WASTE AND RECYCLING SERVICES SUPPORT TO DURHAM COUNTY COUNCIL

An assessment of an agreed 'short-list of alternative household waste collection service design scenarios

Research date: March – April 2024

Project code: TRU100-006

About 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 core purpose is to help you tackle climate change and protect our planet by changing the way things are produced, consumed, and disposed of.

This document provides the supporting evidence and analysis for Durham County Council only

Document reference: TRU100-006 Collection options modelling report

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Executive summary

In 2017/18 WRAP assessed a range of alternative household waste collection scenarios for Durham County Council (the Council). WRAP was asked by officers from the Council to revisit a limited number of scenarios from the 2017/18 cost models (hereafter referred to as the 'short-listed' scenarios) and update these to reflect changes in costs, tonnages collected and household numbers. Whilst the 2017/18 work considered the full range of kerbside collections offered by the Council plus the addition of separately collected food waste, the updated cost models focus on residual waste, dry recycling, and food waste only (i.e. excluding garden waste).

The 'short-listed' scenarios assessed by WRAP are shown in Figure ES1.

Figure ES1' Short-listed' alternative collection scenarios

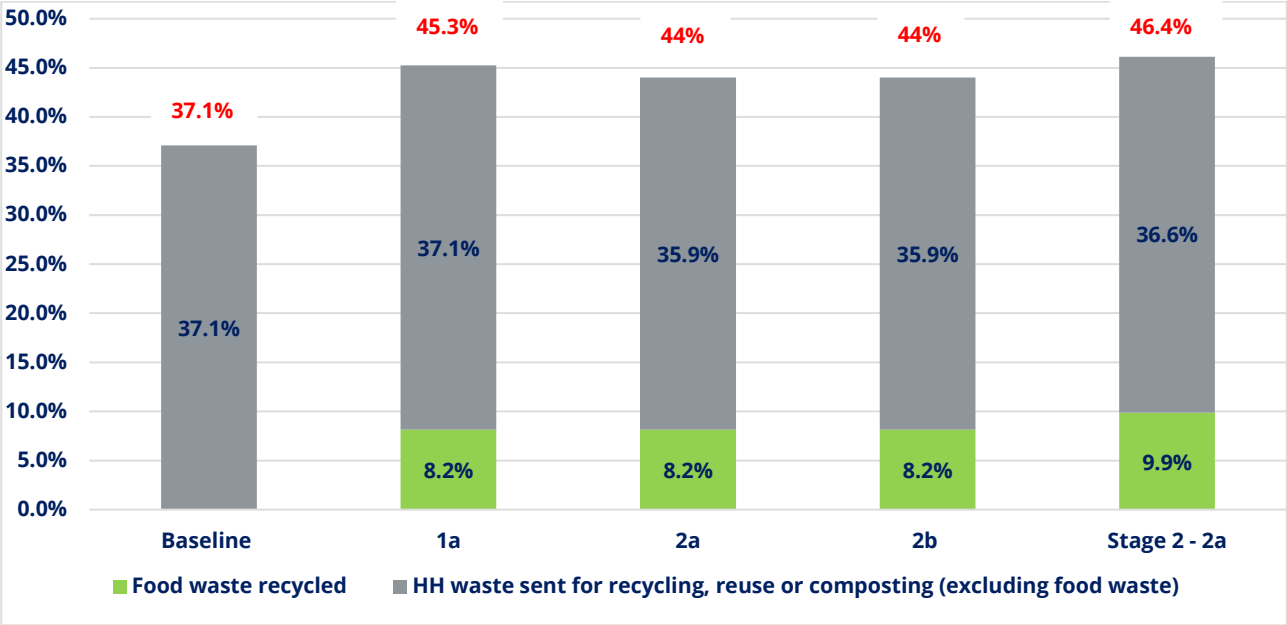
Option		Residual waste	Dry recycling	Separate glass	Garden waste	Food waste
Baseline	Frequency	Fortnightly	Fortnightly		Fortnightly	
	Vehicle	RCV	28m3 split body RCV		RCV	
	Container	240 litre bin	240 litre bin	40 litre box	240 litre bin	
Stage 1 Scenario 1a	Frequency	Fortnightly	Fortnightly		Fortnightly	Weekly
	Vehicle	RCV	28m3 split body RCV		RCV	7.5 tonne dedicated vehicle
	Container	180 litre bin	240 litre bin	40 litre box	240 litre bin	7 & 23 litre caddies
Stage 1 Scenario 2a	Frequency	Fortnightly	Fortnightly		Fortnightly	Weekly
	Vehicle	RCV	RCV		RCV	7.5 tonne dedicated vehicle
	Container	240 litre bin	240 litre bin		240 litre bin	7 & 23 litre caddies
Stage 1 Scenario 2b	Frequency	Fortnightly	Fortnightly		Fortnightly	Weekly
	Vehicle	RCV with food waste pod	RCV with food waste pod		RCV	co-collected with residual and dry recycling
	Container	240 litre bin	240 litre bin		240 litre bin	7 & 23 litre caddies
Stage 2 Scenario 2a	Frequency	3-weekly	Fortnightly		Fortnightly	Weekly
	Vehicle	RCV	RCV		RCV	7.5 tonne dedicated vehicle
	Container	240 litre bin	240 litre bin		240 litre bin	7 & 23 litre caddies

The findings from WRAP's updated analysis are summarised as follows:

Impact on performance

The performance change of the 'short-listed' scenarios as expressed by the household waste recycling rate (ex NI192) is shown in Figure ES2. Applying assumed tonnages and contamination rates to the 'short-listed' scenarios results in an increase in the kerbside recycling rate of between 8.2% and 9.3%.

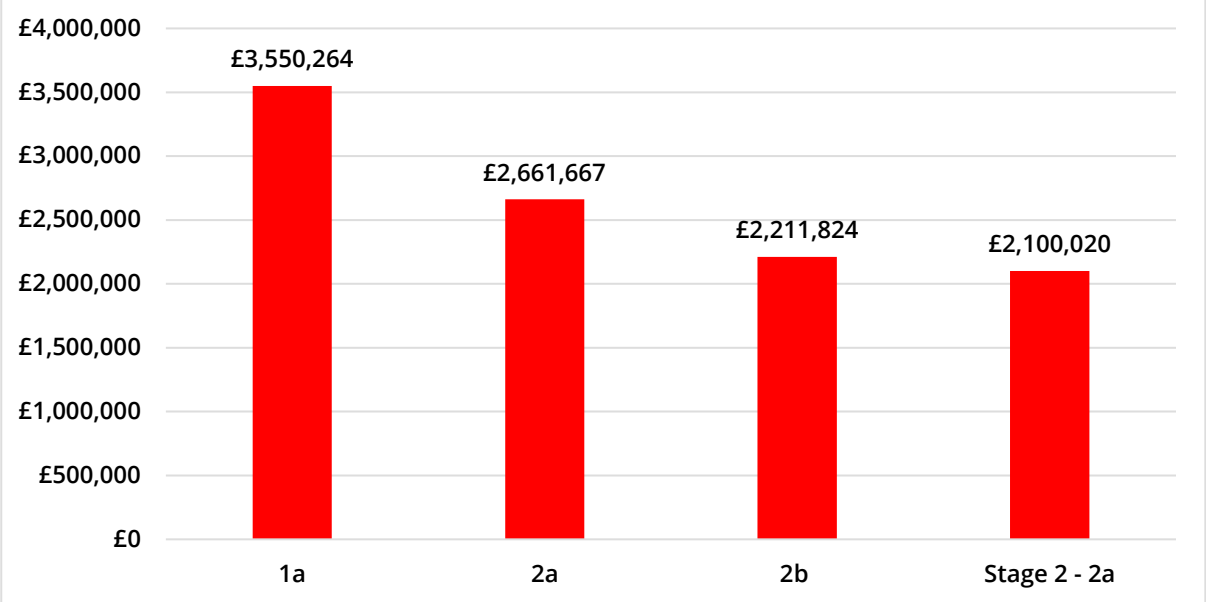
Figure ES2 *Projected household waste recycling rate (ex NI192) for the 'short-listed' scenarios*



Impact on collection costs

The projected collection costs of the 'short-listed' collection scenarios relative to the baseline collection cost are shown in Figure ES3.

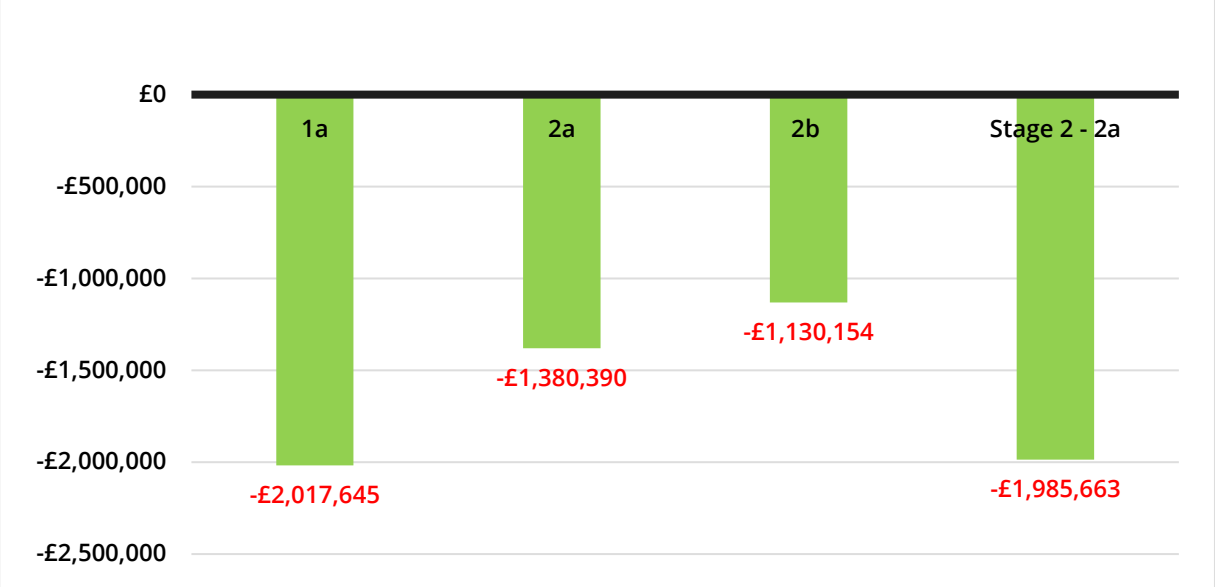
Figure ES3 *Projected collection costs of the short-listed scenarios relative to the baseline*



Impact on disposal costs (including residual waste)

The projected disposal costs of the 'short-listed' collection scenarios relative to the baseline disposal cost are shown in Figure ES4

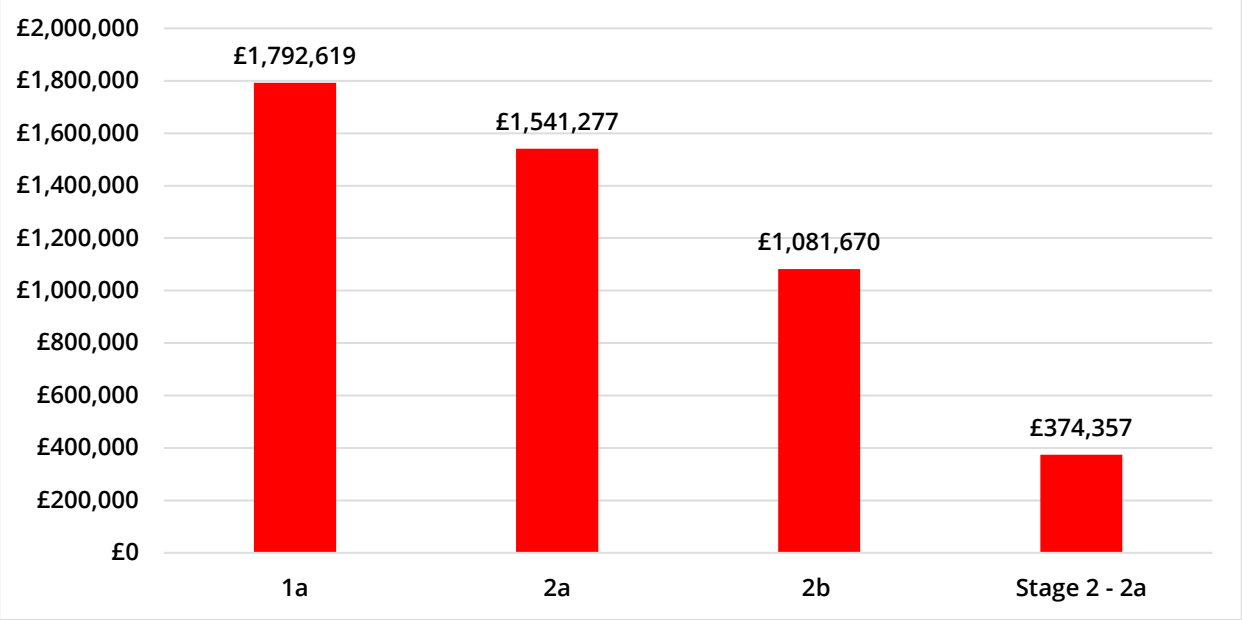
Figure ES4 Projected disposal costs of the 'short-listed' scenarios relative to the baseline



Impact on the 'whole system' costs

The projected 'whole system' costs (i.e. collection, disposal and assumed overheads) of the 'short-listed' collection scenarios relative to the baseline 'whole system costs are shown in Figure ES5.

Figure ES5 Projected 'whole system' costs of the 'short-listed' scenarios relative to the baseline

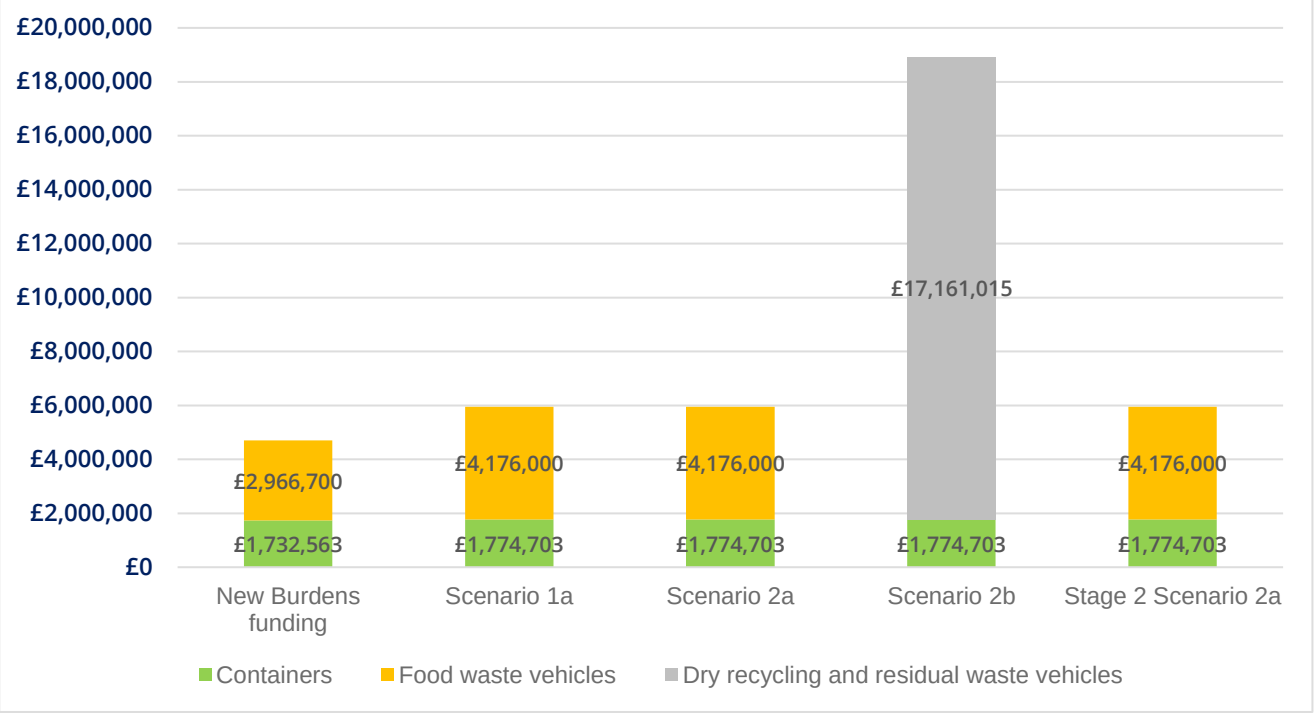


Impact on Capital costs

The projected capital costs of vehicles are included as annualised costs in the projected costs reported in Section 5.2. However, when the projected capital costs of new vehicles and containers for weekly food waste collections are compared against the Council's 'new burdens' capital funding allocation (as listed in DEFRA's letter to the Council dated 9th January 2024) we see that whilst the 'new burdens' funding allocation to the Council will cover the capital costs of food waste containers, the funding does not cover the projected capital cost of food waste vehicles[1]. The projected capital cost of a new fleet of RCVs with food waste pods for Scenario 2b is significantly more than DEFRA's 'new burdens' funding allocation.

It should also be noted that the projected capital costs (nor DEFRA's new burdens' funding) do not include any infrastructure related costs (e.g. transfer station costs) associated with the 'short-listed' collection scenarios.

Figure ES6



Carbon Impact

The net reduction in CO2e resulting from introduction of a separate weekly collection of food waste is projected to be -747 tonnes + 23.9 tonnes = 723.1 tonnes per annum.

[1] 11 tonne vehicles have been assumed for the weekly collection of food waste. The Council may decide to use a mix of 11 tonne vehicles and smaller, less expensive 7.5 tonne vehicles.

Operational considerations

From an operational perspective, the 'short-listed scenarios will, to differing degrees, have an impact on the delivery of the Council's household waste collection service. Table ES1 summarises the main operational pros and cons of the changes associated with the four 'short-listed' scenarios.

Table ES1 Operational pros and cons of the changes associated with the 'short-listed' scenarios.

	Pros	Cons
Collecting food waste using a dedicated fleet of vehicles	Greater flexibility to maximise efficiency of food waste collection (collections are independent of other services). Allows direct delivery where available. Little impact on residual and dry recycling collections	Increased depot space required to house additional fleet. Significantly increases number of employees, potentially placing greater strain on service management.
Co-collecting food waste alongside residual and dry recycling using RCVs with pods	Less additional vehicles (and crews) required for the collection of food waste.	Significant impact on the efficiency of both residual and dry recycling collections as co-collection will slow down collections. Direct delivery of food waste unlikely to be an option, therefore greater need for new bulking and transfer infrastructure.
Fully comingling dry recycling	Simplifies the collection of dry recycling. Collection crews have expressed a preference for a single stream collection system using wheeled bins that doesn't include the use of caddy inserts.	Potential to increase levels of contamination.
3-weekly residual waste collections	Reduces the number of vehicles required for the collection of residual waste.	Unlikely to be welcomed by householders. Communicating collection days becomes more complicated. Increases strain on food waste and dry recycling collections.

Wider policy considerations

Simpler Recycling

On 21st October 2023 the Government published its long-awaited response to the 2021 'Consistency in household recycling' consultation. Renamed 'Simpler Recycling', the Government's response included the following key proposals:

- (Subject to consultation) Waste Collection Authorities can co-collect dry recyclables (without the need to submit a written assessment).
- (Subject to consultation) a requirement that local authorities collect residual (non-recyclable) waste '*at least fortnightly, if not more frequently, to protect local amenity and prevent unintended consequences of cutting residual waste collection frequency*'.

The above proposals were subsequently included in a 'private consultation' with local authorities which has now closed. The Government is expected to either confirm or amend the above proposals in the form of 'Statutory Guidance' which local authorities are required to have regard to.

Therefore, at the time of writing this report, the above proposals have not been confirmed nor set out in regulations.

MRF gate fees

Analysis by WRAP and published in its annual 'Gate Fees reports' Gate Fees report 2022-23 | WRAP has highlighted a year-on-year increase in both the mean and median gross gate fees charged by UK MRFs as is shown in Figure 15 taken from the 2022/23 report. Data collected for the, as yet unpublished, 2023/24 Gate Fees report suggests this trend is accelerating.

Further, the gap between mean gate fees being charged for fully comingled dry mixed recycling and mean gate fees charged for the comingled mix in a two-stream collection (i.e. excluding either fibres or glass) appears to be growing, with both the gross and net gate fees for the latter being lower than for a fully comingled mix.

Plastic films and flexibles

The Government's 'Simpler Recycling' proposals confirmed the Government's intention to require local authorities to separately collect plastic film and flexibles by March 31st 2027. Whilst this is still to be confirmed in the expected Statutory Guidance, a number of trial collections have been taking place across the UK, including a collection by Newcastle City Council. Initial results from the pilot collections can be found at FPF FlexCollect interim report — Flexible Plastic Fund .

Extended Producer Responsibility (EPR) and Deposit Return Scheme

Coupled with 'The Plastic Packaging Tax (General) Regulations 2022', which incentivises producers of plastic packaging to source at least 30% of input material from recycled sources, the introduction of Extended Producer Responsibility for packaging (pEPR) is expected to enhance the quality and quantity of materials collected for recycling. Producers will be directly funding the costs incurred by local authorities of managing household packaging waste.

One of the governing principles of the pEPR scheme is that measures are put in place to increase transparency of material and financial flows, drive efficiency and improve quality along the value chain. Given that statutory targets and duties to fund local authority collections have been placed onto packaging producers, there are clear signals in the UK that future payment mechanisms will seek to maximise and thereby incentivise quality in recycling. In addition, EPR may affect the amount of packaging waste as producers look to reduce their EPR payments.

DRS is considered by many to be a form of Extended Producer Responsibility, but in the UK is being treated as separate from the main packaging EPR system. There are many best practice examples of DRS across Europe and North America. Whilst each scheme varies slightly in design and performance, most modern, efficient systems achieve upwards of 90% return rates after the initial implementation period. However, it should be noted that many of the best practice DRS examples are seen in countries with a different context in terms of kerbside collection so it cannot automatically be assumed we will see similar return rates in the UK.

The introduction of a DRS will undoubtedly remove tonnage from local authorities. Given the scope of the proposed DRS in England (PET bottles and steel and aluminium cans), high value materials will be removed from dry recycling collected at the kerbside, reducing the value of the material collected and potentially impacting DMR sorting costs. However, the introduction of the DRS alongside EPR does not necessarily mean that local authorities will experience a loss of revenue, as within the EPR system, producers are expected to meet the costs of collecting and processing packaging waste from households net of material values. In addition, a DRS has the benefit of reducing the amount of material that enters the residual stream or is littered, which could provide a financial benefit to local authorities.

The current target date for the introduction of pEPR is October 2025. The target date for a DRS has been reported to be likely to be pushed back to 2027 Environment Secretary says 2027 now "more likely" start date for DRS (circularonline.co.uk).

Contents

1.0 Introduction

1.1 Aims and objectives of the WRAP Support

The aim of the WRAP support was to provide Durham County Council (the Council) with information to inform the future design of its household waste collection services in view of the requirements outlined in the Government's 'Simpler recycling' proposals.

The objectives of the support were:

- To Update and, where appropriate, amend the cost and performance models of an agreed 'short-list' of future collection scenarios previously produced by WRAP on behalf of the Council in 2017/18 under project reference RCY128-004.
- To provide the Council with a report summarising the projected cost, resource requirements, and performance of the 'short-listed' alternative household waste collection scenarios.

The 'short-listed' scenarios from the 2017/18 study that were updated are;

- Stage 1, Scenario 1a: adds separate weekly collection of food waste to the current baseline service. No other changes made.
- Stage 1, Scenario 2a: adds separate weekly collection of food waste and replaces current two-stream dry recycling collection with a fully comingled collection.
- Stage 1, Scenario 2b: same as Scenario 2a except food waste is co-collected with residual and dry recycling on alternate weeks (i.e. no separate fleet of food waste vehicles).
- Stage 2, Scenario 2a: same as Scenario 2a except residual waste is collected once every 3 weeks instead of once every fortnight.

2.0 Methodology

In 2017/18 WRAP assessed a range of alternative household waste collection scenarios for the Council. The assessment was undertaken by environmental consultants from Ricardo and used outputs generated by WRAP's Kerbside Analysis Tool (KAT) to construct cost and performance models for each of the different scenarios.

KAT is a Microsoft Excel based spreadsheet tool which allows the user to model a range of refuse, dry recycling, and organic waste kerbside collection options. The model is populated with a range of default values based on extensive observations of kerbside collections and WRAP's research into vehicles and containers. Some of these default values can be replaced with user-defined values based on local data to produce a model which reflects local operating conditions and the performance and costs associated with different kerbside waste collection scheme configurations.

KAT uses data on the existing kerbside collections to build a baseline model that reflects, as accurately as possible, the current service. Baseline modelling requires calibrating known inputs (such as tonnes of waste collected, and number of households served) to known outputs (such as the number of vehicles and crew required to deliver the services), aligning to the authority's current residual waste collection.

WRAP was asked by officers from the Council to revisit a limited number of scenarios from the 2017/18 cost models (hereafter referred to as the 'short-listed' scenarios) and update these to reflect changes in costs, tonnages collected and household numbers. Whilst the 2017/18 work considered the full range of kerbside collections offered by the Council plus the addition of separately collected food waste, the updated cost models for the 'short-listed' scenarios focus on residual waste, dry recycling, and food waste only (i.e. excluding garden waste).

Following discussions with officers, and given the increase in property numbers since the Ricardo study, it was agreed to adjust the outputs from the 2017/18 KAT baseline model to reflect the additional resources (i.e. collection vehicles) that the Council currently uses for the collection of household waste. Tonnage information was provided to WRAP by the Council and was used to construct the baseline cost model and, along with benchmarking data provided by WRAP, inform the assumed tonnages applied to the 'short-listed' scenarios.

3.0 Baseline cost model

The inputs that were used to construct the updated Baseline cost model are detailed in paragraphs 3.1 – 3.3. The Baseline cost model is presented in Appendix 1.

3.1 Number of households

Table 1 shows the number of households served by the Council's current kerbside collections of residual waste and dry recycling[2] and a comparison with the number of households in the 2017/18 study.

Table 1: Number of households served by the Council's current 'baseline' household waste collection services (Residual waste and dry recycling only) and the 2017/18 baseline model.

	Number of households
Number of households currently served	253,529
Number of households in 2017/18 baseline model	230,408

3.2 Tonnes of household waste collected

Table 2 shows the 2022/23 annual tonnages of residual waste and dry recycling collected at the kerbside as provided by the Council and used as inputs in the updated cost model. 2017/18 tonnages are provided as a comparison.

Table 2: Tonnes of residual waste and dry recycling collected by the Council's kerbside household waste collection service in 2022/23 and used as inputs in the updated cost Baseline cost model (2017/18 tonnages provided as a comparison).

	2022/23 tonnages	2017/18 tonnages
Residual waste	121,314	108,555
Dry mixed recycling	32,559	45,238
Co-collected glass	10,892	

[2] Information provided to WRAP by officers from the Council.

3.3 Resource inputs

The resource information shown in Table 3 was provided to WRAP by the Council and was used to construct the amended baseline cost model (2017/18 data provided for comparison).

Table 3: Resource information provided by the Council and used to inform the inputs to the baseline cost model.

Description	2022/23	2017/18
Number of Residual waste collection vehicles	28.5	26
Number of dry recycling collection vehicles (co-collected DMR and glass)	28.5	26

4.0 Future collection scenarios

Following discussions between WRAP and officers from the Council, a 'short-list' of 4 alternative household waste collection scenarios chosen from the scenarios assessed in the 2017/18 work were revisited to help the Council understand and assess the likely cost, performance, and resource implications of future changes to their household waste collection services, in particular the addition of a weekly food waste collection. Using a combination of the resourcing outputs from the 2017/18 KAT models (i.e. projected number of vehicles adjusted to take account of the increase in baseline vehicles as shown in Table 3.3) and the updated inputs and assumptions detailed in paragraphs 4.2 – 4.3, cost models for the 4 'short-listed' alternative collection scenarios were populated to enable the projected collection and disposal costs for each scenario to be calculated.

4.1 'Short-listed' alternative collection scenarios

The 'short-listed' alternative household waste collection scenarios that were revisited are listed in Table 4.

Table 4: 'Short-listed' alternative collection scenarios

Option		Residual waste	Dry recycling	Separate glass	Garden waste	Food waste
Baseline	Frequency	Fortnightly	Fortnightly		Fortnightly	
	Vehicle	RCV	28m3 split body RCV		RCV	
	Container	240 litre bin	240 litre bin	40 litre box	240 litre bin	
Stage 1 Scenario 1a	Frequency	Fortnightly	Fortnightly		Fortnightly	Weekly
	Vehicle	RCV	28m3 split body RCV		RCV	7.5 tonne dedicated vehicle
	Container	180 litre bin	240 litre bin	40 litre box	240 litre bin	7 & 23 litre caddies
Stage 1 Scenario 2a	Frequency	Fortnightly	Fortnightly		Fortnightly	Weekly
	Vehicle	RCV	RCV		RCV	7.5 tonne dedicated vehicle
	Container	240 litre bin	240 litre bin		240 litre bin	7 & 23 litre caddies
Stage 1 Scenario 2b	Frequency	Fortnightly	Fortnightly		Fortnightly	Weekly
	Vehicle	RCV with food waste pod	RCV with food waste pod		RCV	co-collected with residual and dry recycling
	Container	240 litre bin	240 litre bin		240 litre bin	7 & 23 litre caddies
Stage 2 Scenario 2a	Frequency	3-weekly	Fortnightly		Fortnightly	Weekly
	Vehicle	RCV	RCV		RCV	7.5 tonne dedicated vehicle
	Container	240 litre bin	240 litre bin		240 litre bin	7 & 23 litre caddies

4.2 Inputs and assumptions for the short-listed alternative collection scenarios

The following section provides details of the inputs and assumptions that were applied to the updated alternative collection scenario cost models.

4.2.1 Assumed yields and tonnages for the 'short-listed' alternative collection scenarios

For all scenarios, it assumed there are no losses to the system, with materials moving across each stream but the total arisings remaining the same. Table 5 lists the assumed tonnages and corresponding yields (kg/household/year) for each of the 'short-listed' scenarios including contamination.

Table 5: Summary of assumed tonnages and yields (kg/hh/yr) of the 'short-listed' alternative collection scenarios (includes contamination) and the baseline for comparison.

	Residual	Dry recycling (including contamination)	Glass	Food waste
Baseline	121,314	32,559	10,892	
Scenario 1a	102,778	32,559	10,892	18,536
Scenario 1b	102,778	43,451		18,536
Scenario 2a	102,778	43,451		18,536
Stage 2 Scenario 2a	95,309	46,891		

4.2.2 Assumed contamination rates

Table 6 shows the assumed dry recycling contamination rates for the baseline and alternative collection scenarios.

Table 6: Assumed dry recycling contamination rates for the baseline and 'short-listed' alternative collection scenarios

Baseline	26% for DMR and 0% for co-collected glass

Scenario 1a	26% for DMR and 0% for co-collected glass
Scenario 2a	26% for fully comingled DMR
Scenario 2b	26% for fully comingled DMR
Stage 2 Scenario 2a	28% for fully comingled DMR

4.2.3 Resourcing

Following discussions with officers, and given the increase in property numbers since the Ricardo study, it was agreed to adjust the outputs from the 2017/18 KAT baseline model to reflect the additional resources (i.e. collection vehicles) that the Council currently uses for the collection of household waste. The projected resources applied to the updated cost model are summarised in Table 7 below (2017/18 projections provided for comparison).

Table 7: Summary of projected resource requirements (i.e. number of vehicles) for the 'short-listed' alternative collection scenarios

Projected number of vehicles	2017/18 residual	2023/24 residual	2017/18 dry recycling	2023/24 dry recycling	2017/18 food	2023/24 food
Baseline	26	28.5	26	28.5		
Scenario 1a	22	24.1	26	28.5	29	31.8
Scenario 2a	22	24.1	24	26.3	29	31.8
Scenario 2b	25	27.4	26	28.5		
Stage 2 Scenario 2a	17	18.6	26	28.5	29	31.8

4.3 Financial assumptions for the 'short-listed' alternative collection scenarios

4.3.1 Vehicles

The Vehicle costs detailed in Table 8 were provided and agreed with officers from the Council and applied to the cost models of the Baseline and 'short-listed' alternative collection scenarios.

Table 8: Summary of assumed vehicle costs (per vehicle)

	26 tonne RCV	26 tonne split-body RCV	26 tonne RCV with food waste pod	11 tonne dedicated food waste RCV[3]
Capital cost	£210,000	£260,000	£264,000	£116,000
Standing cost p.a.	£1,500	£1,500	£1,500	£1,500
Running cost p.a.	£8,500	£11,000	£11,000	£5,000
Fuel cost p.a.	£13,125	£13,750	£13,750	£4,375

4.3.2 Employee costs

Employee costs were provided by the Council and are shown in Table 9. The number of loaders per vehicle that was assumed for residual waste and dry recycling collections in the future scenarios remained as per the baseline (i.e. D + 2). Food waste was assumed to have 1.5 loaders per vehicle to reflect the different geography across the county.

Table 9: Summary of assumed employee costs p.a.

Driver unit cost	£41,302
Loader unit cost	£34,372
Team leader unit cost	£44,875

[3] 11 tonne vehicles have been assumed for the weekly collection of food waste. The Council may decide to use a mix of 11 tonne vehicles and smaller, less expensive 7.5 tonne vehicles.

Supervision unit cost	£47,083

4.3.3 Container costs

Only costs of replacement containers are included in the overall collection costs and are shown in Table 10. The costs of any new containers for the 'short-listed' collection scenarios are assumed to be 'one-off' capital purchases and are separately reported in Section 5.4.

Table 10: Summary of assumed container costs

Average unit cost for kerbside container (240 bin)	£25.00
Average cost for 40 litre glass box	£5.00
Average unit cost of 23 litre kerbside caddy	£5.00
Average unit cost for 7 litre kitchen caddy	£2.00

4.3.4 Disposal / treatment costs

Disposal and treatment costs have been included to enable the 'whole system' costs (i.e., collection and disposal costs) of the baseline and 'short-listed' collection scenarios to be calculated and are summarised in Table 11. Unless stated otherwise, all costs were provided by the Council.

Table 11: Summary of assumed disposal costs per tonne (as of April 2024)

Residual waste gate fee	£117.08
Dry recycling gate fee (including separately collected glass) net of material value - Baseline and Scenario 1a only.	£53.56 (includes cost of contamination)
Dry recycling gate fee net of material value – Scenarios 2a, 2b & Stage 2 Scenario 2a	£65.66 (includes cost of contamination)
Dry recycling bulking and haulage	£20.13 (DMR excluding glass) £9.27 (DMR including glass)

Food waste gate fee	£13.00[4]
Food waste bulking, storage and haulage	£18.00[5]

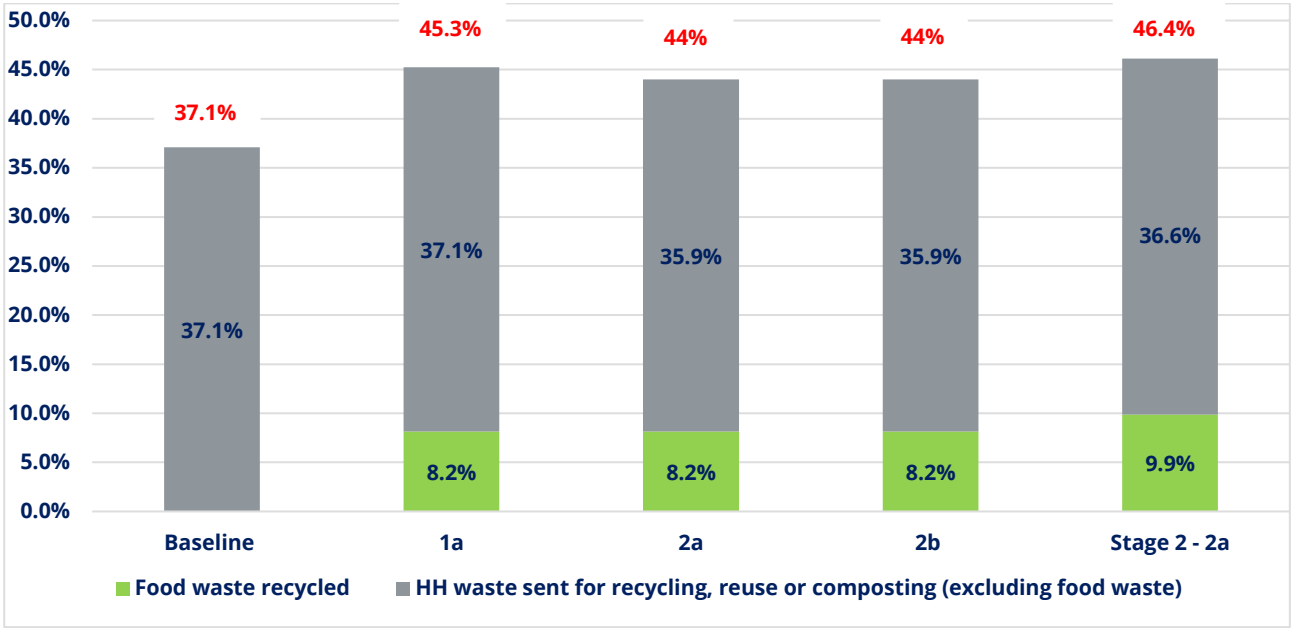
[4] 2022/23 WRAP gate fees report – median UK gate fee for anaerobic digestion
[5] 2022/23 WRAP Gate fees report - median fee for bulking, storage and haulage

5.0 Results of alternative scenarios modelling

5.1 Projected performance

The performance change of the modelled scenarios as expressed by the household waste recycling rate (ex NI192) is shown in Figure 1. Applying the assumed tonnages detailed in Table 5 and the assumed contamination rates in Table 6 results in an increase in the recycling rate of between 8.2% and 9.3%. The lower increase seen in Scenarios 2a and 2b are the result of increased contamination in the fully comingled dry recycling stream when compared with the current two-stream collection. Whilst contamination rates are assumed to be highest in Stage 2 Scenario 2a, reducing the frequency of residual collections is assumed to increase the overall tonnage of dry recycling target materials and food waste.

Figure 1: Projected increase in the household waste recycling rate (ex NI192) for each of the short-listed scenarios



5.2 Projected revenue costs

Using the assumptions detailed in paragraphs 4.2 – 4.3, a summary of the projected annual revenue (operating) costs for the modelled scenarios is presented below.

Spare vehicles are added to the vehicle numbers to arrive at whole numbers (i.e. integers) for the purpose of calculating costs. Collection costs include annualised capital costs for vehicles only. Capital costs for new containers (as opposed to replacement containers) are reported separately in section 5. The projected collection costs do not include the costs associated with collecting garden waste (N.B. these are assumed to apply equally to all scenarios), nor costs associated with implementing the alternative collection scenarios (e.g. communication costs). Internal overhead cost are reported with the Whole system costs in paragraph 5.2.3, Full details of the projected costs are provided in the Excel cost model attached to this report as Appendix 1.

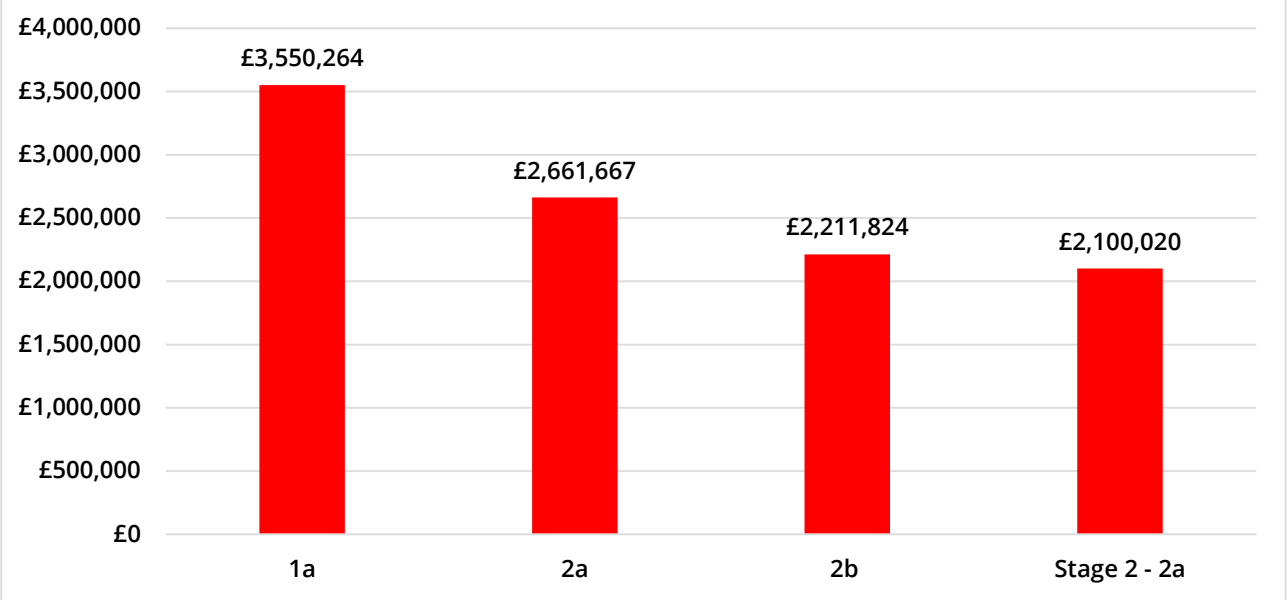
5.2.1 Projected collection costs of the 'short-listed' collection scenarios

Table 12 and Figure 2 present the projected collection costs of the 'short-listed' collection scenarios and the total collection costs relative to the baseline.

Table 12: Summary of projected collection costs of the baseline and 'short-listed' collection scenarios

Collection costs	Baseline	Scenario 1a	Scenario 2a	Scenario 2b	Stage 2, Scenario 2a
Residual waste	**£5,587,450**	**£4,793,293**	**£4,793,293**	**£6,772,989**	**£3,811,471**
Dry recycling	**£6,057,218**	**£6,057,218**	**£5,168,621**	**£7,012,515**	**£5,588,796**
Food waste		**£4,344,421**	**£4,344,421**	**£70,988**	**£4,344,421**
Total	**£11,644,668**	**£15,194,932**	**£14,306,335**	**£13,856,492**	**£13,744,688**

Figure 2: Projected total collection costs of the 'short-listed' collection scenarios relative to the baseline



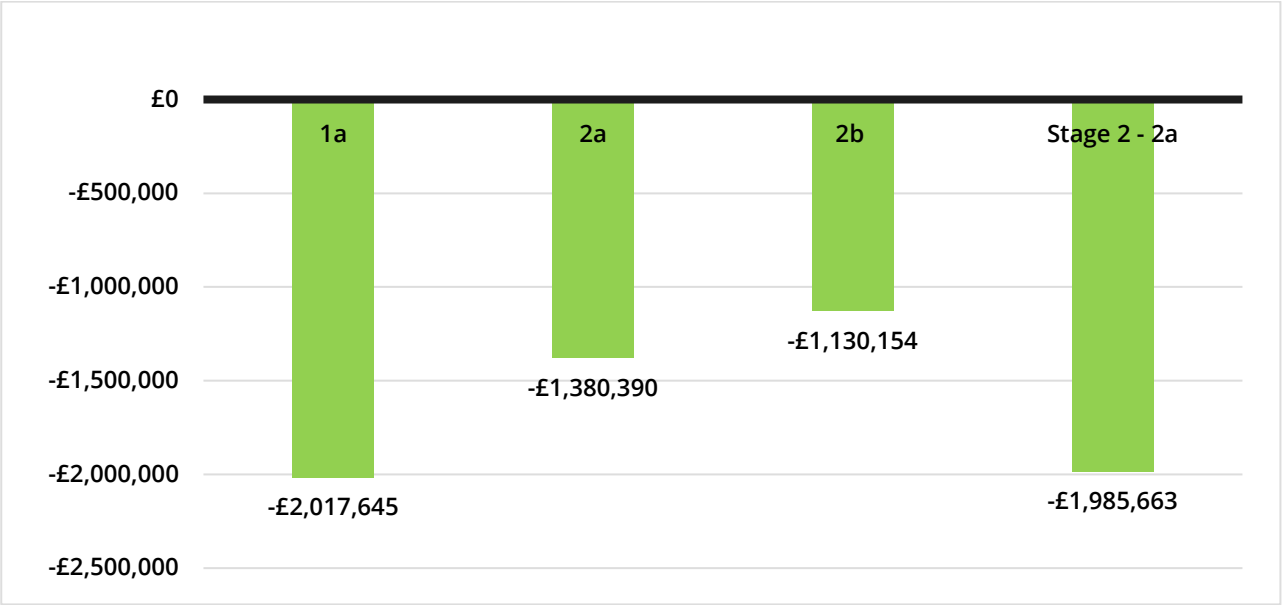
5.2.2 Projected disposal costs for the 'short-listed' collection scenarios

The projected disposal costs for the 'short-listed' collection scenarios are shown in Table 13 and Figures 6, 7, 8 & 9.

Table 13: Projected disposal costs of the baseline and 'short-listed' collection scenarios

Disposal costs	Baseline	Scenario 1a	Scenario 2a	Scenario 2b	Stage 2, Scenario 2a
Residual waste	**£15,328,024**	**£12,985,999**	**£12,985,999**	**£12,985,999**	**£12,059,546**
Dry recycling	**£2,618,529**	**£2,618,529**	**£3,255,783**	**£3,255,783**	**£3,508,844**
Food waste		**£324,380**	**£324,380**	**£574,616**	**£392,500**
Total	**£17,946,553**	**£15,928,908**	**£16,566,162**	**£16,816,399**	**£15,960,890**

Figure 3: Projected disposal costs of the 'short-listed' collection scenarios relative to the baseline



5.2.3 Projected 'whole system' costs for the 'short-listed' collection scenarios

Tables 14 & 15, and Figure 4 present the projected annual whole system costs (i.e., collection, disposal and overheads[6]) and projected annual whole system costs relative to the baseline of the 'short-listed' collection scenarios.

Table 14: Projected annual whole system costs of the baseline and 'short-listed' collection scenarios

Whole system costs	Baseline	Scenario 1a	Scenario 2a	Scenario 2b	Stage 2, Scenario 2a
Residual waste	**£21,442,265**	**£18,306,083**	**£18,306,083**	**£20,285,779**	**£16,397,808**
Dry recycling	**£9,202,538**	**£9,202,538**	**£8,951,196**	**£10,795,089**	**£9,624,432**
Food waste	**£0**	**£4,928,802**	**£4,928,802**	**£645,604**	**£4,996,922**
Total	**£30,644,804**	**£32,437,423**	**£32,186,081**	**£31,726,473**	**£31,019,161**

[6] Overheads costs are detailed in Appendix 1 cost model

Figure 4: Projected whole system costs of the 'short-listed' collection scenarios relative to the baseline.

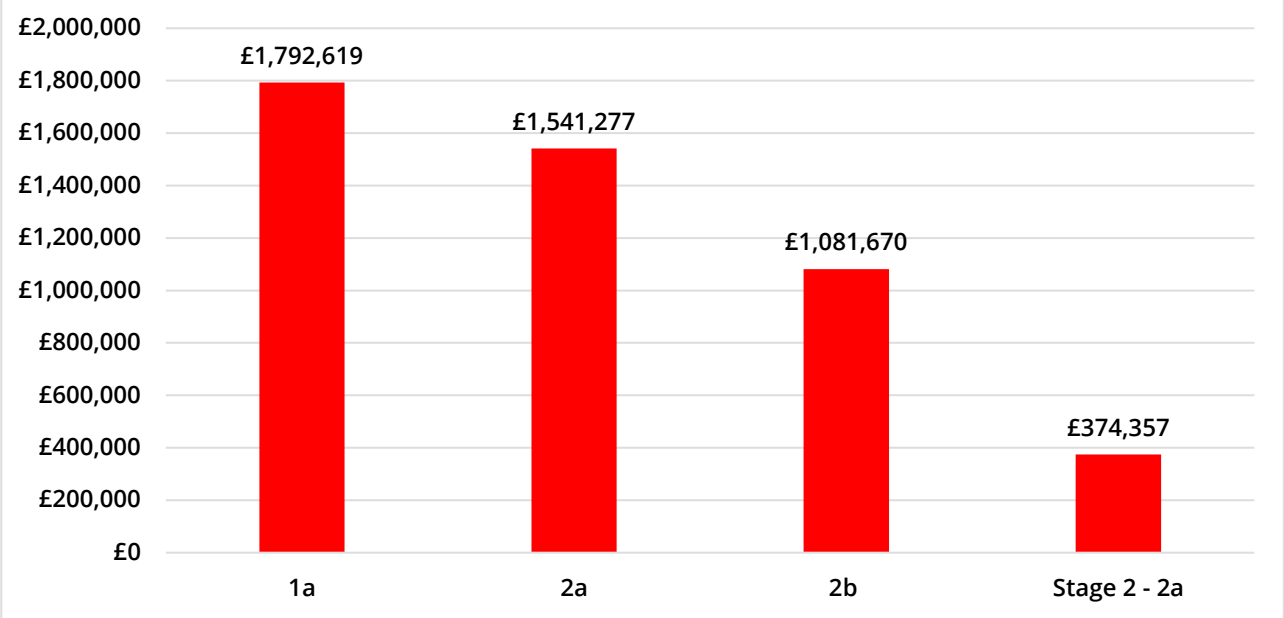


Table 15: Projected annual whole system costs of the 'short-listed' collection scenarios relative to the baseline.

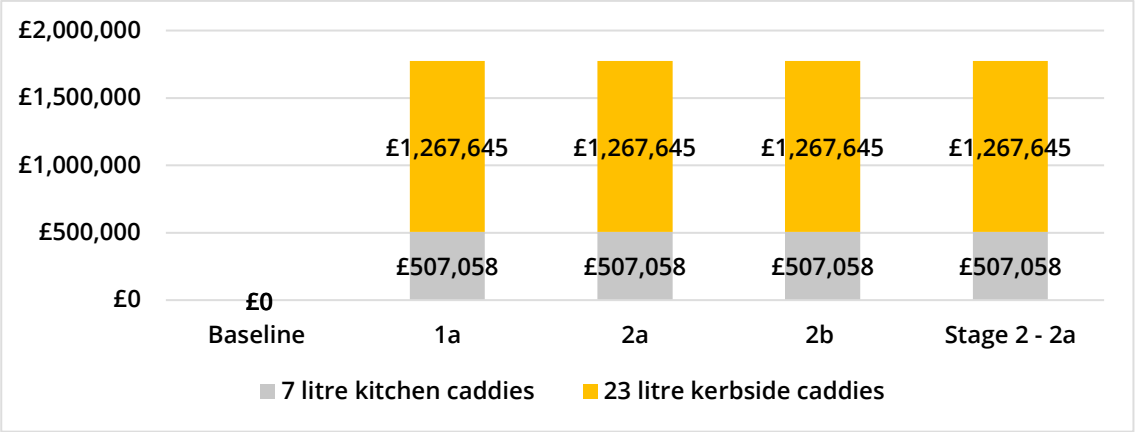
	Scenario 1a	Scenario 2a	Scenario 2b	Stage 2, Scenario 2a
Collection	£3,550,264	£2,661,667	£2,211,824	£2,100,020
Disposal	-£2,017,645	-£1,380,390	-£1,130,154	-£1,985,663
Overheads	£260,000	£260,000	£0	£260,000
Total	£1,792,619	£1,541,277	£1,081,670	£374,357

5.3 Projected Capital costs

5.3.1 Container capital costs

The projected capital costs of vehicles are included as annualised costs in the projected costs reported in Section 5.2. However, capital costs for any new containers required for the modelled scenarios (as opposed to annual replacements for damaged or lost containers) are not included in the projected costs set out in Section 5.2 and are reported separately in Figure 5 (N.B. excludes containers for communal properties). The projected capital costs of containers exclude the cost of communal containers.

Figure 5: Projected capital costs for new containers for the 'short-listed' collection scenarios (excludes communal containers).



5.3.2 Comparison of projected capital costs with DEFRA 'new burdens' funding allocation

In its letter to the Council dated 9th January 2024, DEFRA informed the Council of the funding it will receive to cover the 'indicative capital transitional costs for the introduction of weekly food waste collections' under the Government's 'New burdens' doctrine.

Figure 6 compares the Council's projected capital costs of new vehicles and containers for weekly food waste collections against the Council's 'new burdens' capital funding allocation listed in DEFRA's letter of 9th January 2024.

Figure 6: Comparison of projected capital costs for new containers and vehicles against DEFRA 'new burdens' funding allocation.

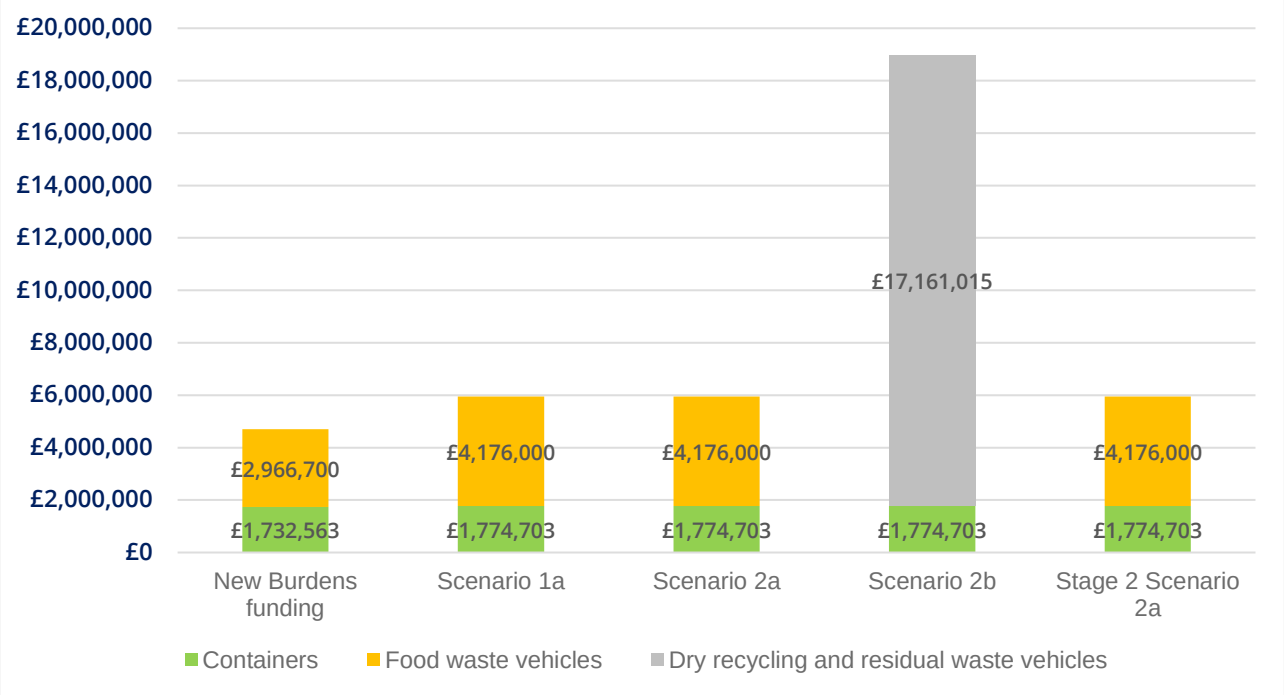


Figure 6 shows that whilst DEFRA's 'new burdens' funding allocation to the Council will cover the capital costs of food waste containers, the funding does not cover the projected capital cost of food waste vehicles[7]. The projected capital cost of a new fleet of RCVs with food waste pods for Scenario 2b is significantly more than DEFRA's 'new burdens' funding allocation.

It should also be noted that the projected capital costs (nor DEFRA's new burdens' funding) do not include any infrastructure related costs (e.g. transfer station costs) associated with the 'short-listed' collection scenarios.

[7] The projected capital costs of vehicles are included as annualised costs in the projected costs reported in Section 5.2. 11 tonne vehicles have been assumed for the weekly collection of food waste. The Council may decide to use a mix of 11 tonne vehicles and smaller, less expensive 7.5 tonne vehicles.

6.0 Carbon impact

Whilst the study did not include a detailed assessment of the Carbon impact of the 'short-listed' scenarios, applying the assumed emission factors listed in WRAP's Carbon Waste and Resources metric Carbon Waste and Resources Metric | WRAP, the following reduction in the emissions of $CO2e$[8] :

- Projected tonnage of food waste diverted from residual waste under the short-listed scenarios assuming the collection of residual waste is once every fortnight = 18,536 tonnes per annum.
- Estimated reduction in CO2e emissions as a result of food waste being processed via Anaerobic digestion (AD) rather than via Energy from Waste (EfW) = -40.3 kg per tonne of food waste collected.
- Projected saving in CO2e as a result of food waste being processed via AD rather than EfW = 18,563 x -40.3 kg = -747 tonnes per annum.

Whilst it has not been possible to calculate the projected emissions from the additional vehicles required by the Council for the separate collection of food waste, WRAP's Carbon WARM metric applies a standard emissions factor of 1.29 kg CO2e per tonne of food waste collected. Applying this factor to the projected tonnage of food waste results in 23.9 tonnes of CO2e being emitted form food waste collection vehicles (18,536 x 1.29kg per tonne collected).

Therefor the net reduction in CO2e resulting from introduction of a separate weekly collection of food waste is projected to be -747 tonnes + 23.9 tonnes = 723.1 tonnes per annum.

[8] Greenhouse Gas emissions impact, measured as carbon dioxide equivalent (CO2e)

7.0 Discussion

The projected increase in the household waste recycling rates (ex NI 192) of the 'short-listed' scenarios relative to the current baseline rate are the result of (i) diverting a projected 18,536 tonnes of food waste from the residual stream, (ii) changes in the amount of contamination in the dry mixed recycling stream (a projected increase in the fully commingled scenarios) and (iii) reducing the frequency of residual collections to once every three weeks.

The projected collection costs for all four 'short-listed' scenarios show an increase over the current baseline costs and are the direct result of an increase in the projected number of vehicles required for the alternative collection scenarios. Simply adding food waste to the current service without making any other changes (Scenario 1a) is projected to add £3.6 million p.a. to the cost of collecting household waste. Replacing the current two-stream dry recycling collections with a fully comingled collection (Scenario 2a) reduces the additional cost of collecting food waste to £2.7 million p.a. This is further reduced to £2.2 million p.a. relative to current costs when food waste is co-collected with both residual waste and dry recycling (Scenario 2b). Replacing the current fortnightly residual waste collection with a 3-weekly collection reduces the additional cost of providing a weekly collection of food waste to £2.1 million p.a.

A comparison of the projected disposal costs against the existing baseline costs shows that all four scenarios are predicted to deliver disposal savings resulting principally from the diversion of food waste from the costly residual stream to less expensive anaerobic digestion. The largest disposal savings are seen in Scenarios 1a (a projected -£2 million p.a. compared to current costs) when the current two-stream dry recycling collection is retained alongside a new weekly food waste collection. The lowest disposal savings are seen in Scenario 2b due to (i) the increased cost of food waste bulking, storage and haulage associated with the co-collection of food waste using RCVs with food waste pods, and (ii) the increased gate fee for fully comingled dry recycling. This latter factor is ameliorated when the residual waste stream is 'squeezed' by the 3-weekly collection in Stage 2 Scenario 2a resulting in greater diversion to both the dry recycling and separate food waste streams.

Combining the collection and disposal costs plus overheads produces projected 'whole system' costs. Comparing the projected 'whole system' costs for the 'short-listed' scenarios against the baseline shows that whilst all four scenarios are projected to deliver disposal savings relative to current costs, these are not enough to counter the projected additional cost of collecting food waste. Scenarios 1a and 2a are projected to add an additional £1.7 million p.a. and £1.5 million respectively to the Council's bottom line. This is reduced to £1.1 million p.a. when food waste is co-collected with dry recycling and residual waste in Scenario 2b. However, the lowest additional 'whole system' costs (£374k p.a.) are projected when the frequency of residual waste collections are reduced from fortnightly to once every three weeks.

Full details of the projected collection and disposal costs are provided in the separate Excel cost models issued as Appendix 1.

From an operational perspective, the 'short-listed scenarios will, to differing degrees, have an impact on the delivery of the Council's household waste collection service. The addition of weekly food waste collections will in itself be a major service change and will require the provision of additional infrastructure to accommodate the new service. Whether food waste collections are undertaken using a separate, dedicated vehicles, or co-collected using RCVs with food waste pods will likely have major operational implications. Conversely, changing dry recycling collections from the current two-stream collection to a single stream comingled collection as in Scenarios 2a and 2b will simplify the delivery of this element of the service. Table 16 summarises the main operational pros and cons of the changes associated with the four 'short-listed' scenarios.

Table 16: Operational pros and cons of the changes associated with the 'short-listed' scenarios.

	Pros	Cons
Collecting food waste using a dedicated fleet of vehicles	Greater flexibility to maximise efficiency of food waste collection (collections are independent of other services). Allows direct delivery where available. Little impact on residual and dry recycling collections	Increased depot space required to house additional fleet. Significantly increases number of employees, potentially placing greater strain on service management.
Co-collecting food waste alongside residual and dry recycling using RCVs with pods	Less additional vehicles (and crews) required for the collection of food waste.	Significant impact on the efficiency of both residual and dry recycling collections as co-collection will slow down collections. Direct delivery of food waste unlikely to be an option, therefore greater need for new bulking and transfer infrastructure.
Fully comingling dry recycling	Simplifies the collection of dry recycling. Collection crews have expressed a preference for a single stream collection system using wheeled bins that doesn't include the use of caddy inserts.	Potential to increase levels of contamination.
3-weekly residual waste collections	Reduces the number of vehicles required for the collection of residual waste.	Unlikely to be welcomed by householders. Communicating collection days becomes more complicated.

		Increases strain on food waste and dry recycling collections.

8.0 Wider policy considerations

This section outlines emerging policy developments that the Council will need to be mindful of when considering future changes to its household waste collection services.

8.1 Simpler Recycling

On 21st October 2023 the Government published its long-awaited response to the 2021 'Consistency in household recycling' consultation. Renamed 'Simpler Recycling', the Government's response included the following key proposals:

- (Subject to consultation) Waste Collection Authorities can co-collect dry recyclables (without the need to submit a written assessment).
- (Subject to consultation) a requirement that local authorities collect residual (non-recyclable) waste '*at least fortnightly, if not more frequently, to protect local amenity and prevent unintended consequences of cutting residual waste collection frequency*'.

The above proposals were subsequently included in a 'private consultation' with local authorities which has now closed. The Government is expected to either confirm or amend the above proposals in the form of 'Statutory Guidance' which local authorities are required to have regard to.

Therefore, at the time of writing this report, the above proposals have not been confirmed nor set out in regulations.

8.2 MRF gate fees

Analysis by WRAP and published in its annual 'Gate Fees reports' Gate Fees report 2022-23 | WRAP has highlighted a year-on-year increase in both the mean and median gross gate fees charged by UK MRFs as is shown in Figure 15 taken from the 2022/23 report. Data collected for the, as yet unpublished, 2023/24 Gate Fees report suggests this trend is accelerating.

Further, the gap between mean gate fees being charged for fully comingled dry mixed recycling and mean gate fees charged for the comingled mix in a two-stream collection (i.e. excluding either fibres or glass) appears to be growing, with both the gross and net gate fees for the latter being lower than for a fully comingled mix as shown in Figures 6 and 7 (albeit that the number of data points for two-stream collections is relatively small).

Figure 7: : UK MRF gate fees reported by local authorities over time, 2008 to 2022 (£/tonne)[9]

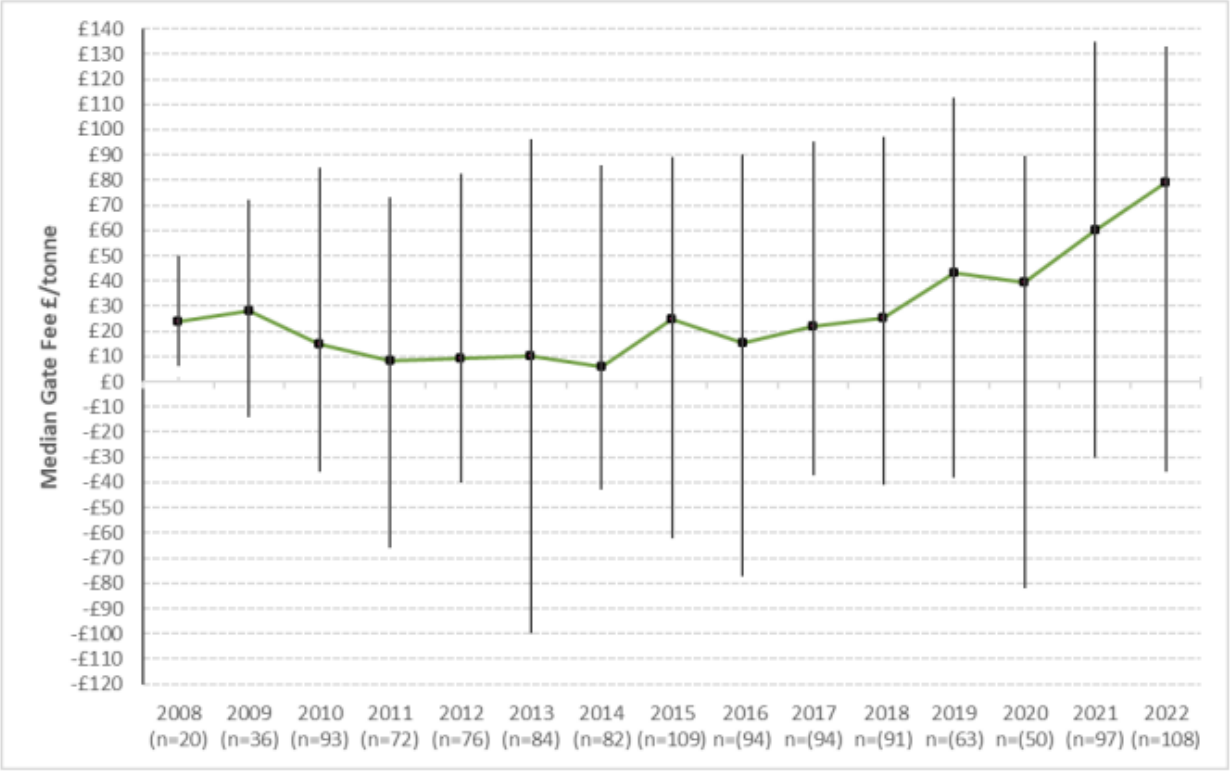


Figure 8: Gross MRF gate fees reported by collection method (2022) (£/tonne)

Collection method	Median (£/t)	Mode (£/t)	Mean (£/t)	Range (£/t)	Response count
Fully commingled	86	85.01 to 90	78	-36 to 133	79
Twin stream (Stream 1 = paper and cardboard; Stream 2 = glass, metal and plastic containers)	60	60.01 to 65	61	22 to 103	14
Twin stream (Stream 1 = glass; Stream 2 = paper, cardboard, metal and plastic containers)	86	15.01 to 20	70	16 to 115	9
Other	87	85.01 to 90	79	12 to 107	6

[9] In the chart, n = the number of responses

Figure 9: Net MRF gate fees reported by collection method (2022) (£/tonne)

Collection method	Median (£/t)	Mode (£/t)	Mean (£/t)	Range (£/t)	Response count
Fully commingled	17	15.01 to 20	12	-67 to 106	102
Twin stream (Stream 1 = paper and cardboard; Stream 2 = glass, metal and plastic containers)	-9	25.01 to 30	-14	-78 to 29	10
Twin stream (Stream 1 = glass; Stream 2 = paper, cardboard, metal and plastic containers)	22	55.01 to 60	18	-83 to 84	8
Other	-0	-	**-2**	-17 to 16	6

8.3 Collection of films and flexibles

The Government's 'Simpler Recycling' proposals confirmed the Government's intention to require local authorities to separately collect plastic film and flexibles by March 31st 2027. Whilst this is still to be confirmed in the expected Statutory Guidance, a number of trial collections have been taking place across the UK, including a collection by Newcastle City Council. Initial results from the pilot collections can be found at FPF FlexCollect interim report — Flexible Plastic Fund .

8.4 Extended Producer Responsibility for packaging and Deposit Return Scheme

Coupled with 'The Plastic Packaging Tax (General) Regulations 2022', which incentivises producers of plastic packaging to source at least 30% of input material from recycled sources, the introduction of Extended Producer Responsibility for packaging (pEPR) is expected to enhance the quality and quantity of materials collected for recycling. Producers will be directly funding the costs incurred by local authorities of managing household packaging waste.

One of the governing principles of the pEPR scheme is that measures are put in place to increase transparency of material and financial flows, drive efficiency and improve quality along the value chain. Given that statutory targets and duties to fund local authority collections have been placed onto packaging producers, there are clear signals in the UK that future payment mechanisms will seek to maximise and thereby incentivise quality in recycling. In addition, EPR may affect the amount of packaging waste as producers look to reduce their EPR payments.

DRS is considered by many to be a form of Extended Producer Responsibility, but in the UK is being treated as separate from the main packaging EPR system. There are many best practice examples of DRS across Europe and North America. Whilst each scheme varies slightly in design and performance, most modern, efficient systems achieve upwards of 90% return rates after the initial implementation period. However, it should be noted that many of the best practice DRS examples are seen in countries with a different context in terms of kerbside collection so it cannot automatically be assumed we will see similar return rates in the UK.

The introduction of a DRS will undoubtedly remove tonnage from local authorities. Given the scope of the proposed DRS in England (PET bottles and steel and aluminium cans), high value materials will be removed from dry recycling collected at the kerbside, reducing the value of the material collected and potentially impacting DMR sorting costs. However, the introduction of the DRS alongside EPR does not necessarily mean that local authorities will experience a loss of revenue, as within the EPR system, producers are expected to meet the costs of collecting and processing packaging waste from households net of material values. In addition, a DRS has the benefit of reducing the amount of material that enters the residual stream or is littered, which could provide a financial benefit to local authorities.

The current target date for the introduction of pEPR is October 2025. The target date for a DRS has been reported to be likely to be pushed back to 2027 Environment Secretary says 2027 now "more likely" start date for DRS (circularonline.co.uk).

Appendix 1: Baseline and ‘short-listed’ scenarios cost model

See attached Excel sheet

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