Gloucestershire Waste Management Need & Infrastructure Capacity Assessment 2022

Management Requirements for Local Authority Collected Waste in Gloucestershire to 2041

Report: Final Issue

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Abbreviations

AD	Anaerobic Digestion
C & I	Commercial & Industrial Waste
C, D & E / CDEW	Construction, Demolition & Excavation Waste
DEFRA	Department for Environment, Food and Rural Affairs
DMR	Dry mixed recyclables
EA	Environment Agency
EfW	Energy from Waste
EWC	European Waste Catalogue
GVA	Gross value added
HWRCs	Household Waste Recycling Centres
LACW	Local Authority Collected Waste
MRS	Metal Recycling Site
MRF	Material Recycling Facility
MWMS	Municipal Waste Management Strategy
PPG	Planning Practice Guidance
WCA	Waste Collection Authority
WDA	Waste Disposal Authority
WDF	WasteDataFlow
WDI	Waste Data Interrogator
WIR	Waste Incinerator Returns
WMNICA	Waste Management Need and Infrastructure Capacity Assessment
WPA	Waste Planning Authority
WTS	Waste Transfer Station

Glossary of Terms

Anaerobic Digestion	A process to manage organic matter including green waste and food waste broken down by bacteria in the absence of air, producing a gas (biogas) and nutrient rich solid or liquid (digestate). The biogas can be used to generate energy either in a furnace, gas engine, turbine or to power vehicles, and digestate can be applied to land as a fertiliser.
Biodegradable waste	Waste that can break down over time due to natural biological action/processes, such as food, garden waste and paper.
Commercial Waste	Waste from factories or premises used for the purpose of trade or business, sport, recreation or entertainment
Construction, Demolition & Excavation Waste	Waste arising from the building process comprising demolition and site clearance waste and builders' waste from the construction/demolition of buildings and infrastructure. Includes masonry, rubble and timber.
Defra	The UK Government department responsible for developing national waste management policy.
Energy from Waste	The conversion of the calorific value of waste into energy, normally heat or electricity through applying thermal treatment of some sort. May also include the production of gas that can be used to generate energy.
Environment Agency	The body responsible for the regulation of waste management activities through issuing permits to control activities that handle or produce waste. It also provides up-to-date information on waste management matters and deals with other matters such as water issues including flood protection.
European Waste Catalogue (EWC)	Comprehensive listing of wastes divided into 20 chapters, most of which are industry-based, although some are based on materials and processes. Each waste type is assigned a unique six-digit code. Otherwise referred to as List of Waste (LoW).
Green waste	Biodegradable plant waste from gardens and parks such as grass and hedge trimmings, from domestic and commercial sources suitable for composting.
Hazardous Waste	Waste requiring special management under the Hazardous Waste Regulations 2005 due to posing potential risk to public health or the environment (when improperly treated, stored, transported or disposed). This can be due to the quantity, concentration, or characteristics of the waste.
Household Waste	Waste from households collected through kerbside rounds, bulky items collected from households and waste delivered by householders to household waste recycling centres and "bring recycling sites". along with waste from street sweepings, and public litter bins.
Incineration	The controlled combustion of waste. Energy may also be recovered in the form of heat (see Energy from Waste).
Industrial Waste	Waste arising from any factory and from any premises occupied by an industry (excluding mines and quarries).
Kerbside Collection	The collection of recyclate and waste from households, or occasionally industrial and commercial premises.
Landfill (including land raising)	The permanent disposal of waste to land, by the filling of voids or similar features, or the construction of landforms above ground level (land-raising).
Local Authority Collected Waste	Waste collected by or on behalf of a local authority. Includes household waste and business waste where collected by a local authority and non-municipal fractions such as construction and demolition waste delivered to HWRCs. LACW is the definition used in statistical publications, which previously referred to municipal (solid) waste (MSW).
Materials Recycling Facility (MRF)	A facility for sorting recyclable materials from the incoming waste stream.
Municipal Solid Waste	Local Authority Collected Waste plus any wastes similar in nature and

(MSW) (from 2010)	composition including that collected from businesses by private waste collection companies. (Term used for reporting against retained EU Directives only).
Non-Hazardous Waste Landfill	A landfill permitted to accept non-inert (biodegradable) wastes e.g. municipal and commercial and industrial waste and other non-hazardous (including inert) wastes. May only accept hazardous waste if a special cell is constructed.
Open Windrow Composting	A process in which biodegradable waste (such as green waste) is broken down in an open air environment (aerobic conditions) by naturally occurring micro-organisms to produce a material suitable for use as a soil improver.
Other Recovery	Processes such as energy from waste that recover value from waste other than recycling or composting. Sits below recycling in the waste hierarchy, but above disposal.
Recovery	Subjecting waste to processes that recover value including recycling, composting or thermal treatment to recover energy.
Recycling	The reprocessing of materials extracted from the waste stream either into the same product or a different one.
Residual Waste	Waste remaining after materials for re-use, recycling and composting/organic waste treatment e.g. anaerobic digestion have been removed.
The Plan area	The area subject to the Waste Local Plan to which this study relates. In this case the county of Gloucestershire.
Waste Collection Authority (WCA)	A local authority that has a duty to collect household waste. WCAs also have a duty to collect commercial waste if requested to do so and may also collect industrial waste. In two tier areas the District or Borough Council are the WCAs.
Waste Disposal Authority (WDA)	A local authority responsible for managing the waste collected by waste collection authorities and the provision of household waste recycling centres. In this case Gloucestershire County Council.
Waste Minimisation / Reduction	The most desirable way of managing waste according to the Waste Hierarchy, by avoiding the production of waste in the first place.
Waste Planning Authority	The authority responsible for planning for waste within a specific administrative area. In this case Gloucestershire County Council.
Waste Transfer Station	A site to which waste is delivered for sorting or baling prior to transfer to another place for recycling, treatment or disposal.

1. Introduction

Gloucestershire County Council (GCC) has contracted BPP Consulting to produce the Gloucestershire Waste Management Need and Infrastructure Capacity Assessment (WMNICA) 2022. This is with the intention of informing a review of the Gloucestershire Waste Core Strategy (adopted November 2012), which is to be updated to cover a Plan period to 2041.

The WMNICA consists of the following documents:

1. Local Authority Collected Waste - Assessment of Management Requirements to 2041;
2. Commercial & Industrial Waste - Assessment of Management Requirements to 2041;
3. Construction, Demolition & Excavation Waste - Assessment of Management Requirements to 2041;
4. Hazardous Waste - Assessment of Management Requirements to 2041;
5. Scoping Review of Other Waste Streams;
6. Review of Strategic Waste Flows; and
7. An Overview Report.

This report is concerned with updating the Local Authority Collected Waste (LACW) baseline for 2021 and assessing its projected management requirements to 2041.

1.1 Principal Data Sources

The principal data sources used to generate this report are as follows:

Waste Data Interrogator

Operators of all sites permitted to manage waste submit quarterly returns on the quantities, types and origin of waste received and, where applicable, destination of waste removed at their sites. These returns are collated by the Environment Agency (EA) and are included in a national database known as the Waste Data Interrogator (WDI). This is released approximately nine months after the end of the calendar year to which the data relates. The 2021 WDI (version 3 released Jan 2023) consisting of data for the calendar year 2021 is the most current version available at the time of writing.

Wastedataflow

Wastedataflow[1] (WDF) is a web-based data entry portal for local authorities to report on local authority waste management arrangements to central Government on a quarterly basis. The data input is used to report on national recycling and landfill diversion performance as well as local authority league tables on recycling rates etc following independent quality checking. While Councils normally report in financial years, as the EA WDI reports for calendar year the data for Gloucestershire covering the four quarters of 2021 has been accessed to ensure comparability between datasets.

1.2 Advice on Data

The principal source of advice with respect to the use of data to inform production of a Plan evidence base is the national Planning Practice Guidance (PPG) available at https://www.gov.uk/guidance/waste. This states that:

"*Assessing waste management needs for Local Plan making is likely to involve:*

- *understanding waste arisings from within the planning authority area, including imports and exports*
- *identifying the waste management capacity gaps in total and by particular waste streams*
- *forecasting the waste arisings both at the end of the period that is being planned for and interim dates*
- *assessing the waste management capacity required to deal with forecast arisings at the interim dates and end of the plan period."*

Paragraph: 022 Reference ID: 28-022-20141016

It includes a section entitled "Using data to monitor and forecast waste needs", which articulates the following principles, should waste planning authorities adopt, when using data to plan for the management of waste arising in their respective administrative i.e. Plan area:

- *Make clear assumptions on how data were handled, as well as their impact (including on forecasting)*

1 http://www.wastedataflow.org/

- *Provide data to an appropriate level of significance, based on their explicit assumptions. In practice, data quoted to more than 2 or 3 significant figures will not be helpful and spurious accuracy stemming from precise figures should be avoided*
- *Plan for a range of each type of waste rather than a specific single figure."*

Paragraph: 036 Reference ID: 28-036-20141016 Revision date: 16 10 2014

1.3 Data Presentation

In order to respect the need to avoid "spurious accuracy", the following approach has been taken:

1. Where actual tonnage data has been accessed, this has been used in the computations.
2. Where data has been subject to computation, this has been rounded to the nearest 500.
3. Where percentages have been used to generate data, the percentages are presented as whole numbers, however the computations actually use the full value. This means that values presented may not always precisely correspond to the values computed when applying the percentage value presented in this report.
4. Certain computations apply a threshold of >500 tonnes.

2. Assessing LACW Arisings

2.1 Introduction

This section of the report is concerned with assessing LACW arisings in Gloucestershire in 2021. From this, future arisings can be forecast for which appropriate targets can be proposed. The current LACW management capacity is then assessed in the overview report 7, with a view to identifying potential future capacity needs for which a revised Waste Local Plan may need to provide.

2.2 Definition

In the UK, until 2010, the term Municipal Solid Waste (MSW) was taken as meaning waste collected by local authorities (mainly from households). However, to ensure consistency with the EU definition of municipal waste, in 2010, the UK expanded the definition to include not just waste from households but any wastes similar in nature and composition and so now the term 'municipal waste' includes wastes (of a similar type) collected from businesses by private waste collection companies as well as waste formerly referred to as MSW.

In light of this, a new term to only cover waste for which local authorities have responsibility to collect/manage was adopted. This term is “Local Authority Collected Waste” (LACW). LACW includes ‘household waste’ (waste produced by householders collected from their homes (collected household waste) and waste deposited at Household Waste Recycling Centres (HWRCs), plus commercial waste collected by councils, street sweepings, litter and fly tipped materials. In general, the non-household waste fraction of LACW represents around 5% of total LACW arisings.

2.3 Gloucestershire County Council

GCC has the responsibility as the Waste Disposal Authority (WDA) for the final management of Local Authority Collected Waste arising in Gloucestershire and provision and operation of household waste recycling centres.

GCC signed a 25 year contract with Urbaser Balfour Beatty (UBB) to design, build and operate a facility to manage the county's residual waste. The EfW facility built at Javelin Park has been in operation since October 2019. At the end of the 25 years the facility will be owned by the county council.

Gloucester City, 2 boroughs and 3 districts councils operate as Waste Collection Authorities (WCA) responsible for collection of waste and recyclates from households across Gloucestershire. These services are either carried out by direct labour or contracted out to third party waste collection companies.

3. Gloucestershire LACW Management Profile

The management profile of LACW arising in Gloucestershire over the last decade is shown in Figure 1 below.

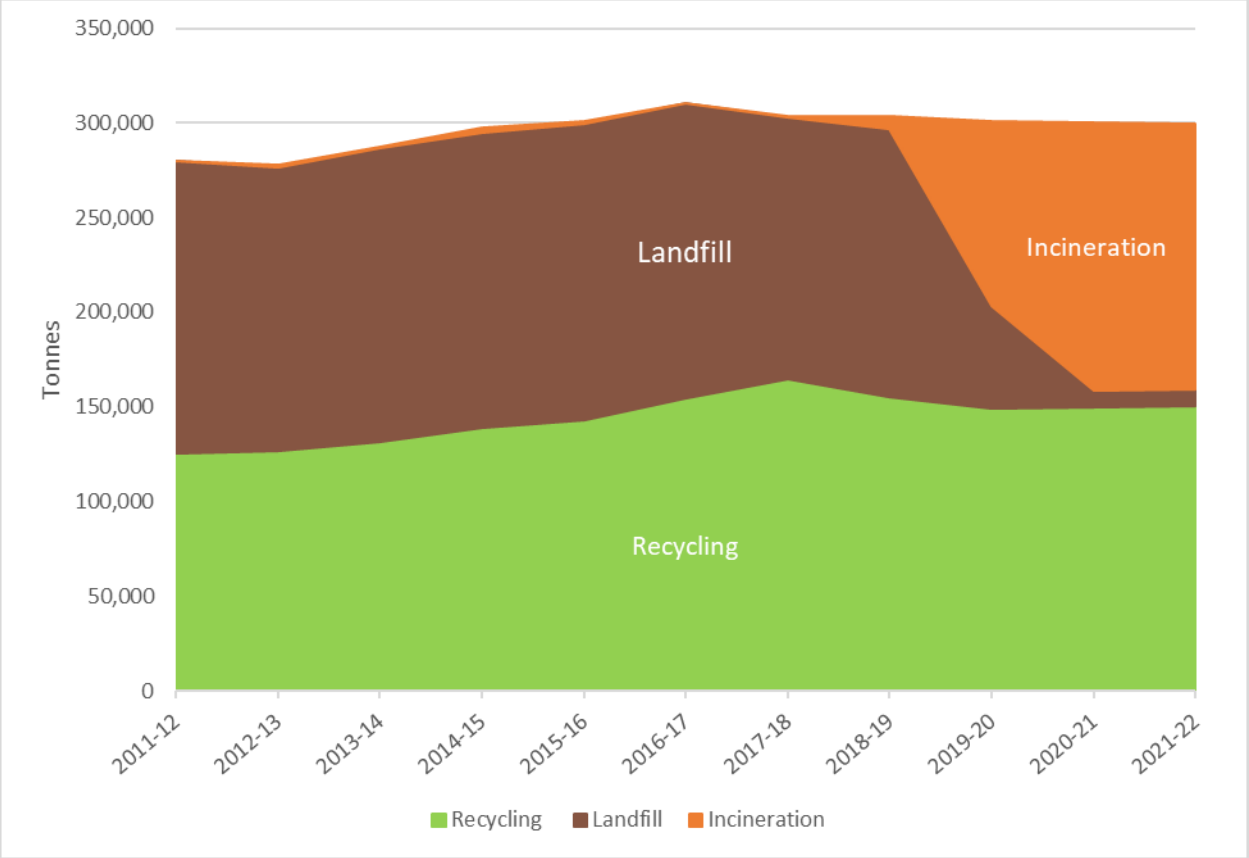

Figure 1: Management Profile for Gloucestershire LACW 2011/12 – 2021/22 (tonnes)

Figure 1 shows that the LACW management profile between 2011/12 and 2021/22 is underpinned by recycling and composting which peaked in 2017/18 and stabilised from 2019/20 onwards with an average rate of c50% (c150,000 tpa). It also shows the sudden transition in final management method for residual waste (waste remaining after recycling/ composting), from landfill to incineration with landfill reducing by 94% as a result of the commissioning of the Javelin Park EfW facility in 2019.

4. Gloucestershire LACW forecast

The following have been taken into account in projecting future LACW arisings in Gloucestershire over the Plan period:

- National Planning Practice Guidance (nPPG)
- National forecast of LACW growth in England
- Historical pattern of LACW arisings in Gloucestershire

These are discussed below.

4.1 Planning Practice Guidance

The national Planning Practice Guidance (nPPG)[2] states the following in relation to forecasting future MSW arisings (now referred to as LACW):

> "***How should waste planning authorities forecast future municipal waste arisings?***
> *Forecasts of future municipal waste arisings are normally central to the development of Municipal Waste Management Strategies.*
> *It will be helpful to examine municipal waste arisings according to source (i.e. household collections, civic amenity site wastes, trade waste etc.). This may allow growth to be attributed to particular factors and to inform future forecasts.*
> *A 'growth profile' , setting out the assumed rate of change in waste arisings may be a useful starting point for forecasting municipal waste arisings. The growth profile should be based on two factors:*
> - *household or population growth; and*
> - *waste arisings per household or per capita.*
>
> **How is a growth profile prepared?**
> *A growth profile is prepared through a staged process:*
> - *calculate arisings per head by dividing annual arisings by population or household data to establish short- and long-term average annual growth rates per household and*
> - *factor in a range of different scenarios, e.g. constant rate of growth, progressively lowering growth rates due to waste minimisation initiatives.*
>
> *The final forecast can then be modelled with scenarios based on the long- and short-term rate of growth per household, together with household forecasts."*

It is notable that the examples of growth scenarios given in nPPG refer to either a constant rate or lowering of growth rates i.e. there is no mention of the possibility of a rising growth rate, suggesting that the Government does not see increasing growth in LACW as a scenario to be modelled.

[2] Ref.: Revision date: 16 10 2014 Paragraph: 029 & 30 Reference ID: 28-029-20141016

4.2 Context in Gloucestershire

While a Joint Municipal Waste Management Strategy (JMWMS) does exist for Gloucestershire (2004-6), given the forecast scenarios are based on historical data from 1995/96 to 2000/01 the forecast is not considered to be applicable. Therefore, the following have been considered to update the forecast and project future LACW arisings in Gloucestershire over the Plan period:

- National DEFRA forecast of LACW in England;
- Historical LACW arisings in Gloucestershire;
- nPPG advice on estimating LACW growth.

4.3 National forecast of LACW growth in England

DEFRA published a study of Future Waste Arisings in England[3] in 2021. This includes the most current national growth forecast published by Government for the LACW waste stream in England (amongst others). The method used to produce a forecast for LACW waste nationally involved the development of a model[4] using external variables such as population growth and Regional Gross Disposable Household Income trends (GDHI) to project LACW growth. Three scenarios were constructed (central, lower and upper) but for the purposes of this exercise the central forecast is referred to. The graph resulting from the forecast produced is reproduced as Figure 2 below.

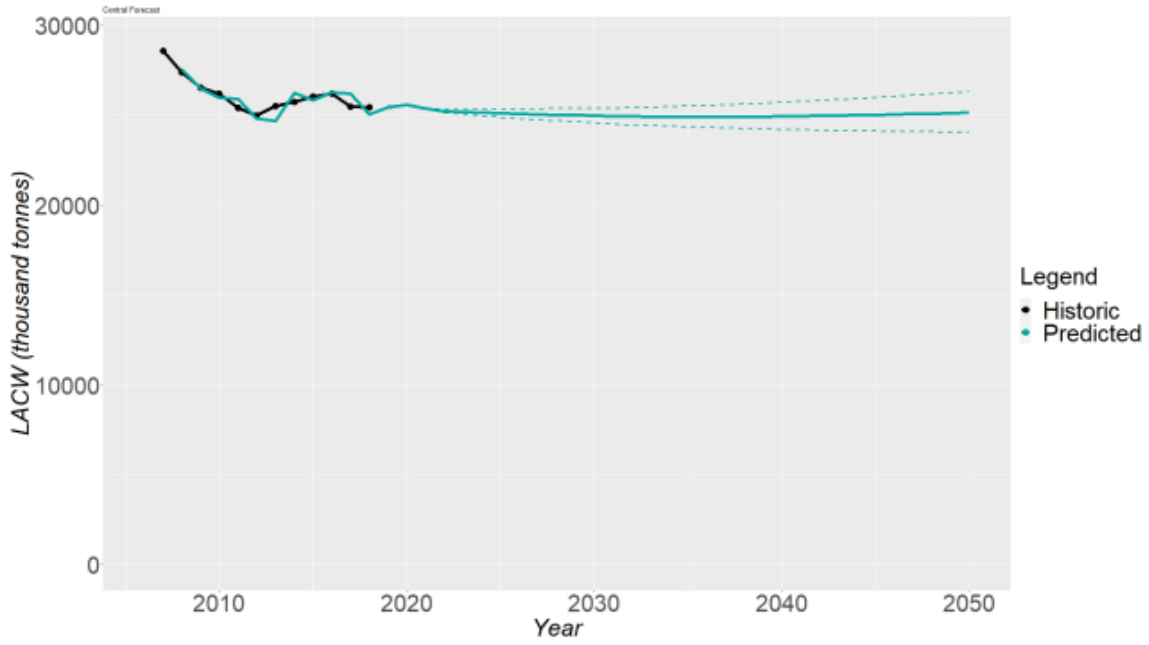

Figure 2: Central Local Authority Collected Waste Arisings Forecast for England (2020-2050)
Source: Reproduced from Future Waste Arisings, for DEFRA (2021)

Figure 2 shows that nationally, LACW arisings are predicted to increase slightly in 2020 and then decrease marginally from 2022 to 2035, with a slight upswing from 2035 to 2050. The growth rate indicated at 5-year intervals from 2020 is shown in Table 1:

[3] 'Future Waste Arisings' Eunomia, April 2021.

[4] This is different to a standard time-series forecast as it includes lagged dependent variables.

Table 1: Defra National LACW Forecast 5-year Growth Rates

	2020	2025	2030	2035	2040	2045	2050
5-year growth rate	-	-2.12%	-0.18%	-0.54%	+0.37%	+0.18%	+0.54%

The national forecast for LACW contained in the DEFRA 2021 report provides a feel for the direction in which growth in LACW in Gloucestershire may be headed, but it should of course be noted that the report is intended to provide a national picture, and so presents an average of what is predicted to happen across England. Thus, it masks any regional or local differences, such as varying levels of prosperity and associated consumption. It should be noted that the forecasts presented in the DEFRA 2021 report have been used as the basis for modelling of the achievement of targets related to the policy goals of national Resources & Waste Strategy published in 2018[5] and the Environment Act, and so represents the forecast of LACW that is driving national policy that can reasonably be expected to impact LACW arising in Gloucestershire locally.

4.4 Historical Pattern of LACW Arising in Gloucestershire

The applicability of the conclusions of the 2021 DEFRA report on future LACW arisings to the situation in Gloucestershire, can be tested by considering the observed pattern of LACW arisings in Gloucestershire over the past decade, as shown in Figure 3 below.

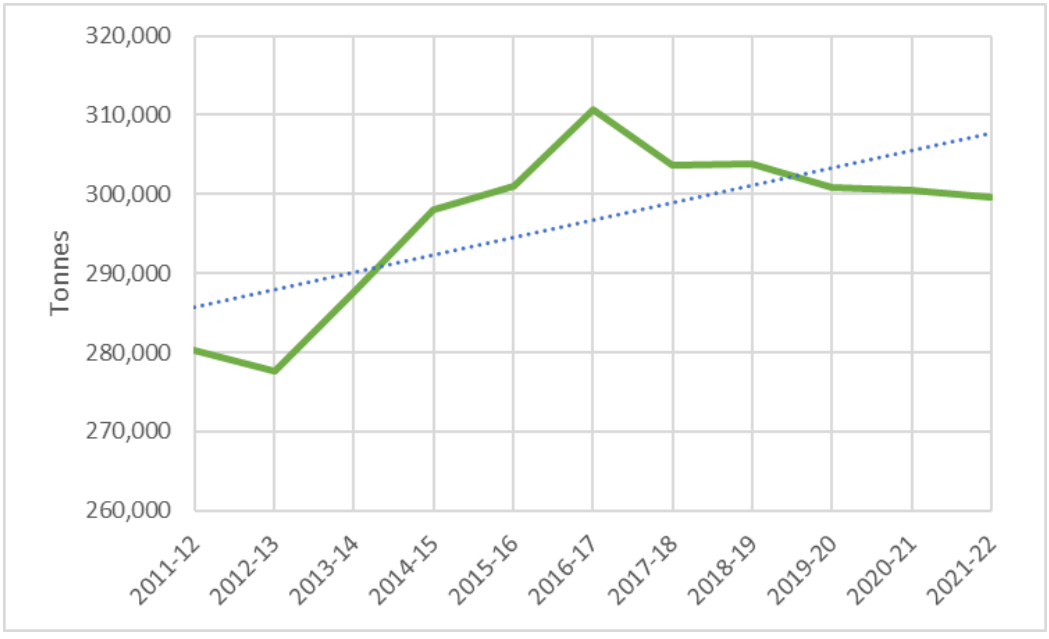

Figure 3: LACW Arisings in Gloucestershire 2011/12 to 2021/22
Blue dashed line is a linear trendline NB: y axis not at zero

[5] Our Waste, Our Resources: A Strategy for England, Department for Environment, Food & Rural Affairs, December 2018.

Table 2: Gloucestershire LACW arisings between 2011/12 and 2021/22 including 10yr and 5yr period growth rates

Year	Total	Annual growth rate	5-year growth rate
2011-12	280,200	-3.01%	
2012-13	277,633	-0.92%	
2013-14	287,574	3.58%	2.10%
2014-15	298,019	3.63%	
2015-16	301,096	1.03%	
2016-17	310,645	3.17%	
2017-18	303,714	-2.23%	
2018-19	303,919	0.07%	-0.72%
2019-20	300,762	-1.04%	
2020-21	300,557	-0.07%	
2021-22	299,604	-0.32%	
	Average growth rate over decade	+0.69%	

Historical data for LACW arisings (Figure 3 and Table 2) shows an overall increasing trend in arisings from 2011/12 to 2021/22 with an average annual growth rate over the decade of 0.69%. However, over the decade LACW arisings have fluctuated significantly, with a short period of decline at the start of the decade, followed by positive growth from 2013/14 to a peak in arisings in 2017/18. Post 2017/18, arisings have stabilised around c300,000 tonnes with a 5-year annual average growth rate of -0.72%. Somewhat surprisingly, arisings did not increase in 2020 in spite of the Covid 19-pademic lock down[6].

As shown in Figure 4, total households in Gloucestershire has increased steadily between 2011-12 and 2020-21 by an average of 1.00% per annum. LACW arisings have also seen an increase over the decade by an average of 0.69% per annum. However, there does not appear to be a direct correlation between the trends during the periods of decreasing LACW arisings from 2011/12 to 2012/13 and 2016/17 to 2021-22. This suggests that while there may be a long-term relationship between growth in the number of households and growth in LACW arising in this case, a growth profile based on the assumption that there is a linear relationship between predicted growth in household numbers and growth in LACW arisings would not be robust, given the multiple variables at play.

[6] this may have been due to a fall in inputs to HWRCs which were closed for a time, offsetting a rise in kerbside collected LACW.

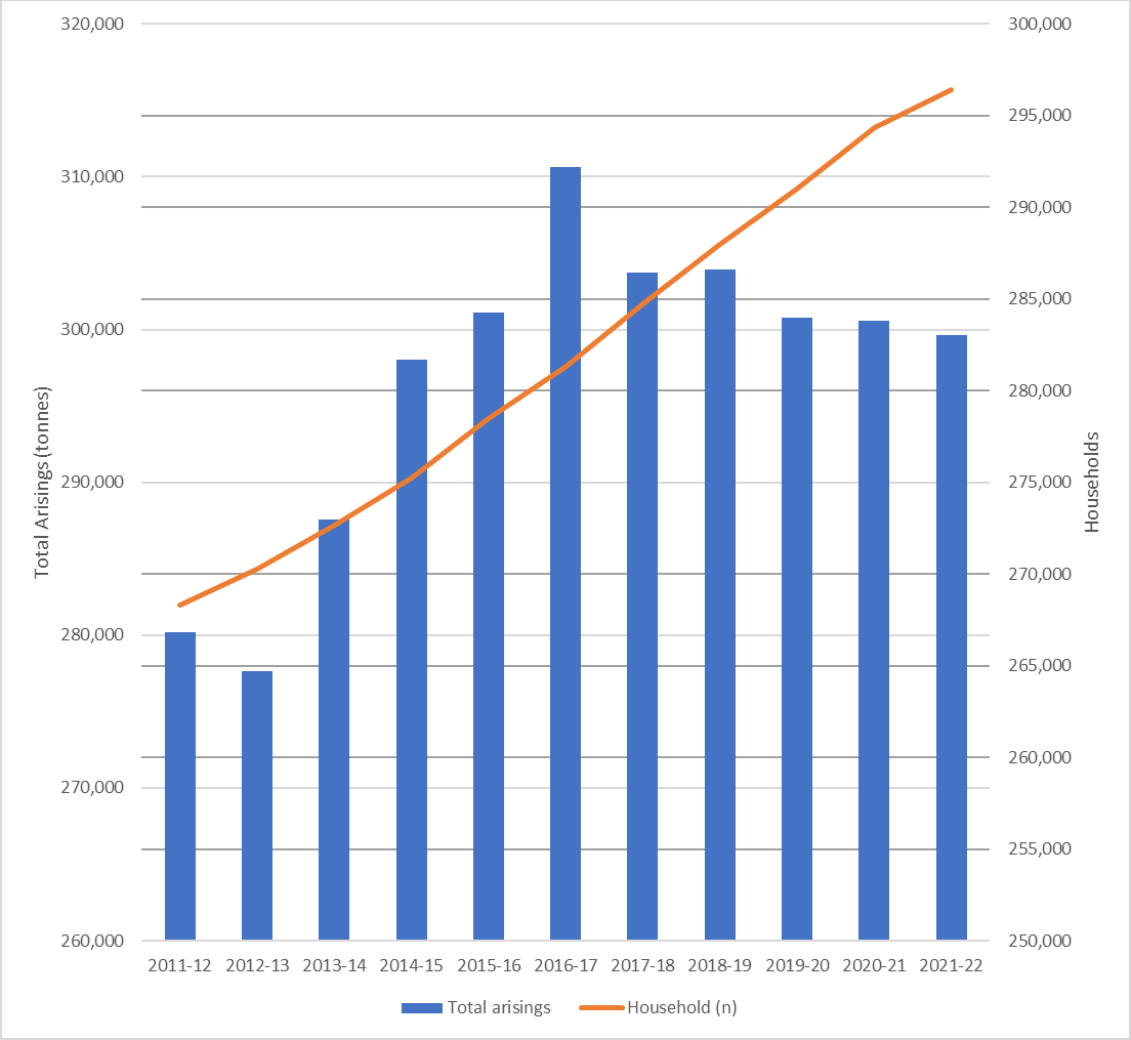

Figure 4: Gloucestershire LACW arisings (bar chart) vs household numbers (orange line) 2011/12 to 2021/212
(y axis not set to zero)

5. Generating a Forecast for LACW

The method proposed in the nPPG suggests that a growth profile be based on household growth and waste arisings per household and/or population growth and waste arisings per capita. This can then be modelled with a range of different scenarios.

5.1 Building a Growth Profile

A growth profile can be established by following the guidance in nPPG on a step-by-step basis:

- Step 1 – Establish short-term average annual growth rates per household/population
- Step 2 – Establish long-term average annual growth rates per household/population

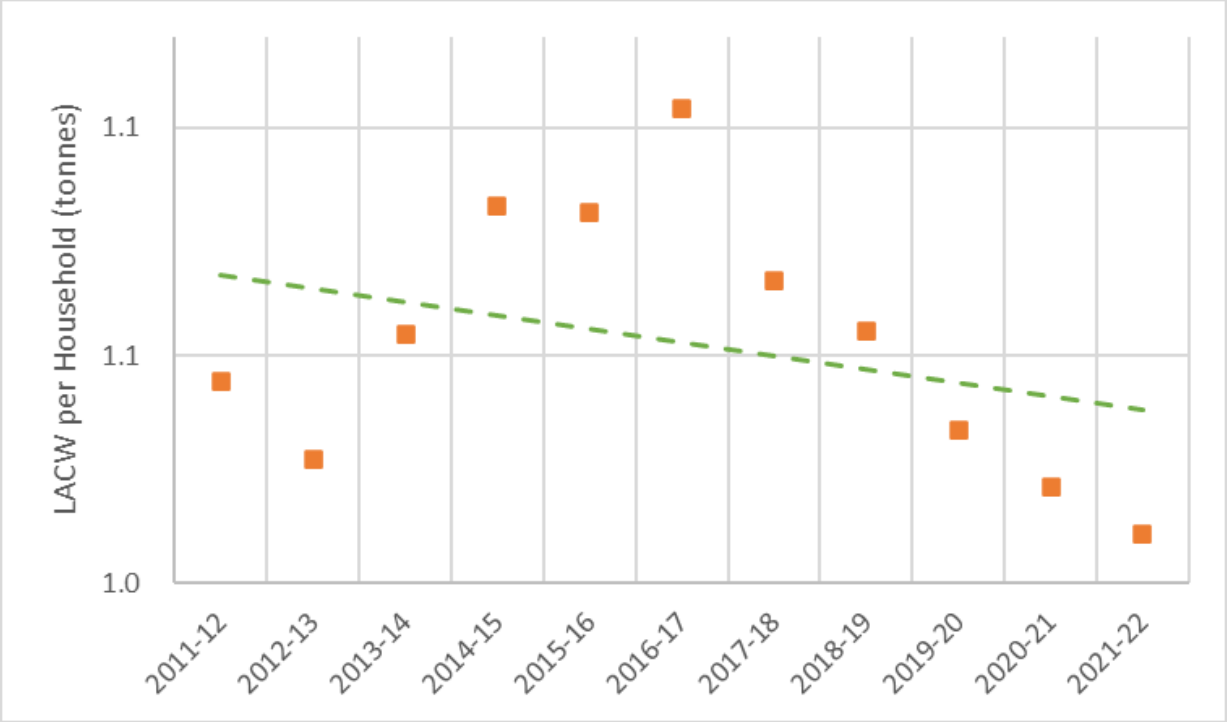

Figure 5: LACW arisings per household in Gloucestershire 2011/12 to 2021/22
Green dashed line is a linear trendline NB: y axis not at zero.

This is done (as indicated by nPPG) in this case by dividing annual arisings by household numbers data. Figure 5 below shows the results of this exercise.

Figure 5 shows that the average household has experienced large fluctuations in LACW arisings over the decade, but overall, it has been decreasing moderately as indicated by the downward trajectory of the trend line. Figure 5 yields the following:

- the average compound annual growth rate for LACW arisings per household for the period 2011/12 to 2021/22 is minus 0.31% (the long-term growth rate);
- the average compound annual growth rate for LACW arisings per household for the 5-year period 2016/17 to 2021/22 is minus 1.75% (short-term growth rate).

The next step is to add the average compound growth rates (for both the short and long-term) for LACW arisings per household to the household number growth forecast[7]. Table 3 presents the outcome of this.

Table 3: Household growth rate and the long and short-term growth rates in household waste arisings

	Household number growth forecast	Long term LACW arisings per household (minus 0.31%) plus household growth forecast value	Short term LACW arisings per household (minus 1.75%) plus household growth forecast value
2022/23	1.01%	0.71%	-0.74%
2023/24	1.00%	0.70%	-0.75%
2024/25	0.99%	0.68%	-0.76%
2025/26	0.91%	0.61%	-0.84%
2026/27	0.89%	0.58%	-0.86%
2027/28	0.90%	0.59%	-0.85%
2028/29	0.89%	0.58%	-0.87%
2029/30	0.85%	0.55%	-0.90%
2030/31	0.82%	0.51%	-0.93%
2031/32	0.81%	0.51%	-0.94%
2032/33	0.80%	0.49%	-0.95%
2033/34	0.78%	0.47%	-0.97%
2034/35	0.75%	0.44%	-1.00%
2035/36	0.72%	0.42%	-1.03%
2036/37	0.73%	0.42%	-1.02%
2037/38	0.70%	0.39%	-1.05%
2038/39	0.68%	0.38%	-1.07%
2039/40	0.66%	0.35%	-1.09%
2040/41	0.65%	0.34%	-1.11%
2041/42	0.66%	0.35%	-1.10%

This shows that adding the projected growth in the number of households over the Plan period moderates the forecast decline in both the long and short-term growth rates in LACW per household, resulting in the long-term growth rate for LACW per household being positive, whilst the short-term LACW per household growth rate remains negative.

For the purpose of this exercise, the long and short-term growth rate for LACW has been applied to the baseline LACW arisings value for 2021 along with the following set of growth factors to create a cone of possibilities:

[7] Table CTSOP1.1: Number of properties by Council Tax band, local authority and lower and middle layer super output area supplied by the Valuation Office Agency (VOA) https://www.gov.uk/government/statistics/council-tax-stock-of-properties-2020

- DEFRA National Forecast of LACW at 5-year intervals;
- Historic LACW Growth of +0.69% per annum (see Table 2). The predicted arisings applying the above growth rates to the most recent LACW arisings value for 2021/22 i.e. baseline, are plotted in Figure 6 below.

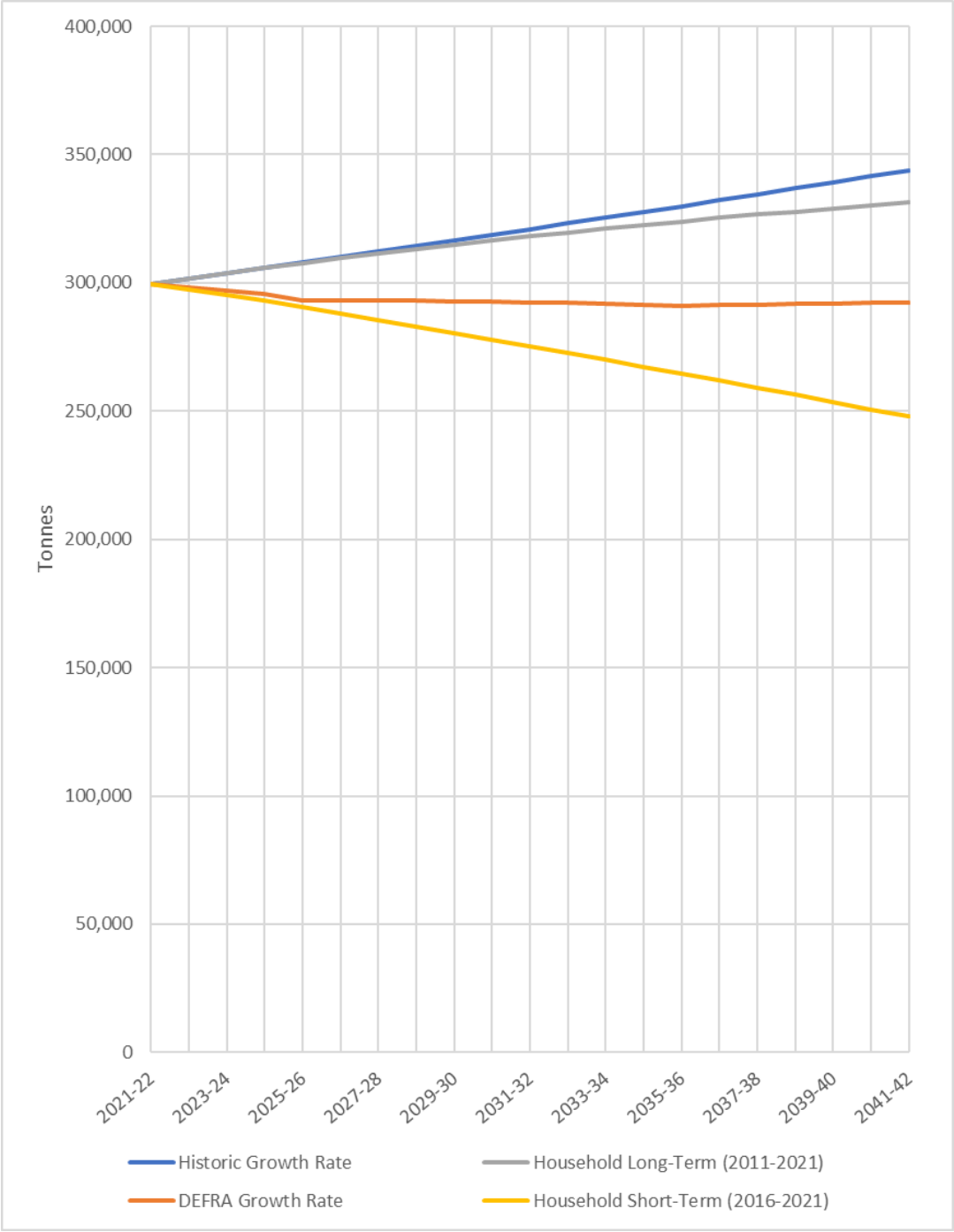

Figure 6: LACW arisings forecasts for Gloucestershire (using 2021/22 baseline)

The corresponding values are presented in Table 4 below.

Table 4: Initial forecast values for Gloucestershire LACW arisings (Tonnes)

	Historic Growth Rate projection	DEFRA Growth Rate	Household Long-Term arisings forecast	Household Short-Term arisings forecast
2021/22	*299,604*	*299,604*	*299,604*	*299,604*
2022/23	301,675	298,334	301,721	297,394
2023/24	303,761	297,063	303,819	295,168
2024/25	305,861	295,793	305,884	292,912
2025/26	307,975	293,252	307,744	290,462
2026/27	310,104	293,147	309,538	287,962
2027/28	312,248	293,041	311,363	285,501
2028/29	314,406	292,936	313,165	283,030
2029/30	316,580	292,830	314,880	280,493
2030/31	318,768	292,725	316,498	277,884
2031/32	320,972	292,408	318,102	275,280
2032/33	323,191	292,092	319,658	272,651
2033/34	325,425	291,776	321,161	269,996
2034/35	327,675	291,460	322,574	267,285
2035/36	329,940	291,144	323,921	264,541
2036/37	332,221	291,359	325,287	261,837
2037/38	334,517	291,575	326,572	259,089
2038/39	336,830	291,790	327,806	256,327
2039/40	339,158	292,006	328,970	253,536
2040/41	341,503	292,221	330,084	250,733
2041/42	343,864	292,326	331,236	247,987

Two out of the four scenarios are showing a rising LACW arisings trajectory and the other two scenarios are showing a falling LACW arisings trajectory, with the Household Short-Term showing a significant fall as compared with the DEFRA forecast. Figure 6 suggests that the Household Short-Term forecast appears to represent a drastic declining trend and the zone within which the actual trajectory will most likely fall is bounded by the DEFRA growth rate (orange line) and Historical growth rate (blue line). However, to account for some decline, taking the average of the projected LACW arisings at 2041 for the DEFRA growth rate and Household Long-Term growth rates, would result in an arising value of c318,000 tonnes at 2041. This would equate to a 6.17% increase over the Plan period. The implications of this for per household arisings is considered in the next section.

5.2 Relating forecasts to waste per household arisings

In order to gauge how realistic the proposed forecasts might be, the waste per household implied by each scenario at 2041 have been calculated and then compared against the actual waste per household in 2021 of 1,080kg. This is shown in Table 5 below.

Table 5: Waste per household factors implied by the chosen scenarios at 2037 compared to 2020 actual and the percentage change year on year implied (kg)

Forecast	Calculated waste arisings per household at 2041 (t/hh)	Difference from actual in 2021 over 20 years (t/hh)	Percentage annual change
Historic	1050	-30	+0.64%
DEFRA	900	-180	-0.12%
Long-Term Growth	1020	-60	+0.48%
Short-Term Growth	760	-320	-1.04%
Central scenario	980	-100	+0.31%

Findings

The findings from the comparison in Table 5 are as follows:

- The historic data scenario implies a reduction of 30kg per household over the Plan period against a starting arising of 1080kg. This equates to a 1.5kg fall per household year on year;
- the national DEFRA central forecast implies a reduction of 180kg per household over the Plan period against a starting arising of 1080kg. This equates to a 9kg fall per household year on year;
- the long-term growth scenario implies a reduction of 60kg per household over the Plan period against a starting arising of 1080kg. The LACW arisings projected by the long-term growth scenario increase significantly by 2041 due to growth in household numbers counteracting falling per household arisings. Overall, this results in a 3kg fall per household per year;
- the short-term growth scenario implies a reduction of 320kg per household over the Plan period against a starting arising of 1080kg. This equates to a 16kg fall per household year on year;
- the central scenario forecast implies a reduction of 100kg per household over the Plan period against a starting arising of 1080kg. This equates to a 5kg fall per household year on year.

The above analysis suggests waste arisings per household could fall year on year by between 3kg and 16kg. The central scenario forecast predicts a fall in waste per household per year of 5kg based on an overall increase of c6.17% over the Plan period and is considered to be the most realistic scenario. This yields the scenario (Central Scenario – green) shown in Figure 7.

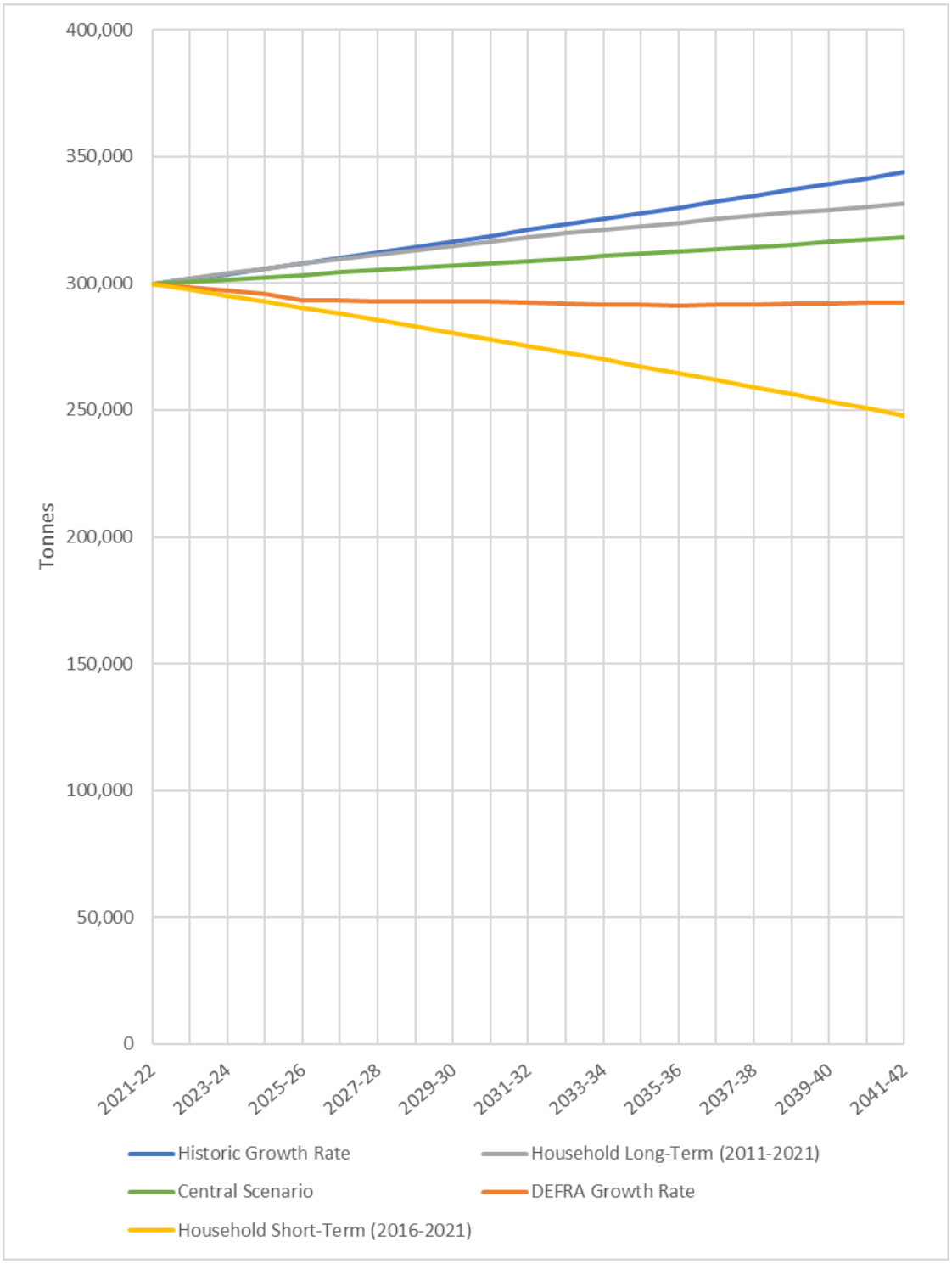

Figure 7: 'Cone of Possibilities' for LACW forecast with Central Scenario
(tonnes per annum)

Forecast Conclusion

Using the baseline arising value for 2021/22 and a 'cone of possibilities' generates a trajectory that tracks a path between the Historical growth rate (blue line) and DEFRA growth rate (orange line) trends in arisings. It is recommended to apply this 0.31% per annum growth rate when considering future LACW capacity needs, whilst remaining mindful that the short-term growth rate displays a steep decline.

Using this scenario results in projected LACW arisings by 2041 of c318,000 tonnes, an increase of c18,500 tonnes on the 2021/22 value. The forecast arisings each year are shown in Table 6 below.

Table 6: Forecast LACW arisings each year using the preferred Central Scenario (tonnes)

	Preferred Central Scenario
2021/22	*299,604*
2022/23	300,529
2023/24	301,453
2024/25	302,378
2025/26	303,302
2026/27	304,227
2027/28	305,151
2028/29	306,076
2029/30	307,000
2030/31	307,925
2031/32	308,849
2032/33	309,774
2033/34	310,699
2034/35	311,623
2035/36	312,548
2036/37	313,472
2037/38	314,397
2038/39	315,321
2039/40	316,246
2040/41	317,170
2041/42	**318,095**

6. Gloucestershire LACW Future Management Capacity Needs

Having identified a preferred forecast, the next step is to establish the current LACW management profile which can then be used to establish realistic future management targets which then informs future capacity requirements, whilst also determining the current flows of LACW management within and beyond Gloucestershire.

6.1 Existing LACW Management Profile

Table 7 below shows the current management profile using 2021 data supplied by GCC.

Table 7: Current LACW Management Profile in Gloucestershire (2021)
Source: Gloucs CC

Route	Tonnes	%
Total Arisings	299,604	
Recycling/ Composting	150,395	50%
Energy from Waste	140,485	47%
Landfill	8,724	3%

Table 7 shows that the actual percentage of LACW recycled/ composted stands at 50%, while the amount sent to EfW stands at 47% and landfill stands at 3%.

6.2 Gloucestershire LACW Management Arrangements

Examination of LACW management data reported in the WDF 2021 and by GCC indicates the following flows of LACW as shown in Table 8.

Table 8: Final Fate Destinations and tonnages of Gloucestershire LACW arisings 2021 Managed within and outside Gloucestershire (500t+)

	Final Fate Destination Site	In Gloucs	Out Gloucs	Note
Residual Waste	Javelin Park, Urbaser Environmental Ltd	130,868		EfW
	Severnside Energy Recovery Centre, SUEZ Recycling and Recovery Ltd		696	
	Wingmoor Farm, Cory Environmental (Gloucestershire)	6,581		Landfill
	Wingmoor Non-haz landfill, Grundon Waste Management Ltd	2,055		
Source Segregated Recycling	Carlton Road, Glass Recycling (UK) Ltd		2,602	Glass recycling
	Lidgate Crescent, URM (UK) Ltd		8,850	
	Headlands Lane, Reuse Glass UK Ltd		6,033	
	Manistry Wharf, Recresco Ltd		1,044	
	Kingsmill Recycling Centre, Jeremy Mark Freeth		3,914	Paper Recycling
	Kemsley Paper Mill, DS Smith Ltd		3,763	
	Mill Street, Smurfit Kappa UK Ltd		2,631	
	Westgate, Greenstar Environmental Ltd		585	
	Printwaste Recycling and Shredding, PW Commercial Company Ltd	1,612		Plastic Recycling
	Plastics Road, Biffa Polymers Ltd		1,598	
	Kingsmill Recycling Centre, Jeremy Mark Freeth		2,463	
	Imerplast, Brightgreen Plastics Ltd		554	
	Holland House, JFC Plastics Ltd		838	
	Hemswell Business Park, Clean Tech Europe Ltd		1,169	
	The Innovation Centre, Clearpoint Ltd		8,920	
	Bentley Road South, European Metal Recycling Ltd		941	Metal Recycling
Mixed Green and Food Waste	Gloucester Refuse Site, Cory Environmental (Gloucestershire) Ltd	11,116		Composting + open windrow
	Parkgate Farm, Hills Waste Solution Ltd		10,211	
	Rosehill Farm, MF Bennion (Potatoes) Ltd	7,748		
	Stoke Orchard, Cory Environmental (Gloucestershire) Ltd	14,653		
	Wingmoor Farm East AD Facility, Andgestion Ltd	23,735		IVC
Dry Mixed Recyclables	Casepak MRF, G A E Smith (Holdings) Ltd		7,407	MRF
	Former British Sugar Site, Palm Paper Ltd		12,087	
	Landor Street Integrated Resource Facility, Sita UK Ltd		7,940	
	Merebank Road, Avonmouth Resource Park Ltd		2,683	
	Wingmoor Farm, S Grundon (Waste) Ltd	1,233		
Wood	Eclipse Works, South West Wood Products Ltd		1,373	Wood Recycling
	Total	**199,601**	**88,302**	

Table 8 reveals the majority of Gloucestershire's LACW was managed within Gloucestershire with c199,500 tonnes being managed within the Plan area and c88,500 managed outside. A significant proportion of the waste managed within Gloucestershire was residual waste managed at the Javelin Park EfW facility at 130,868 tonnes. Table 8 also shows that the majority of source segregated recycling and dry mixed recycles were managed out of Gloucestershire.

7. Waste Management Targets

Having established the existing management profile, the next step is to consider what management profile may be desirable and achievable and therefore what waste management targets ought to be set in the Plan to achieve that management profile. LACW is all classed as municipal waste (along with waste of a similar nature) and therefore, the municipal waste targets discussed below all relate to LACW, although the term 'municipal waste' also captures an element of commercial waste.

The EU Circular Economy Plan[8], to which the UK government has committed[9], includes the following targets for municipal waste:

- 55% recycling floor by 2025; and
- 60% recycling floor by 2030; and
- 65% recycling floor by 2035; plus
- 10% ceiling limit on landfilling by 2035.

The recently adopted Environment Act target of 50% reduction in residual waste per person by 2042 with an interim target of 21% reduction (by tonnage) by January 2028, would require going beyond the above national recycling target. Plus, the Government has stated a desire to eliminate the landfilling of biodegradable municipal waste by 2028.

Considering the above targets, the targets set out in Table 9 below are proposed.

Table 9: Proposed Targets for LACW Management in Gloucestershire

Italicised entries are actual values

	Milestone Year				
	2021	**2026**	**2031**	**2036**	**2041**
Recycling/composting (floor)	*50%*	≥55%	≥60%	≥65%	≥70%
Landfill (ceiling)	*3%*	≤3%	≤3%	≤3%	≤3%
Remainder to Other Recovery inc EfW	*47%*	42%	37%	32%	27%

Applying the proposed targets to the preferred forecast gives the following capacity requirement in Table 10:

[8] New Circular Economy Action Plan The European Green Deal adopted in March 2020

[9] https://www.gov.uk/government/publications/circular-economy-package-policy-statement/circular-economy-package-policy-statement

Table 10: Future Management Profile for Forecast Gloucestershire LACW Arisings (tonnes)

	Milestone Year				Plan Period Peak/Cumulative Capacity Requirement
	2026	**2031**	**2036**	**2041**	
Recycling/Composting Target (Floor)	167,325	185,310	203,757	222,666	222,666
Remainder to Landfill Target (Ceiling)	9,127	9,265	9,404	9,543	176,254
Other Recovery Remainder	127,775	114,274	100,311	85,886	127,775

This would leave the cumulative non-inert landfill requirement for residual waste of c176,500 tonnes over the Plan period (to 2041) as shown in Table 11 below.

Table 11: Cumulative Landfill Requirement in Gloucestershire to 2041

	Landfill Requirement pa[10]	Cumulative Landfill Requirement
2023/24	8,819	8,885
2024/25	8,866	17,851
2025/26	8,913	26,897
2026/27	8,961	36,024
2027/28	8,955	45,178
2028/29	8,949	54,361
2029/30	8,944	63,571
2030/31	8,938	72,808
2031/32	8,933	82,074
2032/33	8,927	91,367
2033/34	8,922	100,688
2034/35	8,916	110,037
2035/36	8,911	119,413
2036/37	8,905	128,817
2037/38	8,900	138,249
2038/39	8,894	147,709
2039/40	8,889	157,196
2040/41	8,883	166,711
2041/42	8,878	**176,254**

The implications of this requirement are considered further in the Management Requirement Overview Report.

[10] Note that the landfill requirement rises in the first 5 years due to rounding up of actual % to landfill in 2021.