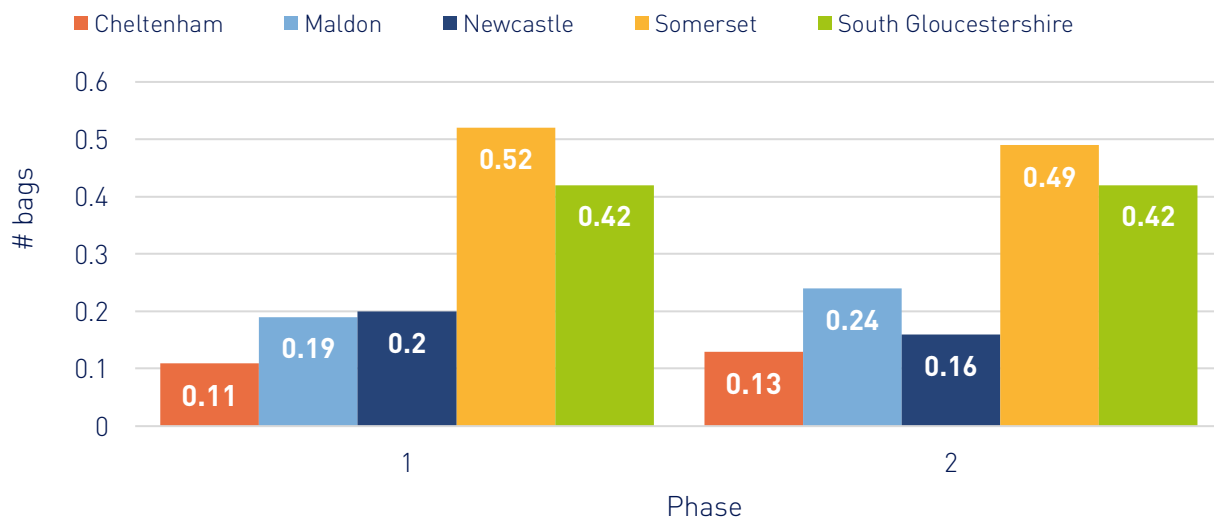
Figure 50 • Average bags collected per household per phase



As collection cycles vary between weekly and fortnightly across the pilot authorities, it is important to consider these participations over a weekly period. The participation figure decreases to 0.29 bags per property passed, or 29% of properties presenting a bag, in this instance, demonstrating that there is a relationship between frequency of collection and participation.

Both South Gloucestershire and Somerset collect recycling on a weekly basis. Subsequent to this data being generated, a rejuvenation of communications at Cheltenham has been undertaken which is expected to increase participation rates.

Figure 51 • Average bags collected per household per week

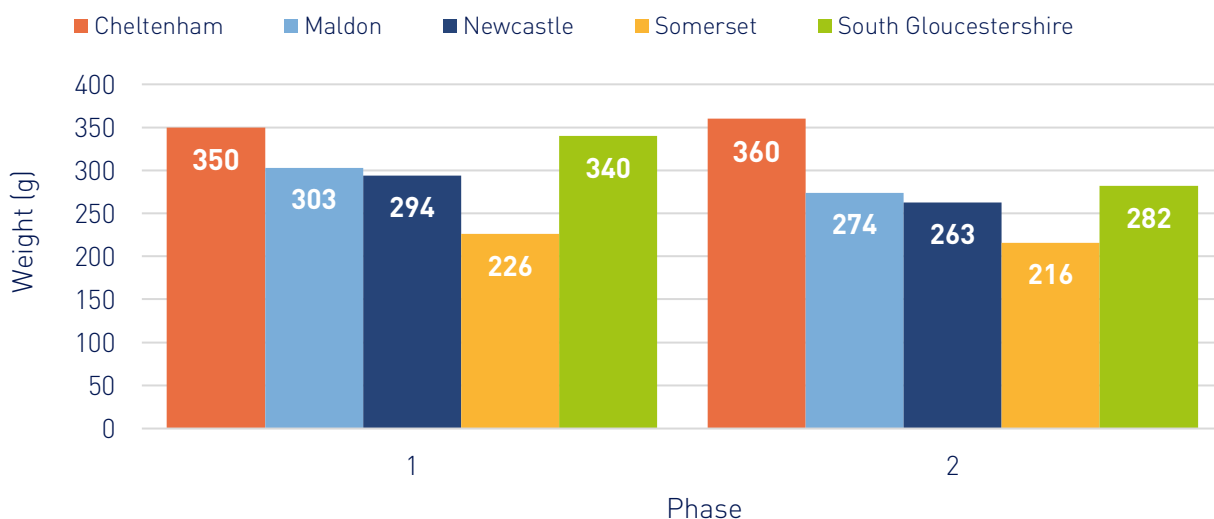


Average bag weight

Average bag weight varies across the five trials, with data worthy of inclusion at this interim stage varying between 221g (Somerset) and 355g (Cheltenham). Bag weight will be influenced by the frequency of collection, where more frequent collections (weekly for instance) are expected to deliver lower weights than those collected less frequently (fortnightly for instance). However, this is not always the case as weekly collections in South Gloucestershire have delivered a higher average bag weight than the fortnightly collections of Maldon and Newcastle. This correlation will be looked at in more detailed as the projects expand.

There was a general decrease in average bag weights between the two phases of collection suggesting that residents are not always using the full capacity of the collection bag.

Figure 52 • Average bag weight (g)



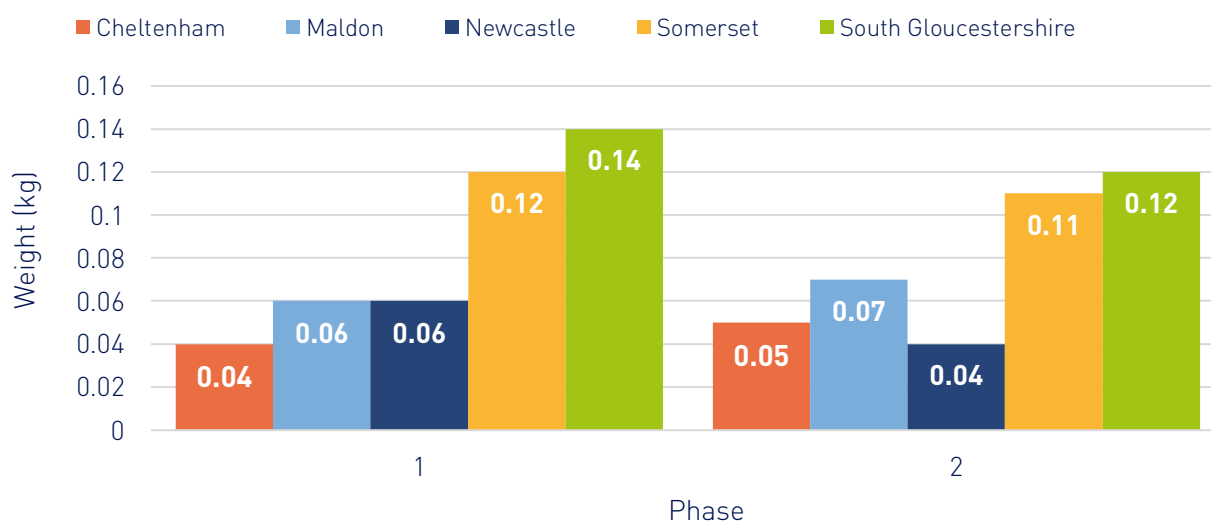
Average weight per trial household

Figure 53 takes into consideration all households who have the opportunity to participate, not just those who are actively participating.

Average weight per trial household varies between 43g (Cheltenham) and 142g (South Gloucestershire).

Subsequent to this data being generated, a rejuvenation of the communications at Cheltenham has been undertaken and it is expected that average weights will increase as a result.

Figure 53 • Average weight per household (kg)



Operational participation rates

There has been no material difference in the average collection rate between source segregated or twin stream collections, with both averaging around 0.4 bags per property per pass.

Communication is essential in establishing and maintaining participation rates.

Where industrial action has interrupted services or where follow up communications have been employed, a respective decline or uplift in participation has been observed. For instance, at Maldon, a follow up communication campaign lifted participation by approximately 10%.

Industry standard participation monitoring

Kerbside participation monitoring has been undertaken by Resource Futures for the following trials:

South Gloucestershire

- + In total 1,589 households were monitored over three collection cycles.
- + The participation rate is calculated as 68%.
- + The average number of flexible plastic packaging bags presented by participating households was 1.16.
- + The total number of households contaminating at least once in a period was 10%.

Somerset

- + In total 1,610 households were monitored over three collection cycles.
- + The participation rate is calculated as 64%.
- + The average number of flexible plastic packaging bags presented by participating households was 1.11.
- + The total number of households contaminating at least once in a period was 23%.

Maldon

- + In total 2,234 households were monitored over three collection cycles.
- + The participation rate is calculated as 47%.
- + The average number of flexible plastic packaging bags presented by participating households was 1.58.
- + Contamination data was not collected, because the flexible plastic packaging material was collected on a separate round.

Figure 53 • Participation monitoring summary

Pilot	No. of houses monitored	No. of households presenting flexible plastic packaging	Participation rate	Average no. of bags presented	Total households contaminating at least once in trial period
South Gloucestershire	1,589	1,083	68%	1.16	10%
Somerset	1,610	1,029	64%	1.11	23%
Maldon	2,234	1,041	47%	1.58	n/a

Frequency and type of collection

(based on operational participation rates)

More frequent collections appear to deliver higher participation rates, with an average of 0.46 bags presented per household per week for weekly collections and 0.18 bags per household per week for fortnightly collections.

This operational data is confirmed by the participation monitoring completed by Resource Futures, which shows participation of 64% and 68% for weekly collections, and 45% for fortnightly.

Figure 54 • Frequency and presentation summary

Collection frequency	No. of bags presented per household collection cycle	No. of bags presented per household per week
Weekly	0.46	0.46
Fortnightly	0.34	0.18

Although this data appears to show higher participation in source-segregated collections, this is driven by collection frequency as the majority of source-segregated collection pilots are weekly collections, and all co-mingled collections are fortnightly.

Figure 55 • Collection type and presentation summary

Collection type	No. of bags presented per household per week
Co-mingled	0.19
Source segregated	0.34

Weight of items collected

On average, 291g of flexible plastic packaging has been collected per bag.

Availability of bags

Availability of bags has been key to participation. Households can reorder bags by various means (aligned to their waste collection authority current or preferred systems).

Use of bags

Using bags has provided flexibility for collection, extraction and consolidation in a low capex, limited infrastructure environment. The cost and circularity of using bags to collect flexible plastic packaging is a key consideration and one with a real focus for pilot authorities that expand trials to incorporate more households.

Discrete collection bags are not used in the European countries that collect flexible plastic packaging items today, but have been necessary in the UK due to the lack of infrastructure which is more common in Europe. Learnings and confidence from this project together with policy certainty and extended producer responsibility (including modulation) funding may be material to more domestic infrastructure being planned and delivered.

Capacity on vehicles

To date, no issues with vehicle capacity have been encountered. Although the bags of flexible plastic packaging items have a large volume, they compress significantly and easily.



Communications

Naming and communications research

From March 2020 to October 2022, WRAP conducted three rounds of citizen testing to assess the clarity and effectiveness of various terminologies for flexible plastic packaging.

A clear preference emerged, along with key principles for effectively communicating positive flexible plastic packaging recycling behaviour. When determining the best approach for engaging with householders, the research highlights the importance of adhering to the following guiding principles:

- + Use a lead message that emphasises the change and/or that there is something new, rather than a norming message.
- + Give preference to using images of items over written lists.
- + Present both 'yes please' and 'no/don't recycle' items together, rather than just 'yes' lists.
- + Ensure that the Recycle Now 'swoosh' plays a prominent and attention-grabbing role.

The research also reveals an underlying trend where householders express a desire for more information while simultaneously preferring less clutter and content to read. This aligns with established best practices in communication.

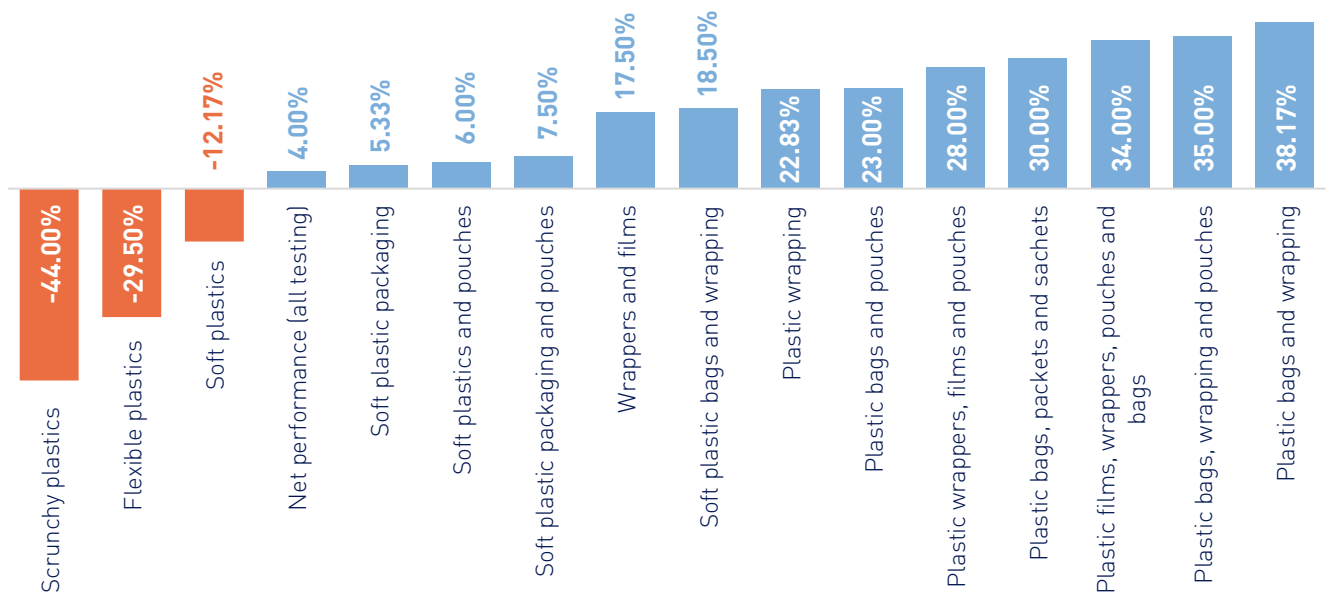
'Plastic bags and wrapping'

The results have been remarkably consistent across the three rounds of testing, highlighting a noticeable contrast between the characteristics of the most and least effective terminologies and the language employed within them.

It is strongly recommended that the term 'plastic bags and wrapping' be consistently employed as the overarching terminology when communicating with the public about flexible plastic packaging. There is a statistical preference that this term not only resonates most effectively and serves as the clearest descriptor of the material to the public, but also aligns with the recommendations outlined in the communication insights.

Interestingly, terminologies commonly used within the market consistently ranked as the poorest performers throughout all three rounds of testing, with terms such as 'scrunchy plastics', 'flexible plastics' and 'soft plastics' occupying the bottom three positions in terms of performance scoring.

Figure 56 • Net performance (all testing)



[net figures, % most sense - % less sense]

The full report and results of the householder research can be found at wrap.org.uk/resources/report/all-wrapped-terminology

Communications plan

WRAP led the development, monitoring and evaluation of householder communications for the trials which has been delivered using the highly recognised Recycle Now campaign, which is underpinned by tested behaviour change theory.

A communications plan was developed to support the launch of the pilot kerbside trials. This plan is informed by WRAP's learnings and insights from previous flexible plastics research and local authority pilots focused on hard-to-capture materials.

Communications objectives

- + Ensure householders in the pilot areas are aware of the plastic bags and wrapping kerbside trials and are encouraged to participate.
- + Help householders in the pilot areas understand what type of plastic bags and wrapping can and can't be collected as part of the kerbside trials.
- + Provide communications support to the pilot local authorities to ensure effective roll out of the service.
- + Ensure the communications (messages and assets) reflect and reinforce the aims of the pilot kerbside trials and what they seek to measure.
- + Gain robust insights and evaluation of communications, including understanding why householders did/did not participate in the pilot kerbside trials.

Communications strategy

A three-stage strategy is used:

- + Introduction flyer to let householders know the trial is coming and that the trial will expand over time in their area. The flyer also provides a list of specific items of what can and can't be recycled and why the trial is being launched.
- + Instruction leaflet providing the same list of specific items that can and can't be recycled, how to order more bags and FAQs about the service. This leaflet was delivered with the collection bags.
- + Nudge techniques like contamination stickers to inform householders of wrong items in their collection bags. Other nudges included a follow up flyer thanking householders for using the new service and reminding those that haven't participated to start using the service.

Further communications used include:

- + Dedicated web pages for each local authority listing specific items that can and can't be recycled, more details about the service, how to order more bags, top tips on how to store and collect the material in the home and FAQs. Photography to clearly explain items that can and cannot be accepted, how to tie bags securely and how to present them on the kerbside.
- + Information shared with local authority call centre staff and recycling collection crews.
- + FAQs for use in the instruction leaflet, web pages and call centre staff training.

Key messages

In order to communicate effectively with households, key messages included:

- + Clear launch dates of when the kerbside plastic bags and wrapping recycling collection service was going to be rolled out.
- + Specific types of plastic bags and wrapping that can be recycled and collected during the kerbside trial.
- + Why it is important to recycle plastic bags and wrapping.
- + What happens to plastic bags and wrapping when it is collected and recycled.
- + How and when plastic bags and wrapping should be presented for collection at the kerbside.
- + Tips on how to store plastic bags and wrapping at home prior to collection day.
- + Adopting Recycle Now's proven behavioural change approach of social norming and unity messaging: "Let's recycle better, together. For each other. For [location]" and "More and more people in [location] are recycling plastic bags and wrapping".

Evaluation

Monitoring and evaluation of the communications consisted of:

- + Doorstepping – testing awareness of the kerbside trials and evaluating the communications with households.
- + Local authority webpage visits on the Recycle Now website.
- + Monitoring collection performance.

Doorstepping

Doorstepping surveys were carried out with households in the trial areas to understand:

- + Collection performance.
- + Householder satisfaction with the new service and their participation.
- + Satisfaction with communications and to identify changes in household behaviours.

A face-to-face survey was undertaken in each of the four initial pilot authorities (Cheltenham, South Gloucestershire, Maldon and Newcastle), approximately five to seven weeks after collections started, achieving a minimum of 200 completed interviews in each area with a locally representative sample of residents (i.e. 800 in total).

To encourage participation, there was a prize draw with three £100 prizes.

The survey adopted a '1 in n' method of selecting households from participating streets within the trial areas, with accompanying quotas to ensure a locally representative sample in terms of age, gender and work status.

Interview shifts were spread throughout the week and across different times of the day.

Doorstepping results

The results from the doorstepping research highlight a varied response to the trial service for flexible plastic packaging. Recall of both communications and the receipt of bags was closely linked to awareness of the pilot and whether or not the participant was recycling items in the trial service.

A common theme across the pilots was a high level of stated participation, over 70%, when looking at respondents who received both the bags and communications. Therefore, a key outcome of the research was that the distribution of the communications and bags to residents was vital to encouraging participation in the new service.

A range of approaches have been adopted by local authority partners, from distribution via mailing companies to hand delivering communications using crews or agency staff.

It is the recommendation of the project that the reliability of delivery methods is prioritised when considering options for distributing communications to householders.

Full reports from the doorstepping trials are available⁷.

Figure 57 • Doorstep research findings (%)

	South Gloucestershire	Newcastle	Cheltenham	Maldon
Aware of pilot	95	89	76	68
Received comms	93	77	73	56
Received bags	95	91	43	75
Received comms and bags	91	76	41	54
Recycling 1+ item in pilot (all households)	81	65	42	42
Recycling 1+ item in pilot (received comms and bags)	85	74	93	71
Very / fairly satisfied with pilot (those participating)	96	95	96	89
Service very / fairly well communicated (those receiving all comms)	91	89	98	85

⁷ <https://wrap.org.uk/resources/report/plastic-bags-and-wrapping-recycling-local-collections-pilot>

Material composition analysis

Material composition analysis has been carried out on each trial area to understand two key points:

- + Whether residents are recycling effectively and what changes could be made to householder communications to improve the quantity and quality of the material collected.
- + To give an understanding of the composition of the feedstock recycled and markets would be receiving.

It also provides an understanding of householder behaviour and habits about how they present the material for recycling.

The timing and quantities assessed in these analyses have been important to get representative samples from each local authority and to make them statistically robust.

It was decided to complete two analyses for each pilot authority. In order to let householders become familiar with the service, it was decided not to analyse the material in the very early stages, with the first analysis taking place around one month after the service started.

The second analysis was completed around six months after the first, to assess the composition after the scheme had become established, and to assess how behaviours might have changed over time.

Seven waste composition analyses have been completed so far:

- + Cheltenham Borough Council – November 2022 and July 2023.
- + South Gloucestershire Council – December 2022 and June 2023.
- + Maldon District Council – June 2023.
- + Somerset Council – July 2023.
- + Newcastle City Council – August 2023.

The analyses provide a number of datasets to represent the target versus non-target material, both by weight and number of items, the composition of these, and variables around the polymer composition, ink coverage and bag weights. These are:

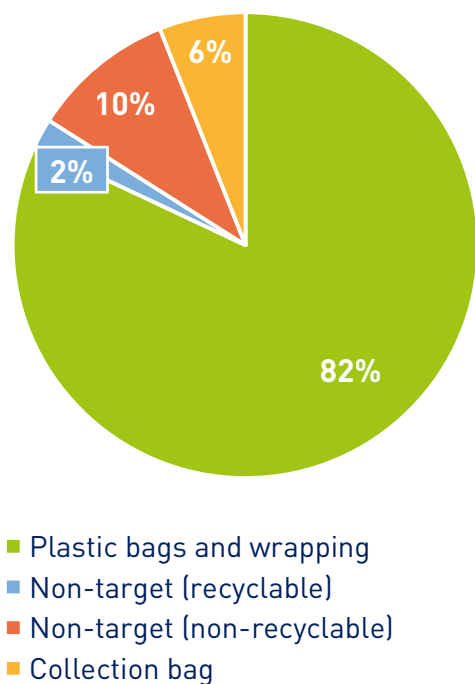
- + Overall composition – weight and number of items.
- + Detailed composition – nine categories plus the collection bag.
- + Polymer composition – PE mono, PP mono, metalised, other and collection bags.
- + Ink coverage – clear, 1-80% coloured, 80-100% coloured, for PE and PP.
- + Bag weights – average bag weight and the heaviest and lightest bag weight.

The total quantity of material analysed across all seven analyses was 711 bags, weighing 197kg and including 41,830 items.

Overall composition

The overall composition summary from the five analyses that took place in 2023 provides the most accurate representation of the data. This focus on the data from the 2023 analyses was due to slight refinement of the material categories and impacts from inclement weather in two analyses in November and December 2022. The latter resulted in the collection bags from one local authority having water and excess moisture from being stored outside after collection. The total quantity of material analysed across these five analyses was 541 bags, weighing 145kg and including 31,377 items.

Figure 58 • Overall composition



The overriding observation across all of the analyses is that the material is largely target material and clean.

The majority of the material was target material (88%) which comprised 82% plastic bags and wrapping, and 6% collection bags. The weight of the collection bags is not insignificant but is the only realistic option, at present, for collecting plastic bags and wrapping from kerbside collection services.

A relatively small quantity of non-target and recyclable material was present (2%), which consisted of rigid plastic packaging (bottles, pots, tubs and trays), paper and card, and a very small quantity of steel and aluminium cans.

10% was non-target and non-recyclable material and this is considered within kerbside recycling normal operating tolerances, and certainly better performing than previous schemes to collect plastic bags and wrapping.

However, visual inspections of the material do not indicate 10% non-target non-recyclable material and the actual figure, based on anecdotal evidence, is estimated to be around 6-7%.

This difference is due to water and excess moisture present in the material after being exposed to rain and damp conditions from being stored outside after collection.

Water that would normally be present in or on the collection bag is weighed as part of the analysis. The collection bag is weighed, the contents removed and the items in the main categories weighed separately.

The remaining weight is the 'other / residual (unsorted)' items at the bottom of the collection bags – which consequently would include the weight of water and excess moisture in the collection bag dispersed when the items are removed.

This 'other / residual (unsorted)' fraction makes up around half (thus 5%) of the 10% 'non-target (non-recyclable)' category alongside 'non-recyclable items' and 'compostables' and 'contaminated packaging'.

With the 'other / residual (unsorted)' fraction often having very little material in it, it can be assumed that this fraction contains any water and excess moisture present.

Therefore, the overall 'non-target (non-recyclable)' material is estimated to be towards the lower end of the 5-10% range. This will be investigated further in future material composition analysis.



Number of items

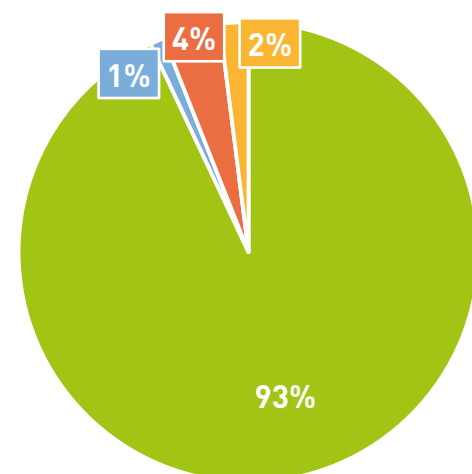
When looking at the composition of the number of items, 95% of the items were target material, which consisted of plastic bags and wrapping (93%) and collection bags (2%), with the remaining 5% made up of non-target non-recyclable material (4%) and non-target recyclable items (1%).

The number of items for each of the main categories from the total 31,377 items in the five-material composition analysis completed so far in 2023 are as follows:

- + Plastic bags and wrapping – 29,039
- + Non-target recyclable items – 365
- + Non-target non-recyclable items – 1,432
- + Collection bag – 541

This data also backs up the estimate that, based on a weight-based analysis, due to water and excess moisture in the material the 10% non-target non-recyclable material fraction is more likely to be around 7.5%.

Figure 60 • Number of items (%)

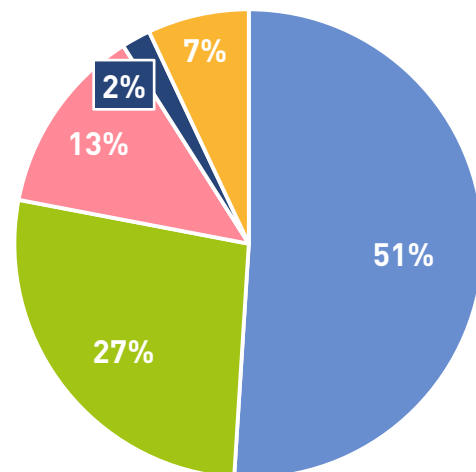


- Plastic bags and wrapping
- Non-target (recyclable)
- Non-target (non-recyclable)
- Collection bag

Polymer composition

The composition of the flexible plastic packaging mainly consisted of mono non-metallised PE and PP (85%), with PE being the most prominent polymer type (51%), followed by PP (27%) and the PE collection bags (7%). The remaining material consisted of metallised material (13%), which is used in crisp packets and sweet wrappers etc, with 2% all other flexible plastic packaging, including laminates.

Figure 61 • Polymer composition (%)



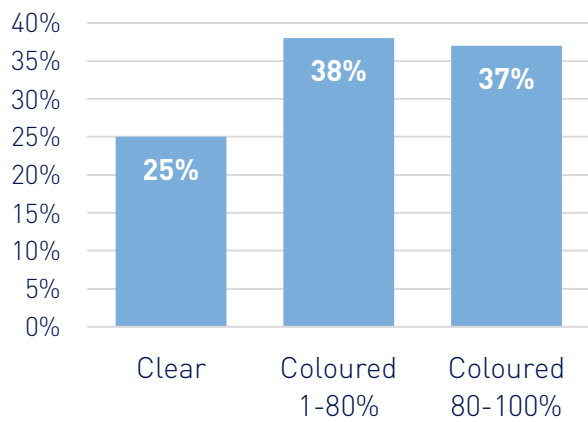
- PE mono
- PP mono
- Metalised
- Other
- Collection bag

Ink coverage

There are a range of ink colours used in plastic bags and wrapping.

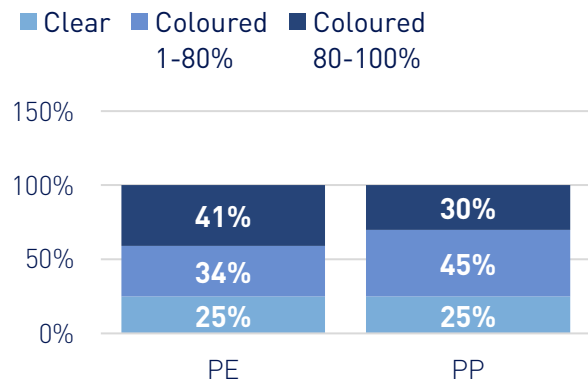
A total of 25% had no, or next to no, ink coverage, and 75% had some level of coloured material. This consisted of 38% which had an estimated 1-80% coloured material and 37% which had 80-100% coloured material.

Figure 62 • Ink coverage (%)



The level of ink coverage varied between whether the polymer was PE or PP. In the heavily inked 80-100% coloured range, 41% was PE whilst PP was significantly lower at 30%. However, it was the opposite result in the 1-80% coloured range where 34% of PE was noticeably lower than 45% for PP.

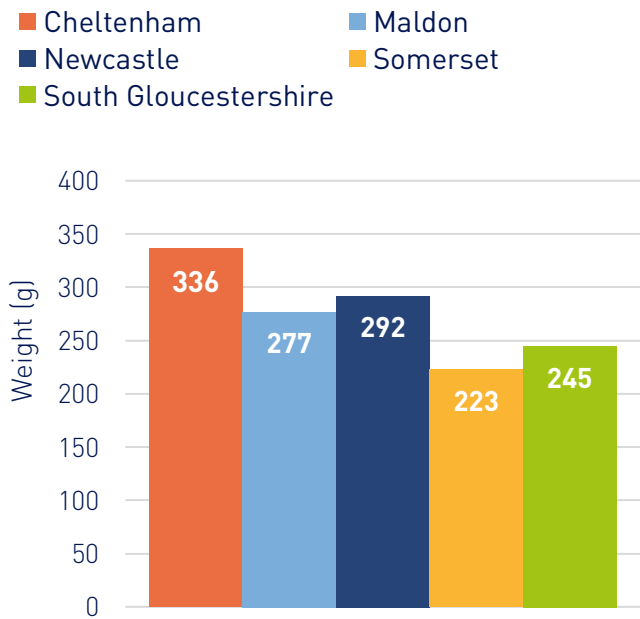
Figure 63 • Polymer type ink coverage (%)



Average bag weights

The average bag weight across the five material composition analyses that have been completed so far in 2023 was 275g, with Cheltenham having the heaviest average bag weight at 336g, and Somerset the lightest at 223g.

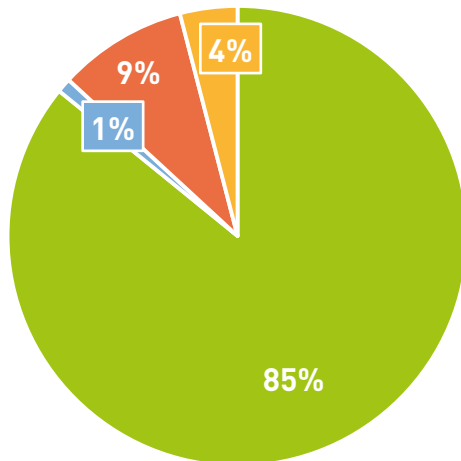
Figure 64 • Average bag weight per trial (g)



Overall composition by local authority

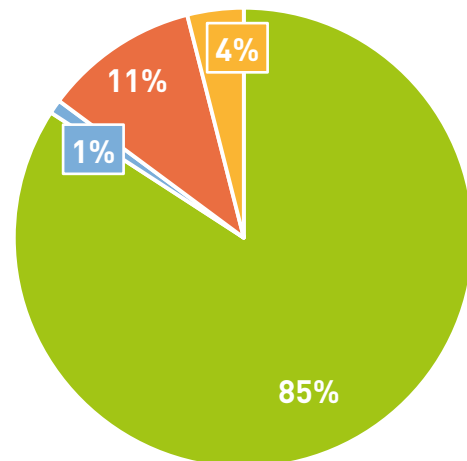
The overall composition of the five material assessments that took place in 2023 are as follows.

Figure 65 • Overall composition (%)
Maldon (June 2023)



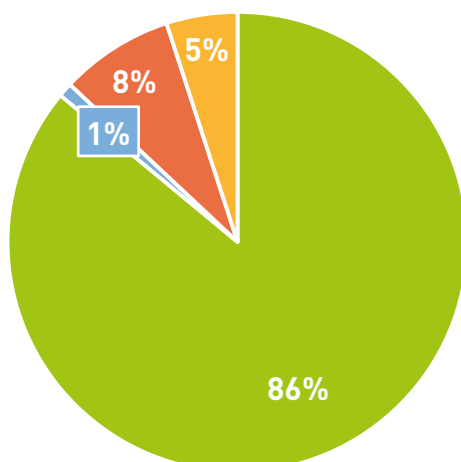
- Plastic bags and wrapping
- Non-target (recyclable)
- Non-target (non-recyclable)
- Collection bag

Figure 67 • Overall composition (%)
Cheltenham (July 2023)



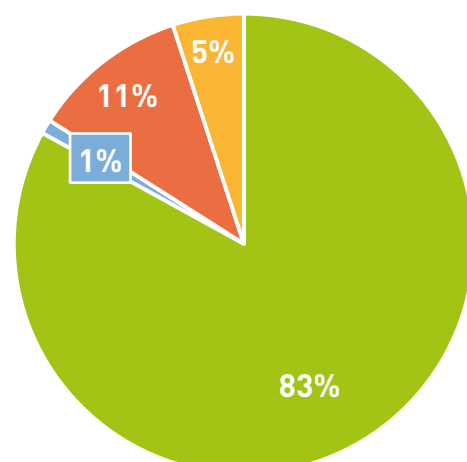
- Plastic bags and wrapping
- Non-target (recyclable)
- Non-target (non-recyclable)
- Collection bag

Figure 66 • Overall composition (%)
South Gloucestershire (June 2023)



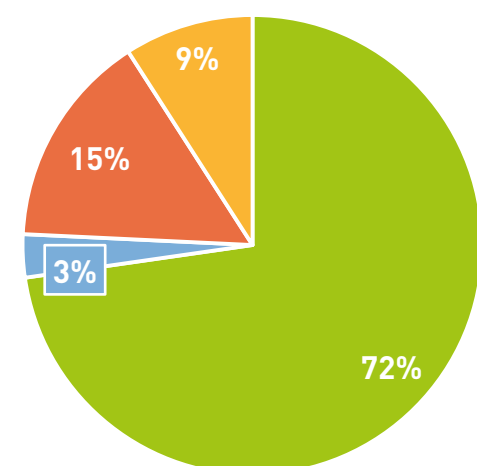
- Plastic bags and wrapping
- Non-target (recyclable)
- Non-target (non-recyclable)
- Collection bag

Figure 68 • Overall composition (%)
Somerset (July 2023)



- Plastic bags and wrapping
- Non-target (recyclable)
- Non-target (non-recyclable)
- Collection bag

Figure 69 • Overall composition (%) Newcastle (August 2023)



- Plastic bags and wrapping
- Non-target (recyclable)
- Non-target (non-recyclable)
- Collection bag

The range for each category is as follows:

- + Plastic bags and wrapping – 72% (Newcastle) to 86% (South Gloucestershire).
- + Non-target (recyclable) – 1% (Maldon, South Gloucestershire, Cheltenham, and Somerset Council) to 2% (Newcastle).
- + Non-target (non-recyclable) – 8% (South Gloucestershire) to 15% (Newcastle).
- + Collection bag – 4% (Cheltenham and Maldon) to 9% (Newcastle).

The collection bag weight for Newcastle (27g) was higher than the other local authority areas (12g), which accounted for the 5% variation in composition across locations.

As previously mentioned, the 88% target material across all five material composition analyses completed so far in 2023 consisted of plastic bags and wrapping (82%) and the collection bag (6%). This total varied between 81-91% as follows:

- + Maldon – 89%
- + South Gloucestershire – 91%
- + Cheltenham – 89%
- + Somerset – 88%
- + Newcastle – 81%

Newcastle's presentation and collection approach differ slightly to the other four pilot areas analysed. In Newcastle, bagged material is presented inside a partially co-mingled bin, whereas in the other areas, bags are presented visible to crews next to other recycling or inside a small recycling box.

Crews in Maldon, South Gloucestershire, Somerset and Cheltenham are expected to sticker and reject contaminated bags at the kerbside, whereas in Newcastle it is not practical or safe for crews to search through bins for contaminated bags. This could be an explanation for the results outlined here.

Similarly, Newcastle is the only project of the five analysed to use a thick, 50micron collection bag (compared to 18-20micron for the others), which explains the increased weight. This is because the bags need to withstand collection, compaction and bulking at a transfer station as well as a materials recycling facility process.

How material is presented

Analysing the composition of the material provides data about the composition of the material, but also householder behaviour with regards to how material is collected and presented for recycling. Different approaches to presentation have the potential to impact how the flexible plastic packaging is processed at a materials recycling facility or end market destination.

One key example was the presentation of flexible plastic packaging in several smaller bags within the collection bag. This behaviour has the potential to change the way the flexible plastic packaging behaves in the materials recycling facility. Similarly, the presentation of folded crisp packets, which, although unlikely to cause any significant sorting impacts, is an interesting example of householder behaviour.



End markets

Understanding the technical and commercial capabilities and considerations of the recycling end markets for flexible plastic packaging is an essential part of the Flexible Plastic Fund FlexCollect project.

End markets are defined as material sorting and reprocessing to produce a washed flake or pellet, or chemical recycling output, that can be used as a raw material to manufacture new products. These could involve:

- + Material sorting of FlexCollect flexible plastic packaging from other materials and into different flexible plastic packaging polymers or formats (e.g. mono-material vs laminates).
- + Intermediate processes like washing and flaking.
- + Producing the final product.

The end markets delivery activities have been split into two broad delivery areas – an end markets research report and recycling trials.

End markets research report

In order to provide a firm foundation and framework to operate within, RECOUP and SUEZ worked collaboratively to research and produce a report to understand both the technical and commercial considerations of recycling flexible plastic packaging collected from kerbside services.

This process included investigating and validating existing material sorting facilities, and mechanical and chemical reprocessors that can, or potentially could, recycle the collected material.

This was done to provide an understanding of two key areas:

- 1) Technical capabilities to process the various polymer and packaging format types in this material stream.
- 2) Commercial considerations for processing the material.

To do this effectively, specific questions were researched for each facility:

- + Material feedstock requirements / specifications.
- + External processes to the facility they are dependent upon – e.g. sorting requirements or material washing.
- + Brief overview of operations, technologies and processes used.
- + Material outputs produced – products and / or material specifications.
- + Production capacity and any plans for expansion.
- + Commercial information for kerbside flexible plastic packaging – gate fee to accept material / value of the products produced / material processing costs (against using standard feedstock).
- + Willingness to accept material for a recycling trial and quantity that can be accepted.

The facilities were broadly split into two primary activities – mechanical recycling and chemical recycling. For mechanical recycling, these activities were further split into four areas:

- + Plastic lumber, board or sheet.
- + Plastic film products.
- + Wash, shred and extrude.
- + Other.



Recycling trials

Facilities were selected to run trials using a number of considerations targeting those facilities that can currently process the material and based on their willingness to be involved in a trial. The selection criteria was as follows:

- ⊕ Ability to process the material.
- ⊕ Willingness to process the material.
- ⊕ The product(s) manufactured.
- ⊕ Quantities that were able to be processed.
- ⊕ Processes that need to take place before the material is accepted for processing.
- ⊕ Processes that need to take place after the material is processed in order to manufacture a recycled end product.
- ⊕ Cost in terms of gate fees and use of Packaging Recovery Notes to accept the material and any further processing costs that are needed to be covered.
- ⊕ The ability for brands and other stakeholders (that have a commercial interest in purchasing recycled end products) to buy back the end product that is produced.

As there were a relatively small number of households that took part in the initial stages of the project, only small amounts of material were available for trials. This led to initial, smaller trials and focused on the plastic film manufacturer and recycler, Berry BPI, who assessed one tonne of material, which is being used to inform their future strategy about processing post-consumer flexible plastic packaging.

This was followed by a trial with Plastecowood, a company that produces plastic lumber products which, subject to some operational and commercial considerations, was a successful trial. This also used one tonne of material.

Following these, the focus shifted towards a trial using a minimum of a 'full load' of material (15-20 tonnes). A trial took place at a new facility, Stirling Polymers, to sort, shred and extrude material to produce a pellet. Again, subject to operational and commercial considerations, the material could be processed at this facility.

As material quantities build, several other full load trials are being planned in Q4 2023 and Q1 and Q2 in 2024. These include Meplas Ltd, a plastic reprocessor in the UK that can wash, shred and extrude the material to produce a pellet as a reduction to virgin pellets in manufacturing processes in the UK.

In the chemical recycling category, ReNew ELP, a subsidiary of Mura Technology and Mura's first commercial-scale HydroPRS™ advanced recycling site, located in Teesside, are set to commence commercial operations in 2024

A series of smaller trials also took place, using laboratory-based analysis and small pilot plants that demonstrate the capability of various technologies to recycle the material. Quantities varied between 2.5-18kg and trials included ReVentas, a company that is developing a technology to remove odours, colours and contaminants to produce a clear pellet. The success of this has led to FlexCollect providing one tonne of material to ReVentas for larger trials.

Other laboratory-based trials took place with Remarkable Energy and Sylatec, both developing chemical recycling technologies.

Another trial took place with Teesside University's Net Zero Industry Innovation Centre (NZIIC) – a new £13.1m facility which draws on the university's expertise in clean energy and sustainability. The facility includes the Circular Economy and Recycling Innovation Centre (CERIC) and houses the Circular Economy Lab, which has the capability to process a range of materials through mechanical and chemical technologies.

There are also ongoing discussions and visits to a variety of facilities, both in the UK and overseas. These include: Eurokey, Jayplas, Fibreright, Impact Recycling, Ecoo (Belgium), Prodelix (Portugal) and Plastic Energy (Spain).

Learnings are being developed as trials progress, and the key operational requirement is to meet feedstock requirements for reprocessors through effective sorting. This has technical and commercial requirements and means a staged set of processes needs to be in place to recycle this material as effectively and efficiently as possible. From a commercial viewpoint, use of the Packaging Recovery Notes is needed as price support to make the processing of the material commercially viable.

Cost modelling for reprocessing flexible plastic packaging is currently in its infancy. Further detail will be shared in the final project report.



Summary

Operations

The project has been successful in recruiting and launching trial collection services for flexible plastic packaging in a range of waste collection authorities, covering the main collection types (source segregated, twin stream and co-mingled), frequencies (weekly and fortnightly) population densities (urban through to very rural) and socio-demographics (low, medium and high deprivations).

Each trial has integrated the collection of flexible plastic packaging into current operations seamlessly, with no issues regarding space on vehicle, frequency of tipping or impact on collections operatives. The project is collecting a consistent set of data across all pilot authorities, including participation, weight, volume and costs. For participation, two datasets were collected – one set continuously collected giving a proxy calculation for participation (Operational Participation Rate) and a second set collected through Resource Futures giving participation data to Defra standards (Industry Standard Participation Rate).

There is a clear link between frequency of collection, and the number of bags presented per household per week. This is further supported by the industry standard participation monitoring which demonstrates that more frequent collections result in higher levels of participation (47% participation for fortnightly and 64% participation for weekly collections).

While more data is required for validation, these findings show that a weekly collection could drive higher participation and therefore more material collected.

Figure 70 • Operational data key findings

Parameter	Data
Average weight presented by participating households per collection bag across all pilots	291g
Average weight collected per household per week across all pilots ⁸	84g
Bags collected per household per week across all pilots	0.29
Bags collected per household per week for weekly collections	0.46
Bags collected per household per week for fortnightly collections	0.17
Industry standard participation across monitored pilots	60%
Industry standard participation across weekly collection pilots	64%
Industry standard participation across fortnightly collection pilots	47%

⁸ Average weight collected per household per week across all pilots is a measure including all households within the trial area who are eligible to participate, not just those who are participating.

Communications

Doorstep surveys have given an indication of the influence of communications on residents' understanding of the project, satisfaction with the trial service and satisfaction with the communications.

Unsurprisingly, householders have a better understanding of the service and more satisfaction, with both it and the communications, if the initial bags and communications deliveries are completed efficiently and effectively. Where there have been issues with the delivery of bags and communications, there is a clear drop in awareness and satisfaction, as highlighted in figure 71. This is also seen in the performance of collections, particularly participation levels and the amount of material collected. It is therefore recommended that the reliability of delivery methods is prioritised when considering options for distributing both communications and collection bags.

Figure 71 • Doorstep research findings (%)

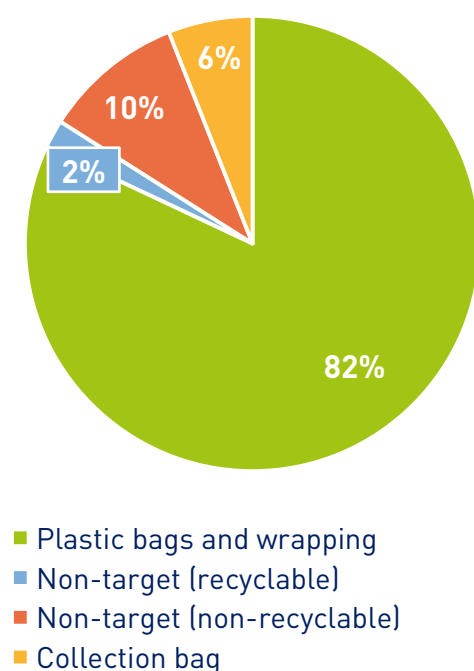
	South Gloucestershire	Newcastle	Cheltenham	Maldon
Aware of pilot	95	89	76	68
Received comms	93	77	73	56
Received bags	95	91	43	75
Received comms and bags	91	76	41	54
Recycling 1+ item in pilot	81	65	42	42
Recycling 1+ item in pilot (received comms and bags)	85	74	93	71
Very / fairly satisfied with pilot (those participating)	96	95	96	89
Service very / fairly well communicated (those receiving all comms)	91	89	98	85

Composition

The composition of collected flexible plastic packaging was analysed to gain insight into the composition of the feedstock for recycling end markets, as well as to understand whether residents are effectively recycling the right materials, thus testing the effectiveness of the communications.

Figure 72 details the overall composition, based on five analyses. Flexible plastic packaging material collected is predominantly target material and generally of a good, clean quality. The 10% contamination rate is typical for normal kerbside recycling scheme and certainly an improvement on previous flexible plastic packaging collection trials.

Figure 72 • Overall composition (%)



The composition of the flexible plastic packaging was predominantly mono non-metalised PE and PP (85%), with PE being the most prominent type (51%). Ink coverage was significant, with only 25% having no, or next to no, ink coverage. Additional analyses will take place in 2024.

End markets

The availability of effective sorting infrastructure is currently a barrier to widespread collection and reprocessing of flexible plastic packaging. This is a known challenge related to the current lack of collections or infrastructure.

Reprocessing trials have started with encouraging results, but have been limited by the amount of material collected. Good results were observed from a company who produced plastic lumber products. Another company who sort, shred and extrude material to produce a pellet were also able to process the flexible plastic packaging material, subject to operational and commercial considerations. The pace of this programme will increase as the collection trials expand and more material is collected for more expansive sorting and recycling trials.

As collections, sorting and recycling trials are still being undertaken and the process 'industrialised', we have chosen not to include costs in this report at this time. Costs in different options and choices is a key area of work that is a fundamental part of the project and reported outcomes.

Next steps

A further two pilot authorities are set to join the project in the early part of 2024, with the focus then turning to expanding the nine trial services to additional households, with the intention of delivering learnings at scale.

Project partners

SUEZ recycling and recovery UK

SUEZ recycling and recovery UK employs over 5,600 people, operating across hundreds of sites, and handles in excess of 10 million tonnes of waste materials every year – a significant proportion of the UK's total waste. Through collection, treatment, recycling and logistics operations, it serves more than 30,000 business customers and millions of householders throughout the country. Visit www.suez.co.uk to find out more.

WRAP

WRAP is a climate action NGO working around the globe to tackle the causes of the climate crisis and give the planet a sustainable future. Our vision is a thriving world in which climate change is no longer a problem. We believe that our natural resources should not be wasted and that everything we use should be re-used and recycled. We bring together and work with governments, businesses and individuals to ensure that the world's natural resources are used more sustainably. Our core purpose is to help tackle climate change and protect our planet by changing the way things are produced, consumed and disposed of.

For more information, visit wrap.org.uk

RECOUP

RECOUP is the UK's leading independent authority and trusted voice on plastics resource efficiency and recycling. As a registered charity, our work is supported by members who share our commitments including a more sustainable use of plastics, increased plastics recycling, improved environmental performance and meeting legislative requirements. We achieve these by leading, advising, challenging, educating and connecting the whole value chain to keep plastics in a circular system that protects the environment, underpinned by evidence and knowledge.

For more information, visit www.recoup.org

Ecosurety

Ecosurety is the market-leading packaging compliance scheme committed to accelerating change towards an environmentally sustainable world. It ensures its members comply with the EPR regulations and enables them to make sustainable packaging decisions via data and insights. Ecosurety supports efficient and transparent investment in circular economy projects through improved infrastructure, innovation and consumer awareness campaigns. B Corp certified since 2020, Ecosurety is committed to the balancing of profit with social and environmental performance.

The Flexible Plastic Fund

The Flexible Plastic Fund is a collaborative fund giving value to flexible plastic films, so they are properly recycled.

Managed by market-leading producer responsibility compliance scheme Ecosurety, the Fund was established in May 2021 by five founding partners: Mars UK, Mondelēz International, Nestlé, PepsiCo and Unilever. Partners of the Fund now include Abel and Cole, Eat Real, Ella's Kitchen, Kiddylicious, Koninklijke Douwe Egberts, KP Snacks, Lotus Bakeries, McCain Foods, Natural Balance Foods, Ocado Retail, pladis, Proper Snacks, The Collective, Vitaflo and Yeo Valley Organic.

The Fund explores how to support the recycling of flexible plastic packaging in two ways: through kerbside pilots and via retail collections. Launched in 2022, the Flexible Plastic Fund FlexCollect project is a series of pilots collecting flexible plastic packaging from households via kerbside collections in nine local authorities. The project, which runs until 2025, will also investigate different recycling technologies. The retail project supports the recycling of flexible plastic packaging collected by supermarkets. There will be full visibility on the recycling journey of flexible plastics collected by participating retailers through to their recyclers.

For more information, visit flexibleplasticfund.org.uk

Brands supporting the Flexible Plastic Fund

Abel & Cole
Easy Organic Everything

Eat Real

Ella's
kitchen

JDE
JACOBS DOUWE EGBERTS

KIDDYLICIOUS

KP Snacks

Lotus
Since 1932

MARS
Tomorrow starts today

McCain
We are family

Mondelēz
International
SNACKING MADE RIGHT

natural balance foods
WHOLEFOOD WONDERS

Nestlé

Ocado

PEPSICO

pladis

PROPER

COLLECTIV

Unilever

Vitaflo
Enhancing Lives Together

Yeo Valley
ORGANIC

Defra

We are responsible for improving and protecting the environment. We aim to grow a green economy and sustain thriving rural communities. We also support our world-leading food, farming and fishing industries.

Our broad remit means we play a major role in people's day-to-day life, from the food we eat, and the air we breathe, to the water we drink.

We are here to make our air purer, our water cleaner, our land greener and our food more sustainable.

Our mission is to restore and enhance the environment for the next generation, leaving it in a better state than we found it.

For more information, visit www.gov.uk/government/organisations/department-for-environment-food-rural-affairs

UK Research and Innovation

UK Research and Innovation (UKRI) is the largest public funder of research and innovation in the UK, with a budget of around £8bn. It is composed of seven disciplinary research councils, Innovate UK and Research England.

We operate across the whole country and work with our many partners in higher education, research organisations businesses, government and charities.

Our vision is for an outstanding research and innovation system in the UK that gives everyone the opportunity to contribute and to benefit, enriching lives locally, nationally and internationally. Our mission is to convene, catalyse and invest in close collaboration with others to build a thriving, inclusive research and innovation system that connects discovery to prosperity and public good. Find out more at www.ukri.org

Zero Waste Scotland

Zero Waste Scotland is a not-for-profit environmental organisation funded by the Scottish Government.

We exist to lead Scotland to use products and resources more responsibly, focusing on where we can have the greatest effect on reducing climate change together through responsible consumption, responsible production and maximising value through waste.

For more information, visit www.zerowastescotland.org.uk



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