



Wet waste options appraisal

Wokingham Borough Council
July 2020

Executive Summary

Wokingham Borough Council's (WBC) current recycling service performed well in the first two quarters of 2019/20 with a recycling rate of 55.49%¹. In October 2019, the European end markets (where WBC recyclate is sent) introduced higher quality standards in response to the widespread global economic changes happening at that time. This resulted in significant proportions of WBC's paper and card being rejected, due to the high moisture content which lowered the quality of the material. Tonnage data for 2019/20, shows the annual recycling rate at 50.83% (a difference of 4.66% compared to the average for the first two quarters of the year). WBC has a 70% recycling rate Climate Emergency target to meet by 2030 (and 100% target by 2050) and this reduction in recycling rate severely affects the council's progress in meeting this target. The wet waste issue also increased disposal costs in the region of £368,000 in 2019/20. WBC is rightly concerned about this issue and a solution is required which can be implemented in readiness for inclement weather arriving in Autumn 2020.

Research indicated that there are nine different methods that local authorities use for ensuring recyclable material is kept dry. For the immediate term, these solutions are:

- Weighted waterproof recycling bags;
- Non-weighted waterproof recycling bags;
- Hinged lids on kerbside boxes;
- Loose lids on kerbside boxes;
- Shower-caps (bonnets), tied to the handle of the kerbside box; and
- Single use disposable bags.

And in the medium term:

- Wheeled bins;
- Wheeled bins with a separate container inside; and
- Trollibocs (stackable kerbside boxes).

The option of using non-weighted waterproof recycling bags for all recyclate was discounted due to there being no containment available to contain the bags in following collection, resulting in empty bags being left at the mercy of the weather.

Research identified that the hinged lidded box option only had a capacity of 40 litres. Compared to the 55 litres of the existing kerbside box, the reduction in capacity resulted in this option being discounted.

Single use disposable bags to contain paper and card was also discounted as an option, based on the negative environmental impacts implementing this solution would bring.

Using the findings from the desktop study, the following options were identified for appraisal for all non-flatted properties currently receiving a kerbside recycling collection service using two kerbside boxes:

- **Option 1:** Do nothing;
- **Option 2:** Two loose lids per property for the two existing kerbside boxes;
- **Option 3:** Two weighted waterproof recycling bags per property, no kerbside boxes used;

¹ Figure taken from an average of Q1 and Q2 2019/20 tonnage data figures from WBC Options Appraisal for Wet Paper MS Excel document

- **Option 4:** Two shower caps per property for the two existing kerbside boxes.

The table below provides the results of the appraisal for each option:

Category	Weighting	Considerations	Guide	1 Do nothing (baseline)	2 2 x loose lids per property for existing boxes	3 2 x weighted reusable sacks for all properties receiving a kerbside	4 2 x shower caps per property for existing boxes
Recycling performance	40.0%	Impact on recycling rate	Recycling rate for each option considering potential impacts on wet waste. Maximum recycling points added = 10 points, baseline = 0 points.	0.0	6.0	10.0	6.0
Financial	30.0%	Annual revenue impact (Best)	Annual revenue impact for each option, including the Baseline. Scored as deviation from the maximum (0 points) and minimum (10 points) annualised operational cost calculated for each option.	0.0	4.3	10.0	5.5
	30.0%	Annual revenue impact (Worst)	Annual revenue impact for each option, including the Baseline. Scored as deviation from the maximum (0 points) and minimum (10 points) annualised operational cost calculated for each option.	7.8	0.0	10.0	0.9
	10.0%	Capital cost (Best)	Cost of implementation, with the Baseline (Option 1) scoring the highest (10 points), and most costly option scoring 0.	10.0	0.5	0.0	5.2
	10.0%	Capital cost (Worst)	Cost of implementation, with the Baseline (Option 1) scoring the highest (10 points), and most costly option scoring 0.	10.0	0.0	3.4	1.5
Political + public acceptability	10.0%	Number / type of containers	Points system based on number and type of container, available capacity and communications required. See "Political and public acc.".	6.0	1.7	6.7	2.6
Health and safety	5.0%	Maximum weight possible	Weight of empty container plus full possible weight of contents based on average bulk density of comingled recycling. Heaviest scores 0, lightest scores 10.	10.0	9.2	0.0	5.3
Carbon impact	2.5%	Assessment of potential carbon (Best)	Points system based on impact of extra vehicle resource, and diversion of 'wet waste' to recycling. Baseline =5, with options scoring higher or lower in comparison.	5.0	7.0	9.0	7.0
	2.5%	Assessment of potential carbon (Worst)	Points system based on impact of extra vehicle resource, and diversion of 'wet waste' to recycling. Baseline =5, with options scoring higher or lower in comparison.	5.0	3.0	4.0	3.0
Equality impact assessment	2.5%	Potential to affect persons in the protected characteristics group	A high-level impact assessment of how each method of containment has the potential to affect persons in the protected characteristics groups. Baseline =5, with options scoring higher or lower in comparison.	5.0	4.0	6.0	4.5
Best Case Total Score (unweighted):				36.0	32.7	41.7	36.2
Best Case quantitative assessment weighted score:				2.3	4.6	8.0	5.4
Best Case quantitative assessment rank:				4	3	1	2
Worst Case Total Score (unweighted):				43.8	23.9	40.1	23.8
Worst Case quantitative assessment weighted score:				4.7	3.2	8.3	3.5
Worst Case quantitative assessment rank:				2	4	1	3

The overall results of both the best case and worst-case options appraisals shows that Option 3 (weighted waterproof recycling bags) is the preferred option, ranking first in both the best and worst-case scenarios. This option scored highest in recycling performance, annual revenue impact, political and public acceptability, carbon impact (best-case) and in the equality impact assessment category. It is therefore recommended that Option 3 is progressed to alleviate the current issues associated with wet waste.

To mitigate any confusion arising at the point the service changes, WBC should consider allowing residents a grace period where the existing kerbside boxes and/or weighted bags are collected for a short period of time whilst the weighted bags become embedded. In addition, as kerbside boxes will no longer be used, the council will need to decide how the boxes will be discontinued from their current use – whether they are collected back or whether residents are asked to repurpose them.

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1 Introduction

Wokingham Borough Council's (WBC) current recycling service provides a weekly kerbside collection of paper, cardboard, cans, tins, aerosols, cartons, foil and plastic bottles, tubs, pots and trays. Kerbside properties have two 55 litre boxes issued per household and flatted properties have large comingled recycling bins. A weekly food waste collection service also operates all properties.

The service performed well in the first two quarters of 2019/20 with a recycling rate of 55.49%². In October 2019, the European end markets (where WBC recycle is sent) introduced higher quality standards in response to the widespread global economic changes happening at that time. This resulted in significant proportions of WBC's paper and card being rejected, due to the high moisture content which lowered the quality of the material. Tonnage data for 2019/20, shows the annual recycling rate at 50.83% (a difference of 4.66% compared to the average for the first two quarters of the year). It should be noted that the impact of wet waste is only based on two quarters of data (quarter 3 and quarter 4) and therefore the impact on the recycling performance is likely to be greater in 2020/21. WBC has a 70% recycling rate Climate Emergency target to meet by 2030 (and 100% target by 2050) and this reduction in recycling rate severely affects the council's progress in meeting this target. The wet waste issue also increased disposal costs in the region of £368,000 in 2019/20.

WBC is rightly concerned about this issue and a solution is required which can be implemented in readiness for inclement weather arriving in Autumn 2020.

In remediation, the council has already:

- initiated changes in disposal methods;
- launched a communications campaign to drive resident behaviour change for storing mixed paper and card to ensure its kept dry; and
- undertaken an options appraisal of various measures to remediate this issue.

WBC has appointed Resource Futures to further explore the options available. Firstly, suitable options need to be identified which can be implemented immediately. These options will be appraised against a set of agreed categories and weightings and a preferred option identified for implementation. Secondly, options which provide a permanent solution to the issue but which require further preparation to implement (for example, because the type of containment identified affects the types of vehicles required to collect them) will be identified in readiness for appraising these as part of the medium term options appraisal, to follow.

2 Desktop study

Research was undertaken to identify possible solutions to the wet waste issue. WBC confirmed that to eradicate the issue of wet paper and cardboard, all recycling must be kept dry as far as practicable, since if other recycle had moisture present at the point of collection, it would make the paper and cardboard wet when it was mixed with the other recycle in the collection vehicles. Research indicated that there are

² Figure taken from an average of Q1 and Q2 2019/20 tonnage data figures from WBC Options Appraisal for Wet Paper MS Excel document

nine different methods that local authorities use for ensuring recyclable material is kept dry. For the immediate term, these solutions are:

- Weighted waterproof recycling bags;
- Non-weighted waterproof recycling bags;
- Hinged lids on kerbside boxes;
- Loose lids on kerbside boxes;
- Shower-caps (bonnets), tied to the handle of the kerbside box; and
- Single use disposable bags.

And in the medium term:

- Wheeled bins;
- Wheeled bins with a separate container inside; and
- Trollibocs (stackable kerbside boxes).

The desktop study then identified the councils who use each solution to ensure recyclate is kept dry. Whilst every endeavour was made to find comparable local authorities to benchmark, due to the small number of local authorities who use each of the solutions found, most of the authorities included within this study are not directly comparable with WBC as they collect glass at the kerbside, operate various dry recycling collection methods (including twin-stream and multi-stream) and at various collection frequencies.

2.1 Immediate term options research

The option of using non-weighted waterproof recycling bags for all recyclate was discounted as with this option kerbside boxes will be discontinued and therefore returned bags cannot be contained following collection.

Research identified that the hinged lidded box option only had a capacity of 40 litres. Compared to the 55 litres of the existing kerbside box, the reduction in capacity resulted in this option being discounted.

Single use disposable bags to contain paper and card was also discounted as an option, based on the negative environmental impacts implementing this solution would bring.

2.1.1 Weighted waterproof recycling bags

A range of councils use waterproof recycling bags for separately containing paper and/or cardboard to keep the material dry, with most councils choosing a weighted waterproof recycling bag to ensure as far as possible that it is retained following collection during inclement weather. It should be noted that most councils use a combination of bags and boxes for the containment of dry recycling. The councils listed in Table 1 below use a weighted recycling bag for containing paper and/or card as a minimum, and kerbside boxes and/or bags for containing other recycling material.

Table 1: Local authorities who use a separate weighted recycling bag to contain paper and/or card

Local authority	Only weighted bags used?	Capacity	Bottom handle?	Image
Brentwood Borough Council	Yes	130L	Yes (customised handles at the bottom, different to manufacture standard type)	
Bristol City Council	No (plus boxes)	90L	Yes	
Pembrokeshire County Council	No (plus another bag and boxes)	Not known	Yes	
Carlisle City Council	No (plus boxes)	70L	Yes	
Monmouthshire County Council	No (plus another bag and box)	Not known	Not known	

Local authority	Only weighted bags used?	Capacity	Bottom handle?	Image
Cheltenham Borough Council	No (plus boxes)	Not known	Not known	
Gloucester City Council	No (plus boxes)	Not known	Not known	
Eden District Council	No (plus boxes)	40L	Not known	

From this list, the only council who collected all kerbside recycling material comingled was Brentwood Borough Council. However, this scheme has not yet started (due to commence in August 2020) and whilst it will replace the existing bag scheme which uses single use bags, it is not yet an established collection method to prove of use to WBC.

2.1.2 Loose lids on kerbside boxes

Several local authorities use loose rigid lids on kerbside boxes to ensure recycling material is kept dry, as illustrated below. The lids clip on to the rim of the kerbside boxes and need to be replaced back inside the box following collection to ensure they are not lost.



Table 2 shows the councils who have adopted this approach. We were unable to find an authority who used solely lidded kerbside boxes for their collection service. Research showed that the councils who use at least one lidded kerbside box to contain recycling in only use a combination of bags and boxes or boxes and wheeled bins.

Table 2: Local authorities who use loose lids on kerbside boxes

Local authority
Neath Port Talbot Council
Chiltern area (now part of Buckinghamshire Council)
South Bucks area (now part of Buckinghamshire Council)
Wycombe area (now part of Buckinghamshire Council)
Wiltshire Council
Harlow District Council

2.1.3 Shower caps

Shower caps (or bonnets) are UV stable waterproof woven polypropylene sheets with an elasticated edge. They fit snugly over the kerbside boxes to prevent the material inside from being affected by the weather. Shower caps have the ability to be tied on to the handles of the kerbside boxes so as not to be lost during collection and are illustrated below.



The use of shower caps on kerbside boxes to keep recycling material dry was uncommon amongst local authorities. However, it is the cheapest solution available in terms of the per unit capital cost (at approximately 60 pence per unit). Table 3 details those councils who use this approach.

Table 3: Local authorities who use shower caps

Local authority
Merthyr Tydfil County Borough Council
Copeland Borough Council
East Lothian Council

2.2 Medium term options research

There are three options available to WBC which will solve the issue of wet waste in the medium term, detailed below. To implement any of these solutions, a fundamental change in the collection contract and/or the collection vehicles will be necessary, making these unsuitable options for immediate implementation.

2.2.1 Wheeled bins

Wheeled bins are frequently used by local authorities to contain dry mixed recycling. To ensure only comparable councils are considered, only those that do not collect glass at the kerbside were researched. These are detailed in Table 4.

Table 4: Local authorities who use wheeled bins for recycling and who do not collect glass at the kerbside

Local authority
Leeds City Council
Kirklees Metropolitan Council
Cherwell District Council
East Suffolk Council
Rushcliffe Borough Council
Bedford Borough Council
Gravesham Borough Council
Bracknell Forest Council
Aberdeenshire Council

2.2.2 Wheeled bins with a separate container inside

Wheeled bins which have either a 19, 40 or 55 litre inner caddy resting inside the frame of the bin enables the separate collection of a (usually singular) material stream, such as cans, paper or glass, as illustrated below.



This helps ensure the quality of all recycling material collected is retained by containing the material in the caddy in a different pod on the collection vehicle to the rest of the material contained in the body of the bin. The authorities which use them to separately collect paper and/or card are detailed in Table 5, although it should be noted that all these authorities also collect glass at the kerbside within the main body of the wheeled bin.

Table 5: Local authorities who use wheeled bins with a separate container inside

Local authority	Material contained in the separate container
Derbyshire Dales District Council	Paper and card
Isle of Wight Council	Paper and card
Birmingham City Council	Paper
Darlington Borough Council	Paper and card
Redcar and Cleveland Borough Council	Paper
Sunderland City Metropolitan Borough Council	Paper
South Tyneside Council	Paper
Gateshead Council	Paper
South Derbyshire District Council	Paper
Bolsover District Council	Paper
Nuneaton and Bedworth Borough Council	Paper and card
Welwyn Hatfield District Council	Paper

2.2.3 Trollibocs

Trollibocs are a recycling system which holds three stackable recycling boxes in a wheeled frame to store boxes upright whilst retaining full use of the boxes in situ. They are also easily transported to the kerbside, as illustrated below.



Since Trolibocs containers can be collected using WBC's existing collection methods (i.e. by using a slave bin during collection) and by using existing recycling collection vehicles, these would be suitable as an immediate solution to the wet waste issue. However, the cost per unit is approximately £37. Compared with other immediate term options this makes it financially unsuitable to compare and it would not score well in an options appraisal because of this. It has therefore been included as a medium term option, with the cost issue being more balanced by the other containment options.

The local authorities using the Trolibocs system are detailed in Table 6.

Table 6: Local authorities who use the Trolibocs system

Local authority
Conwy County Borough Council
Blaenau Gwent County Borough Council
Lisburn and Castlereagh City Council
Pembrokeshire County Council
East Ayrshire Council
Isle of Anglesey County Council
Gwynedd County Council

In addition, Denbighshire Council also has plans to introduce Trolibocs (along with four weekly residual waste collections) from 2021. Furthermore, Northwest Leicestershire District Council is trialling a Trolibocs system amongst 250 households³.

³ <https://www.nwleics.gov.uk/pages/recyclemore>

3 Options Appraisal

Using the findings from the desktop study, the following options were identified for appraisal for all non-flatted properties currently receiving a kerbside recycling collection service using two kerbside boxes:

- **Option 1:** Do nothing
- **Option 2:** Two loose lids per property for the two existing kerbside boxes
- **Option 3:** Two weighted waterproof recycling bags per property, no kerbside boxes used
- **Option 4:** Two shower caps per property for the two existing kerbside boxes

It was agreed with WBC that the options which retained the use of the kerbside boxes should be provided with two lids (Option 2) and two shower caps (Option 4) to ensure both boxes have a covering provided. This helps to mitigate the risk of moisture being transferred to paper and card once loaded into the collection vehicle. For the purposes of modelling, it was determined that 150,000 units would therefore be required for these options.

No medium term solutions were included as this will be undertaken separately as part of the medium term options appraisal, to follow as part of the continuing Waste Improvement Activities project.

3.1 Options appraisal approach

An options appraisal was produced by WBC to evaluate a range of possible solutions to the wet waste issue. An updated model has been developed from these initial assumptions and refined in consultation with WBC Officers.

Specific categories were identified and agreed for the appraisal and an appropriate weighting has been applied to each to reflect the relative importance in the category achieving WBC's Climate Emergency objectives, summarised in Table 7.

Table 7: Agreed categories and weightings used to evaluate each option in the appraisal

Category	Weighting applied
Recycling performance	40.0%
Financial (annual cost)	30.0%
Financial (capital cost)	10.0%
Health and safety	5.0%
Political and public acceptability	10.0%
Carbon impact ⁴	2.5%
Equality impact assessment	2.5%

3.1.1 Procurement assumptions (not included within scoring of appraisal)

The lead times for procuring 150,000 units for each option is typically 6-8 weeks. However, WBC's collection contractor, Veolia, have advised that to supply weighted waterproof recycling bags could take an estimated 12 weeks. Due to the impact on manufacturing from the COVID-19 pandemic, current delivery

⁴ It should be noted that this exercise did not include undertaking a full carbon impact assessment. Instead, a high level assessment was undertaken which identified the extent of each solution requiring an increased number of vehicles to deliver the collection service, as well as the impact of diverting 'wet' paper/card from EfW to recycling

times are expected to be unusually long. For the purposes of the model, delivery time is set at 5 weeks across all options.

3.1.2 Additional vehicle assumptions

When WBC undertook an initial options appraisal to evaluate the options available in remedying the wet waste issue, Veolia advised that two additional collection vehicles would be necessary when operating a solution which involved lids, which was previously considered. Veolia stated that there will be a significant impact on productivity time expected as crews are unable to complete rounds at current speeds owing to the handling of the lids. It is likely that Veolia will consider Option 4 (shower caps) to have the same issue since the shower caps need to be handled in a similar way. As a consequence of Veolia's initial information, we have estimated that one extra vehicle would also be necessary for Option 3 (bags) due to the additional capacity this option offers, which will affect the capacity of the vehicle and consequently the size of the rounds. The Velcro on the bags (Option 3) is also likely to affect productivity time, albeit to a lesser extent than in Option 2 (lids) and Option 4 (shower caps).

When the modelling was initially undertaken the additional cost of vehicles and crew significantly disadvantaged these options. As the impact of these options is currently untested, two options appraisals were run: one with the additional vehicles and staff being necessary and one without. This dual modelling presents WBC with a 'worst-case' options appraisal and a 'best-case' options appraisal with which to assess the impact of this issue. The differences in the outputs of the modelling is seen in the financial category and the carbon impacts category. The results of the modelling are the same for both appraisals across all other categories.

3.2 Options appraisal results

The results of the wet waste options appraisal are provided in full in the attached 'wet waste option appraisal' MS Excel document. Each Option was appraised against each category and given a score out of 10, with 10 being the highest score and 0 being the lowest.

Table 8 below provides a summary of the results of the appraisal for each option, including the best-case (in light salmon colour) and the worst-case (in darker salmon colour) scenario results. Each subsequent section provides the detailed results for each category assessed.

Table 8: Options appraisal results

Category	Weighting	Considerations	Guide	1	2	3	4
				Do nothing (baseline)	2 x loose lids per property for existing boxes	2 x weighted reusable sacks for all properties receiving a kerbside	2 x shower caps per property for existing boxes
Recycling performance	40.0%	Impact on recycling rate	Recycling rate for each option considering potential impacts on wet waste. Maximum recycling points added = 10 points, baseline = 0 points.	0.0	6.0	10.0	6.0
Financial	30.0%	Annual revenue impact (Best)	Annual revenue impact for each option, including the Baseline. Scored as deviation from the maximum (0 points) and minimum (10 points) annualised operational cost calculated for each option.	0.0	4.3	10.0	5.5
	30.0%	Annual revenue impact (Worst)	Annual revenue impact for each option, including the Baseline. Scored as deviation from the maximum (0 points) and minimum (10 points) annualised operational cost calculated for each option.	7.8	0.0	10.0	0.9
	10.0%	Capital cost (Best)	Cost of implementation, with the Baseline (Option 1) scoring the highest (10 points), and most costly option scoring 0.	10.0	0.5	0.0	5.2
	10.0%	Capital cost (Worst)	Cost of implementation, with the Baseline (Option 1) scoring the highest (10 points), and most costly option scoring 0.	10.0	0.0	3.4	1.5
Political + public acceptability	10.0%	Number / type of containers	Points system based on number and type of container, available capacity and communications required. See "Political and public acc.".	6.0	1.7	6.7	2.6
Health and safety	5.0%	Maximum weight possible	Weight of empty container plus full possible weight of contents based on average bulk density of comingled recycling. Heaviest scores 0, lightest scores 10.	10.0	9.2	0.0	5.3
Carbon impact	2.5%	Assessment of potential carbon (Best)	Points system based on impact of extra vehicle resource, and diversion of 'wet waste' to recycling. Baseline =5, with options scoring higher or lower in comparison.	5.0	7.0	9.0	7.0
	2.5%	Assessment of potential carbon (Worst)	Points system based on impact of extra vehicle resource, and diversion of 'wet waste' to recycling. Baseline =5, with options scoring higher or lower in comparison.	5.0	3.0	4.0	3.0
Equality impact assessment	2.5%	Potential to affect persons in the protected characteristics group	A high-level impact assessment of how each method of containment has the potential to affect persons in the protected characteristics groups. Baseline =5, with options scoring higher or lower in comparison.	5.0	4.0	6.0	4.5
Best Case Total Score (unweighted):				36.0	32.7	41.7	36.2
Best Case quantitative assessment weighted score:				2.3	4.6	8.0	5.4
Best Case quantitative assessment rank:				4	3	1	2
Worst Case Total Score (unweighted):				43.8	23.9	40.1	23.8
Worst Case quantitative assessment weighted score:				4.7	3.2	8.3	3.5
Worst Case quantitative assessment rank:				2	4	1	3

3.2.1 Recycling performance

A 40% weighting was applied to this category to reflect the importance of the preferred option contributing directly to achieving WBC's Climate Emergency targets.

The wet waste issue in 2019/20 resulted in a reduction in recycling rate of 4.66% arising from only the last two quarters, since the wet waste issue did not arise until October 2019. Since inclement weather is variable year on year, WBC determined that it should be assumed the wet waste issue results in an annual 6% loss in recycling rate for Option 1 (do nothing). Modelling a 6% recycling rate loss due to the wet waste issue results in a projected recycling rate of 49.5% for Option 1, the 'do nothing' scenario. As other options aim to solve this issue, this scored 0 for recycling performance.

Options which provide a lid or shower cap for existing boxes were determined to reduce this recycling rate loss by half (3%). The assumption is based on the fact that the attachment of the covering will be at the residents' discretion, especially where lids or caps have been lost but not replaced, and therefore some wet waste is likely to remain an issue. Option 2 (lids) and Option 4 (shower caps) therefore both scored 6 with recycling rates of 52.5% each.

Option 3 (bags) is determined to reduce wet waste contamination to 1%, leading to a recycling rate of 54.5%. This is owing to the integral sealing mechanism of the bag, which is likely to be closed by residents in most cases. Option 3 (bags) therefore scored 10 and was the highest scoring option for recycling performance.

3.2.2 Financial

Within the modelling, annual revenue impact and capital costs were separately appraised, with a weighting of 30% and 10% respectively.

3.2.2.1 Annual revenue results

Annual revenue impacts include the cost of delivering the collection service, including extra resourcing if required, the annual cost of container replacement and the disposal cost of materials based on expected recycling rates.

The revenue cost includes the cost of replacing containers each year. For Options 2 (lids) and 4 (shower caps), it is assumed that 75% of residents may opt to revert to using one covering if the second is lost or damaged. Despite the replacement rate of weighted waterproof recycling bags being determined as higher than those for boxes (7.5% per year compared to 5% per year), the cost saving per unit means no significant impact on costs is expected compared to the baseline. In terms of replacement distribution costs, shower caps and recycling bags incur only a third of the costs associated with lids, as these can be supplied by WBC outlets such as libraries and the council Offices, while lids are assumed to always be replaced through dedicated delivery to the kerbside.

For Option 1 (do nothing), the cost of disposing the 6% wet waste is confirmed as £436,000 per annum, based on costs incurred by WBC during the period November 2019 to March 2020. This includes the £368,000 per annum incurred through disposal of wet waste through Energy from Waste (EfW), and a £68,000 contamination fee. For each option, we have assumed the cost of disposing the wet waste paper and card is proportional to the figure of £368,000 per annum, based on the wet waste contamination percentage produced by each container type (i.e., when 3% is lost to wet waste, cost of disposal is halved). We have also costed the disposal saving realised through diversion of 'wet' paper and card from EfW to

recycling, based on a disposal saving of £100 per tonne. A contamination cost of £68,000 is applied to each option as a recycling contamination fee, irrespective of the wet waste issue.

Best-case scenario results

In the best-case options appraisal, it is assumed no extra resourcing of vehicles will be required to deliver the service. As the cost of container replacement differs by only £40,000, the results of the annual revenue impacts are primarily influenced by the cost of disposal. Option 1 (do nothing), provides the greatest annual revenue impact (£436,000 per annum) owing to the disposal costs incurred by the 6% wet waste contamination. Option 1 therefore scored 0.

Option 2 (lids) scored 4.3 because the wet waste contamination has decreased to 3%. Similarly, Option 4 (shower caps) scored 5.5.

The highest scoring option is Option 3 (bags), with a score of 10, providing a cost saving of approximately £233,000 per annum when compared to Option 1 (do nothing).

Worst-case scenario results

In the worst-case options appraisal, it is assumed that two extra vehicles will be required to implement Option 2 (lids) and Option 4 (shower caps) and one extra vehicle will be required to implement Option 3 (bags). We have therefore assumed that annual revenue impacts will include costs of running the vehicles (£50,000 per annum) and the cost of two additional crews (£118,540 per crew per annum, based on three loaders and one driver).

Option 1 scored 7.8 because no additional vehicles are needed to deliver the service. Comparatively, Option 2 (lids) and Option 4 (shower caps) scored 0 and 0.9 respectively due the requirement of two extra vehicles, including running costs and crew costs.

Option 3 (bags) was the highest scoring option, with a score of 10, providing a cost saving of approximately £65,000 per annum when compared to Option 1 (do nothing). This is owing to the reduced cost of container replacement throughout the year, one further vehicle being required and a disposal saving through the diversion of 5% paper and card material which would otherwise be wet waste in the 'do nothing' scenario.

3.2.2.2 Capital costs results

Capital costs are treated separately within the appraisal and are determined as the initial cost of purchasing the new containers, and the purchase of additional vehicles, relative to the baseline. The purchase of containers, or container accessories, will also incur an initial distribution cost however, as this cost is currently unknown and likely to be relatively similar across all options, this has been omitted from the modelling.

Best-case scenario results

Based on capital costs alone, Option 1 (do nothing), provides the highest score of 10, simply owing to the fact that no intervention is taking place and therefore no additional costs are necessary.

Option 3 (bags) scores 0, and therefore scores the lowest due to the high cost of purchasing the bags compared to lids. Option 2 (lids) scored 0.5 due to being the second most expensive option with an implementation cost of £180,000 owing to the purchase of two lids per household.,

The second highest scoring option is Option 4 (shower cap) with a score of 5.2, as the unit costs are half of those required by lids.

Worst-case scenario results

Based on capital costs alone, Option 1 (do nothing), provides the highest score of 10 because no additional vehicles are required.

Option 2 (lids) scores 0 and is the lowest ranking option, followed by Option 4 (shower caps) with a score of 1.5. This is because both Options require two additional vehicles to resource at a cost of £440,000.

Option 3 (bags) scores 3.4 because only one additional vehicle is required in this scenario.

3.2.3 Political and public acceptability

Political and public acceptability is appraised by a points-based system which scores each option based on several important factors of relevance to both residents and members. This includes the number and type of containers required, the available capacity at the kerbside, and communications approach. For each option, a subjective score was provided to determine the preference of each option. The current service scored the highest as there was no deviation from the popular service. The option which required the greatest service change scored the lowest.

For capacity scoring, we have assumed that boxes without lids, or those with flexible shower caps could be filled over the rim of the box and have therefore assumed available capacity equates to 65 litres per box (i.e. 10 litres more capacity than available in Option 2 (lids)).

For Option 3 (bags) a number of bags with different specifications were identified, with sizes ranging from 60 litres to 130 litres. A mid-range point of 90 litres was assumed for the purposes of modelling. It was determined that two weighted bags per property would be required to ensure an appropriate level of capacity was maintained at the kerbside, in lieu of losing the kerbside boxes which have no covering in this option and therefore can no longer be used. The most suitable specification of weighted recycling bag was considered to be those which have a pitched opening at the top, with Velcro along the opening to almost eliminate the likelihood of moisture getting in, as illustrated with the Monmouthshire County Council kerbside recycling service, below.



For communications, we have provided a score based on the nature of the communications required to carry out each option. For Option 1 (do nothing), we have provided a central score of 5 (out of 10). This reflects the need to encourage residents to limit wet waste via stacking methods, but without intervention. Both Option 2 (lids) and Option 4 (shower caps) scored below this, as messaging will need to be instructive to enforce the importance of utilising the coverings. Option 3 (bags) scored the highest, reflecting the positive messaging related to increased capacity at kerbside and the ease of use in covering due to the Velcro fastening at the top.

These individual scoring factors were then combined to provide an overall public and political acceptability score, with a 10% weighting in the appraisal.

Option 3 (bags) performed the best with a score of 6.7 owing to increased capacity at the kerbside, supported by positive communications from WBC. This was closely followed by Option 1 (do nothing) which scored 6 as no new containment is required. Option 4 (shower caps) and Option 2 (lids) were deemed to be much less publicly and politically acceptable and scored 2.6 and 1.7 respectively with the difference in the scores being that shower caps provide slightly more capacity in the box compared to using the lids.

3.2.4 Health and safety

To appraise each option in terms of health and safety, a score was calculated based on the maximum weight of the container if filled. This category applies a 10% weighting to the overall score. We used an approximation of 53.9kg/m³ for the bulk density of recyclate (minus glass), the capacity of each container, and the weight of each empty container to calculate the maximum weight presented by each household at the kerbside.

Option 1 (do nothing) and Option 2 (lids) had the highest scores of 10 and 9.2 respectively, with the lowest maximum weights of 9.8kg and 9.9kg, while Option 3 (bags) had the lowest score of 0 owing to the largest capacity and therefore heaviest containment result of 11.3kg arising from the increased capacity provided by bags compared to the kerbside boxes.

Option 4 (shower caps) scored 5.3 due to having mid-range capacity (and therefore weight) between the boxes (Option 1 and Option 2) and the bags (Option 3).

3.2.5 Carbon impact

A carbon impact score was provided to assess the appropriateness of each option based on their potential climate impact. A 'high level' score was given to each option, based on the amount of wet recyclate prevented, and therefore diverted to recycling, against the number of vehicles required to service the collection. This score was weighted as 2.5% within the overall options appraisal.

A best-case and worst-case options appraisal was undertaken as the impact of the additional vehicles detailed in the capital cost category would consequently have an impact on carbon.

Best-case scenario results

Within the best-case scenario, with no extra resource determined for the options, Option 3 (bags) scored the highest, with a score of 9. This was determined by the fact that this provides the most protection against wet waste contamination, and therefore more tonnage is recycled. Option 4 (shower caps) scored 7 due to the likelihood that some residents would not use them. Similarly, Option 2 (lids) also scored 7 for the same reason.

The worst performing option was Option 1 (do nothing) which scored 5, which was the starting point from which to compare the other Options.

Worst-case scenario

Within the worst-case scenario, as Option 2 (lids) and Option 4 (shower caps) were deemed to require an extra two vehicles for service delivery, these Options both scored 3. Option 3 (bags) scored 4 owing to the one additional vehicle necessary. Option 1 (do nothing) scored 5 based on no additional vehicles being necessary.

3.2.6 Equality impact assessment

When considering making changes to the recycling collection service, WBC has a statutory duty to assess the likely impact of any decisions on groups with protected characteristics, as defined in the Equality Act 2010.

There are nine protected characteristics which must be given due regard in the context of the need to promote equality of opportunity. These are between persons of:

- age;
- disability;
- gender reassignment;
- marriage and civil partnership;
- pregnancy and maternity;
- race;
- religion or belief;
- sex; and
- sexual orientation.

Equality Impact Assessments (EIAs) were introduced under the Race Relations Amendment Act 2000, as a way of requiring public service providers to assess the likely impact of policy decisions on these groups. Whilst the completion of equality impact assessments is not a legal requirement in England, it is a useful method of demonstrating compliance in ensuring that the protected characteristics and any resulting issues have been carefully considered.

A high-level equality impact assessment was undertaken for each Option, in terms of how each method of containment has the potential to affect persons in the protected characteristics groups. A score was provided for each Option, with a weighting of 2.5% applied in the options appraisal.

Using a score of 5 (out of 10) for Option 1 (do nothing), we provided a comparative score to highlight any possible equality issues associated with each option. All options scored similarly. The appraisal identified Option 3 (bags) would be likely to present a slightly improved containment for those with mobility issues compared to the kerbside boxes, since residents no longer have to hold a box at waist height. Therefore, this option scored 6 and was the highest scoring option.

Option 2 (lids) and Option 4 (shower caps) meanwhile could represent a further mobility issues as these both need to be secured to the boxes which may be difficult for older and/or disabled or less able residents. These Options therefore scored 4 and 4.5 respectively, with Option 4 (shower caps) scoring slightly higher due to the shower caps being slightly easier to affix to the box.

3.2.7 Overall results

In Option 1 (do nothing) there is no need to run additional vehicles and no disruption to the existing service. However, the service is clearly in contrary to the council's Climate Emergency agenda. With this option, WBC will continue losing potentially recyclable material due to the wet waste issue, pay additional costs and there will continue to be a negative impact on recycling rate. In short, do nothing means a highly significant impact on WBC's recycling rate and disposal budget. Option 1 therefore scored the lowest in the best-case options appraisal scenario with an overall weighted score of 2.3 out of 10. However, in the worst-case scenario Option 1 scored better, with an overall score of 4.7, ranked in second place. This is due to no additional vehicles being necessary with this option.

With Option 2 (lids), there is also no guarantee of paper and card being dry due to residents' discretion to use the lids. It is anticipated that there would be high volumes of calls for damaged and lost lids, as well as complaints being received of lids blowing across streets and littering the locality. In addition, there is likely to be a reduced capacity with this Option as boxes can no longer be filled over the box height as in Option 1 (do nothing) and Option 4 (shower caps). This may lead to a requirement of extra boxes from residents and/or previously recyclable material instead going into the residual waste stream once capacity of the boxes has been reached. However, the impact on wet paper and cardboard will be noticeable, diverting 3% from wet paper into recycling. It should be noted that the recycling rate is still not expected to recover to the baseline of 56% in wet weather due to residents' discretion to use lids and the potential for uncovered side waste to be presented. This Option scored 4.6 out of 10 in the best-case scenario and ranked in third place. In the worst-case scenario it scored the lowest of all Options with a score of 3.2 and ranked fourth, largely due to the costs of the two additional vehicles and the slightly higher unit cost of the lids compared to Option 4 (shower caps).

The overall results of both the best-case and worst-case options appraisals shows that Option 3 (weighted recycling bags) is the highest scoring option, ranking first in both scenarios. The option scores significantly above the other Options with a best-case scenario score of 8 out of 10 and a worst-case scenario score of 8.3 out of 10. This option scored highest in recycling performance, annual revenue impact, political and public acceptability, carbon impact (best-case) and in the equality impact assessment categories. Similarly to Option 2 (lids) and Option 4 (shower caps), it will still be at residents discretion to ensure the bag is secured correctly using the Velcro fastening. In addition, with this option boxes will become redundant so additional communications and support from the customer delivery team will be needed to advise against usage.

Option 4 (shower caps) ranked second in the best-case scenario with a score of 5.4 and ranked third in the worst-case scenario with a score of 3.5. This option scored well for recycling performance, annual revenue impact, capital cost, and carbon impact. However, similarly to Option 2 (lids), several disadvantages should be noted. Two additional collection vehicles at the cost of £440k would be required in the worst-case scenario. Furthermore, residents may not tie the shower cap to their boxes, resulting in an increased quantity going missing and needing replacement. There is therefore the need to account for the same replacement schedule as with Option 2 (lids). It is anticipated that there would therefore be high call volumes and complaints regarding lost shower caps, as well as complaints being received of lids blowing across streets and littering the locality, requiring additional support from the communications and customer delivery teams. However, this Option presents additional capacity to be presented in the same way as with Option 1 (do nothing). Shower caps are also the cheapest capital cost option to implement, aside from doing nothing.

4 Recommendations

The wet waste options appraisal result identifies that the preferred solution to the wet waste issue is the weighted waterproof recycling bags option, in both the best-case and worst-case scenarios. It is therefore recommended that this option is progressed to alleviate the current issues associated with wet waste.

5 Operational considerations for the preferred option

There is uncertainty in relation to the impact of operating the weighted bag option (as well as with Option 2 (lids) and Option 4 (shower caps)) on the number of additional collection vehicles which may be required. Further discussion and testing of the bags with Veolia will be necessary to determine the resource requirements of this option. Following this, further analysis of the impact on pick rates can be undertaken to assess the resource requirements in more detail. This would provide WBC with some due diligence on the assessments which Veolia will similarly make when considering the impacts of collecting weighted recycling bags instead of kerbside boxes.

When introducing the weighted bags option, it is important to consider the service changes from a resident perspective. Two key changes will take place. Firstly, the kerbside boxes will be discontinued from use and secondly new receptacles, the weighted bags, will be introduced. To mitigate any confusion arising at the point the service changes, WBC should consider allowing residents a grace period where the existing kerbside boxes and/or weighted bags are collected for a short period of time whilst the weighted bags become embedded. This will allow residents time to transition to the service change and WBC time to deliver any bags which may have been missed from the initial delivery.

Operatives will need to communicate with residents who present boxes for collection during this time. A bespoke communications plan should be written to support this, detailing what communication method should be used (i.e. stickers on boxes, for example). However, it is recommended that the overall communications campaign which accompanies the service change does not deviate from the simple message that bags will replace boxes from a given date, despite operating a grace period of collecting boxes. It is also important to limit operating the grace period for any longer than four collection cycles; with this ideally lasting for two to three. Allowing any longer than this can cause confusion amongst residents and potentially lead to additional customer enquiries and complaints.

As kerbside boxes will no longer be used, there are two options available for ensuring the boxes are discontinued from their current use:

1. Collect back the boxes; or
2. Ask residents to repurpose the boxes.

The advantages and disadvantages of these options are summarised in Table 9.

Table 9: Advantages and disadvantages of each option

Option	Advantages	Disadvantages
Collect back the boxes	<ul style="list-style-type: none"> Will minimise complaints from residents at the point the service changes Will minimise the likelihood of any boxes being fly tipped 	<ul style="list-style-type: none"> Expensive as dedicated vehicles and staff will be required, working full time for up to four weeks (i.e. four collection cycles). Disposal costs of the boxes will also need to be factored in A bespoke communications plan will be necessary Will not capture all boxes owing to residents forgetting, holidays, illness etc and therefore complaints may still be received Collecting and disposing of boxes before the end of their life expectancy may lead to complaints about misspending If residents haven't yet received their weighted bags (perhaps they were accidentally missed off the initial bag delivery, for example), collecting the boxes back in could leave residents with no containment for a period of time, causing complaints and potentially resulting in recyclate going in the residual waste stream
Residents repurpose boxes	<ul style="list-style-type: none"> Re-use is top of the waste hierarchy and demonstrates that the council adheres to its own messaging The boxes are multi-functional and many residents can usefully repurpose them (as storage for use in sheds / attics / playrooms / bedrooms or as planters in the garden, for example) There are no costs associated with this option, aside from any communications support Residents can take the boxes to the HRC for disposal or give them to friends or neighbours who may be able to use them 	<ul style="list-style-type: none"> A bespoke communications plan will be necessary Complaints will be received from residents who do not wish to find an alternative use for them or who do not wish to dispose of them themselves May lead to an increase in likelihood of residents fly tipping the boxes, although they will be accepted at the HRCs, so this risk is minimised

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