FRITH RESOURCE MANAGEMENT

North London Waste Authority
Waste Projections Briefing Note

27th October 2023

Acknowledgements:

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Disclaimer:

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1 Introduction

Frith Resource Management Ltd (FRM) has been commissioned by North London Waste Authority (NLWA) to provide consultancy support in the development of Joint Waste Strategy. Part of this process is to undertake waste projections for the North London Boroughs and Waste Disposal Authority. These projections will take into account population growth, local and national policy drivers as well as other relevant measures. This briefing note details the background to the policies that are considered relevant to these projections, following engagement with the Borough Officers and NLWA. It also presents results of the projections. The projections are carried out at the Borough level and results are reported at the NLWA level for the Strategy.

1.1 Waste data

Waste arisings data was provided by each of the North London Boroughs for the years 2018/19 to 2021/22, with clarification and confirmation as necessary. The arisings from 2021/22 forms the basis for the waste projections summarised in this paper, presented in Appendix B.

1.2 Projections

Five waste projections have been developed to give a range of potential arisings as a result of various factors coming into effect (policy, environmental and socio-economic). These projections are comparable to those chosen by other authorities that have produced joint waste strategies, and give a broad picture of the likely scenarios which could come into play in the future, ensuring all possible outcomes are covered and given full consideration in the strategy. Table 1 summarises the projections and the impact factors applied within the model.

The projections have been chosen to show the expected range of arisings and recycling rates that the Boroughs and NLWA may need to plan to manage. The rationale is as follows:

Projection A depicts the “business as usual” situation, with current arisings per household and recycling performance maintained. This is a “high tonnage growth model” with modest recycling, influenced by growth in housing and economic growth.

Projection B is based on a similar approach to Projection A in the “business as usual” for the Councils’ recycling services with the exception of assuming Boroughwide food waste collections and a moderate impact of packaging policy measures. This projection has a lower tonnage growth, with household waste arisings decoupled from economic growth, and further impacts from cost of living and changing buying habits. This is a “moderate tonnage growth” model with an enhanced recycling rate.

Projection C builds on Projection B with further waste minimisation with a focus on reuse activities and full expected impacts of packaging policy measures. This is a “low tonnage growth” model with enhanced recycling rates slightly above Projection B.

The primary basis of the tonnage growth assumed in Projections A, B and C is planned increases in household numbers, tempered by waste minimisation and policy impacts. Historic waste arisings in the north London Boroughs (as a whole, combined) show a relatively static tonnage profile, suggesting a low tonnage growth model is more appropriate to the area.

It is reasonably assumed that all new households will be flats and apartments, rather than street level properties, due to the availability of land for development. Evidence from London Boroughs shows that flats have lower yields of recycling than street level properties; therefore, the recycling rates for Projections A, B and C decline over time. Projections D and E are based on the Boroughs rolling out increased education and awareness programmes to increase recycling levels in all property types, as

well as targeting the recycling of waste streams currently not recycled, such as street litter and trade waste.

Projection D – The same "low tonnage growth" model as Projection C, but depicts a progressive recycling approach with increases in the types of materials collected, increased participation by householders, good practice separation and higher materials capture at estates / flats and a reduction in the amount of rejected loads (through lower levels of contamination). This projection presents a "best practice" recycling approach for urban areas.

Projection E – The same "low tonnage growth" model as Projection C and D, but with further progressive recycling beyond Projection D to meet the Mayor of London and GLA recycling targets. This projection will be a challenge to achieve and require significant investment of time and resources into delivering behaviour change campaigns to increase recycling.

The waste growth projections and the modelling assumptions have been agreed with the Boroughs and NLWA.

Table 1: Summary of projections

Projection	Detail
A	**GLA population projections:** As the key driver for growth (kg/ person) **Changes in housing stock:** All new properties are assumed to be flats. Future yields adjusted to reflect lower levels of recycling and higher residual waste per person from flats **Economic growth:** All waste streams grow in line with GDP
B	As Projection A plus allowance for: **Economic growth:** GDP impacts for trade waste only **Public spending reductions / Cost of Living impacts:** Waste reduction impacts as evidenced by the last recession, lasting approximately 5 years **Changing buying habits:** Increased WEEE arisings & recycling, reduced paper consumption **EPR measures and Consistent Collections**: Food waste collections, effect of packaging EPR on residual and dry recycling streams
C	**GLA population projections:** As the key driver for growth (kg/ person) **Changes in housing stock:** All new properties are assumed to be flats. Future yields adjusted to reflect lower levels of recycling and higher residual waste per person from flats **No changes due to economic growth:** No increase due to GDP **Doubling resource productivity:** Waste reduction measure as materials are used for longer, focus on reuse **Public spending reductions / Cost of Living impacts:** Waste reduction impacts as evidenced by the last recession, lasting approximately 5 years **Changing buying habits:** Increased WEEE arisings & recycling, reduced paper consumption **Full impacts from DRS & EPR measure:** Effect of packaging EPR and DRS on residual and dry recycling streams

D	**GLA population projections:** As the key driver for growth (kg/ person) **Changes in housing stock:** All new properties are assumed to be flats. Future yields adjusted to reflect lower levels of recycling and higher residual waste per person from flats **No changes due to economic growth:** No increase due to GDP **Doubling resource productivity:** Waste reduction measure as materials are used for longer, focus on reuse **Public spending reductions / Cost of Living impacts:** Waste reduction impacts as evidenced by the last recession, lasting approximately 5 years **Changing buying habits:** Increased WEEE arisings & recycling, reduced paper consumption **Full impacts from DRS & EPR measure:** Effect of packaging EPR and DRS on residual and dry recycling streams **Increased recycling performance to best practice urban levels:** Increased recycling performance from reduction of rejected loads, increased participation and increased recycling of trade, street litter and RRCs
E	**GLA population projections:** As the key driver for growth (kg/ person) **Changes in housing stock:** All new properties are assumed to be flats. Future yields adjusted to reflect lower levels of recycling and higher residual waste per person from flats **No changes due to economic growth:** No increase due to GDP **Doubling resource productivity:** Waste reduction measure as materials are used for longer, focus on reuse **Public spending reductions / Cost of Living impacts:** Waste reduction impacts as evidenced by the last recession, lasting approximately 5 years **Changing buying habits:** Increased WEEE arisings & recycling, reduced paper consumption **Full impacts from DRS & EPR measure:** Effect of packaging EPR and DRS on residual and dry recycling streams **Mayor of London / GLA Targets delivered:** LACW recycling rate of 50%, Household recycling rate of 45% by 2025, 65% MSW recycling rate target for London by 2030

The full suite of policies, legislation and other related factors considered to potentially impact waste arisings in North London are listed in Table 2. Further detail is provided in Appendix A.

1.3 Summary of Policies & Impacts

Table 2: Policy impacts

Assumption	Detail[1]	Impact duration
Projection A		
- GLA population projections	Population projections from the GLA have been used as the basis for waste yields and tonnage projections	2022-2050
- Changes in housing stock	All new properties are assumed to only be flats, hence impacts on yields of residual and recycling per person derived based on current housing splits and tonnages for individual Boroughs (see Appendix A) Yields of all new properties has been adjusted according to tonnage split information received from Boroughs (flats and houses) **Recycling**: -51.33% / **Residual**: +42.29%	2022-2050
- GDP impacts on all waste arisings	1.8% growth in all waste tonnage p.a., PwC GDP projections to 2050[2]	2022-2050
Projection B		
- GLA population projections	Population projections from the GLA have been used as the basis for waste yields and tonnage projections	2022-2050
- Changes in housing stock	As Projection A **Recycling**: -51.33% / **Residual**: +42.29%	2022-2050
- GDP impacts on trade waste arisings	1.8% growth in all waste tonnage p.a., PwC GDP projections to 2050[2]	2022-2050
- Public spending reductions	c.17% decrease in arisings per person over 5 years from public spending reductions / cost of living impacts, based on FRM analysis of total LA collected waste (England) - regular household, other household, Civic Amenity, household recycling, non-household sources (residual + recycling)	2022-2025
- Changing buying habits	3.5% decrease in paper yields in residual and recycling as paper consumption over the last 10 years has decreased at a rate of approximately 3-4% p.a.[3,4]; 1% increase in WEEE separately collected p.a. for 5 years[5,6]	2022-2025
- Full impacts of EPR only	Resource and Waste Policy Impact Calculator (RAWPIC) tool to inform exact % for both residual and dry recycling. EPR to impact residual and dry recycling streams (excluding glass). **EPR (%)** **Recycling / Residual** Barnet 1.9% / -0.7% Camden 7.6% / -2.6% Enfield 3.7% / -1.1% Hackney 3.6% / -1.8% Haringey 5.3% / -2.4% Islington 3.6% / 0.0% Waltham Forest 8.0% / -1.5%	2025
- Food waste (Consistent Collections)	Mandatory food waste collections as part of Consistent Collections agenda. WRAP's Ready Reckoner tool utilised to estimate the increased tonnage of food waste that could be collected for each borough (based on a 'low' yield). **Food waste tonnage 2025, increasing with household numbers thereafter** Barnet 9,411 Camden 5,067 Enfield 11,196 Hackney 6,705 Haringey 6,983 Islington 6,363 Waltham 6,182	2025-2050
Projection C		
GLA population projections	Population projections from the GLA have been used as the basis for waste yields and tonnage projections	2022-2050
Changes in housing stock	As Projection A **Recycling**: -51.33% / **Residual**: +42.29%	2022-2050
- Full impacts of DRS/EPR (RAWPIC tool to inform exact % for both residual and dry recycling)	DRS and EPR to impact residual and dry recycling streams (excluding glass) **DRS & EPR (%)** **Recycling / Residual** Barnet -0.1% / -1.3% Camden 5.2% / -4.2% Enfield 1.1% / -1.9% Hackney 0.8% / -3.3% Haringey 2.6% / -3.9% Islington 0.9% / -0.8% Waltham 3.6% / -2.3%	2025
- Changing buying habits	As for Projection B	2022-2025
- Public spending reductions c.17% decrease in arisings per person over 5 years	As for Projection B	2022-2025
- Food waste (Consistent collections)	As for Projection B	2025-2050
- Doubling resource productivity	0.76 % decrease p.a. to all waste yields[7,8] based on data in WRAP report on doubling resource productivity	2022-2050
Projection D		
GLA population projections	Population projections from the GLA have been used as the basis for waste yields and tonnage projections	2022-2050
Changes in housing stock	**Recycling**: -5% / **Residual**: +5%	2022-2050
- Full impacts of DRS/EPR (RAWPIC tool to inform exact % for both residual and dry recycling)	DRS and EPR to impact residual and dry recycling streams (excluding glass) **DRS & EPR (%)** **Recycling / Residual** Barnet -0.1% / -1.3% Camden 5.2% / -4.2% Enfield 1.1% / -1.9% Hackney 0.8% / -3.3% Haringey 2.6% / -3.9% Islington 0.9% / -0.8% Waltham 3.6% / -2.3%	2025

[1] All impacts applied to yields per person, except for trade waste (as that cannot be normalized to the population of the area)
[2] https://www.pwc.com/gx/en/world-2050/assets/pwc-the-world-in-2050-full-report-feb-2017.pdf
[3] https://www.ofcom.org.uk/__data/assets/pdf_file/0027/241947/News-Consumption-in-the-UK-2022-report.pdf
[4] https://thecpi.org.uk/library/PDF/Public/Publications/Reports/CPI%20EVR3%202021%20Final.pdf
[5] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1165119/EIR2023_11437_Response_Redacted_Accessible.pdf
[6] https://b2bcompliance.org.uk/news/2023-household-weee-collection-targets-confirmed/#:~:text=The%20government%20has%20released%20the,of%20WEEE%20collected%20in%202022.
[7] https://wrap.org.uk/sites/default/files/2022-09/WRAP%20Resource%20Productivity%20Policy%20Pathways_Version5_0.pdf
[8] https://www.nao.org.uk/wp-content/uploads/2023/06/governments-resources-and-waste-reforms.pdf

<table>
<tr><th>Assumption</th><th>Detail[1]</th><th>Impact duration</th></tr>
<tr><td>- Changing buying habits</td><td>As for Projection B</td><td>2022-2025</td></tr>
<tr><td>- Public spending reductions c.17% decrease in arisings per person over 5 years</td><td>As for Projection B</td><td>2022-2025</td></tr>
<tr><td>- Food waste (Consistent collections)</td><td>As for Projection B</td><td>2025-2050</td></tr>
<tr><td>- Doubling resource productivity</td><td>0.76 % decrease p.a. to all waste yields[9,10] based on data in WRAP report on doubling resource productivity</td><td>2022-2050</td></tr>
<tr><td>- Increased recycling performance to best practice urban levels</td><td>Yield uplift (p.a.) applied to dry recycling yields (%)
<table><tr><th></th><th colspan="2">To 2035</th><th colspan="2">After 2035</th></tr><tr><th></th><th>Street level</th><th>Flats</th><th>Street level</th><th>Flats</th></tr><tr><td>Kerbside</td><td>5%</td><td>7.5%</td><td>1%</td><td>2%</td></tr><tr><td>Bring banks & street litter recycling</td><td>-</td><td>[7.5%]</td><td>-</td><td>[2%]</td></tr><tr><td>Trade</td><td>-</td><td>[7.5%]</td><td>-</td><td>[2%]</td></tr><tr><td>RRC</td><td>[5%]</td><td>-</td><td>[1%]</td><td>-</td></tr></table>
A proportion (3% rising to 5%) of kerbside residual waste is also to assumed recycled from 2025 onwards as pre-treatment prior to EfW and / or recycling of metals from bottom ash, is assumed to have slight enhanced recovery of dry recycling.</td><td>2022-2050</td></tr>
<tr><td colspan="3">Projection E</td></tr>
<tr><td>GLA population projections</td><td>Population projections from the GLA have been used as the basis for waste yields and tonnage projections</td><td>2022-2050</td></tr>
<tr><td>Changes in housing stock</td><td>As Projection A
<table><tr><th>Recycling</th><th>Residual</th></tr><tr><td>-51.33%</td><td>+42.29%</td></tr></table></td><td>2022-2050</td></tr>
<tr><td>- Full impacts of DRS/EPR (RAWPIC tool to inform exact % for both residual and dry recycling)</td><td>DRS and EPR to impact residual and dry recycling streams (excluding glass)
<table><tr><th colspan="3">DRS & EPR (%)</th></tr><tr><th></th><th>Recycling</th><th>Residual</th></tr><tr><td>Barnet</td><td>-0.1%</td><td>-1.3%</td></tr><tr><td>Camden</td><td>5.2%</td><td>-4.2%</td></tr><tr><td>Enfield</td><td>1.1%</td><td>-1.9%</td></tr><tr><td>Hackney</td><td>0.8%</td><td>-3.3%</td></tr><tr><td>Haringey</td><td>2.6%</td><td>-3.9%</td></tr><tr><td>Islington</td><td>0.9%</td><td>-0.8%</td></tr><tr><td>Waltham</td><td>3.6%</td><td>-2.3%</td></tr></table></td><td>2025</td></tr>
<tr><td>- Changing buying habits</td><td>As for Projection B</td><td>2022-2025</td></tr>
<tr><td>- Public spending reductions c.17% decrease in arisings per person over 5 years</td><td>As for Projection B</td><td>2022-2025</td></tr>
<tr><td>- Food waste (Consistent collections)</td><td>As for Projection B</td><td>2025-2050</td></tr>
<tr><td>- Doubling resource productivity</td><td>0.76 % decrease p.a. to all waste yields[11,12] based on data in WRAP report on doubling resource productivity</td><td>2022-2050</td></tr>
<tr><td>- Mayor of London / GLA Targets Delivered</td><td>Recycling increased to achieve targets at a Borough level of: LACW recycling rate of 50% by 2025[13], Household recycling rate of 45% by 2025, 65% MSW recycling rate target for London by 2030[14]</td><td>2022-2050</td></tr>
</table>

[9] https://wrap.org.uk/sites/default/files/2022-09/WRAP%20Resource%20Productivity%20Policy%20Pathways_Version5_0.pdf
[10] https://www.nao.org.uk/wp-content/uploads/2023/06/governments-resources-and-waste-reforms.pdf
[11] https://wrap.org.uk/sites/default/files/2022-09/WRAP%20Resource%20Productivity%20Policy%20Pathways_Version5_0.pdf
[12] https://www.nao.org.uk/wp-content/uploads/2023/06/governments-resources-and-waste-reforms.pdf
[13] https://www.london.gov.uk/who-we-are/what-london-assembly-does/questions-mayor/find-an-answer/london-recycling-rates#:~:text=My%2050%25%20recycling%20rate%20target,LACW%20recycling%20rate%20was%2029.9%25.
[14] https://www.london.gov.uk/sites/default/files/london_environment_strategy_0.pdf

2 Projection Outputs

2.1 Projections at NLWA level

As shown in the figures below, the local authority collected waste (LACW) tonnage arisings under the five projections vary considerably, from current arisings of around 820,000tpa to over 1.1m tpa in the high growth projection by 2050. The arisings for Projections C, D and E are the same, hence not visible in the chart.

2.1.1 Total NLWA arisings

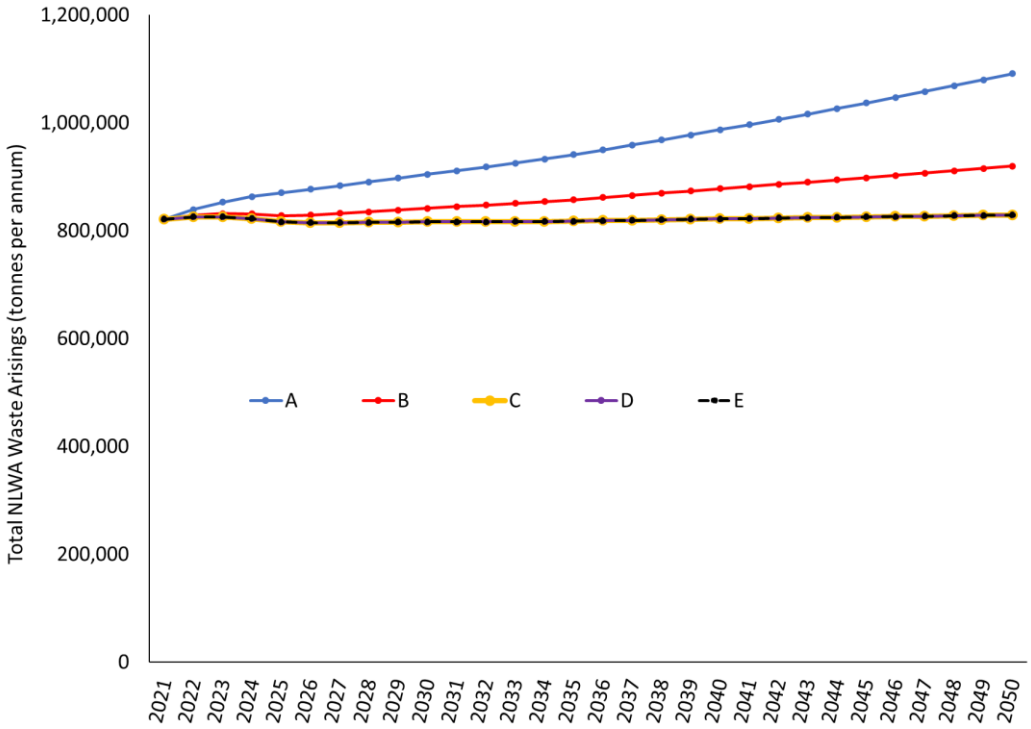

Figure 1 – Total LACW arisings for North London

Figure 1 shows the total LACW arisings for all North London Boroughs combined.

- For all projections, population growth is the largest driving factor in growth.
- Due, in a large part to the GDP-driven growth assumption, projection A has the highest tonnage, followed by B and C/D/E.
- Projection B results in lower tonnages than A due to the waste minimisation effect of public spending reductions and that economic growth is only a factor on the trade (commercial) waste collections.
- Projection E gives a flat growth profile due to a lack of any GDP-driven growth paired with public spending reductions, buying habits as well as full DRS & EPR impacts and waste minimisation introduced with a doubling resource productivity.
- As projections D and E build upon projection C in terms of recycling performance, the total arisings for these are identical to that within C.

2.1.2 Recycling rate

Local Authority Collected Waste

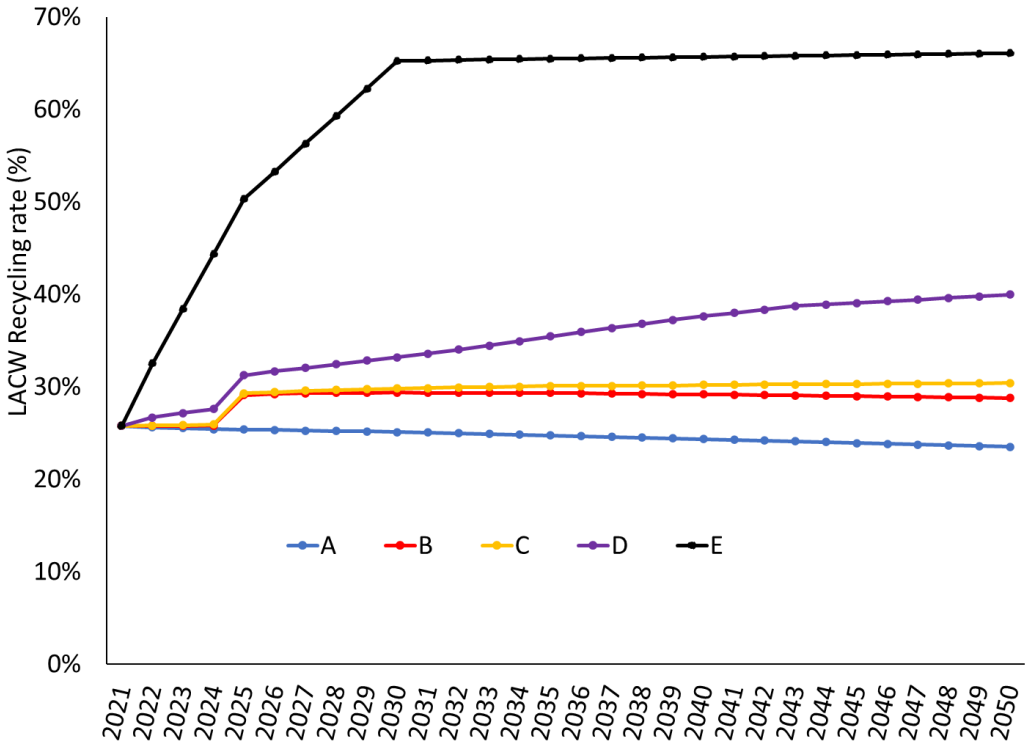

Figure 2 – LACW Recycling rate for North London

Household Waste

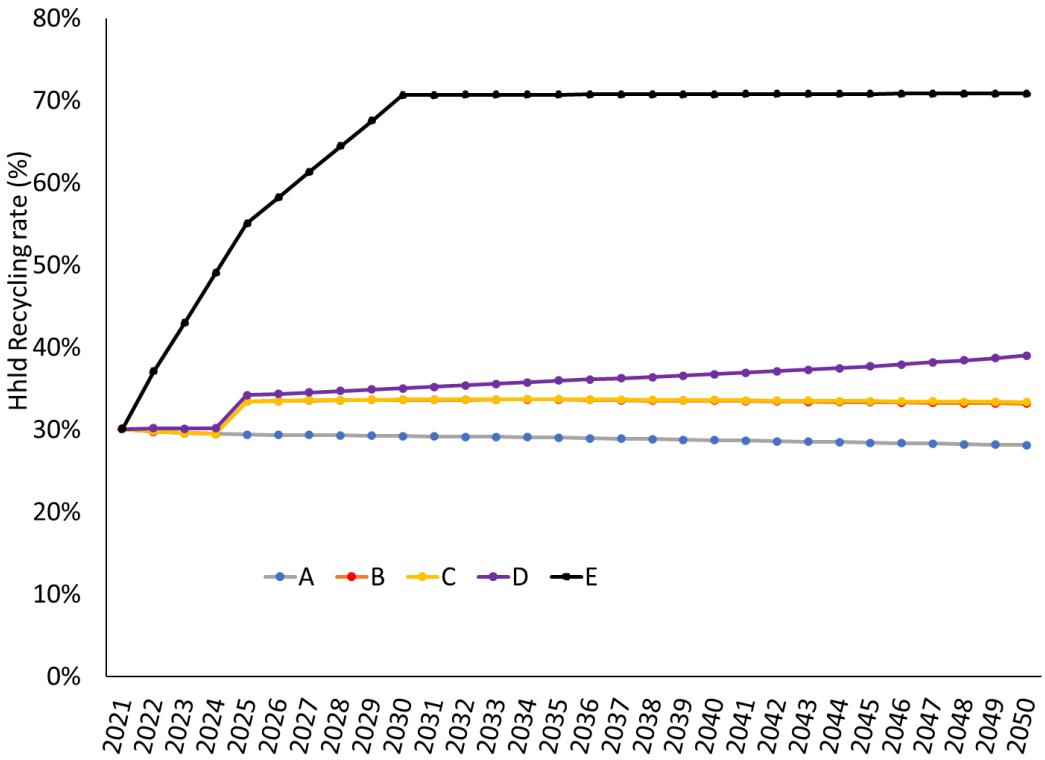

Figure 3 – Household waste recycling rate for North London

Figure 2 and

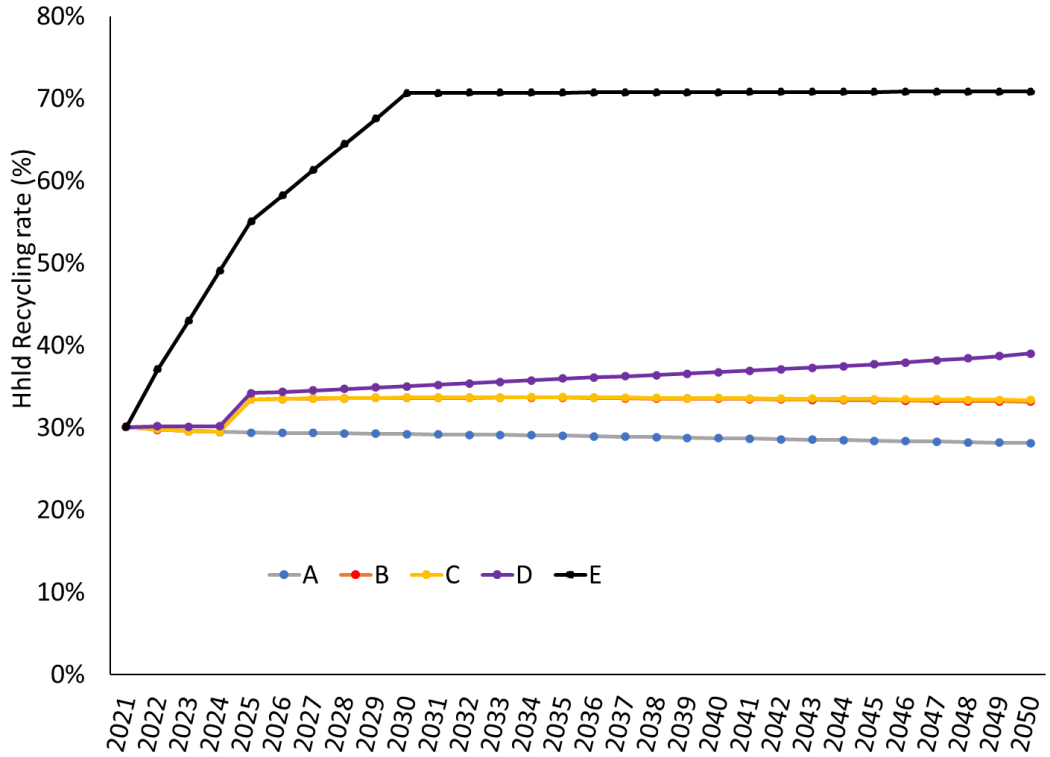

Figure 3 shows the LACW and household waste recycling rates for North London from each of the projections.

- The recycling rates for each of the projections vary considerably.
- A slight drop in the recycling rate for Projection A occurs as the GDP-driven growth also increases the tonnage of waste types that are not recycled in some Boroughs (e.g., trade waste).
- For Projection B, introduction of food waste in Barnet and increases in food waste tonnage collected in other Boroughs as part of consistent collections results in a step change in the recycling rate. In addition, EPR-only measures increase the tonnage of recycling and slightly decreases the tonnage of residual waste which benefits the recycling rate.
- Within Projections C, D and E, the full suite of DRS & EPR measures paired with doubling resource productivity and lack of GDP-related growth has beneficial impact on the recycling rate. Introduction of food waste as part of consistent collections again has a positive step-change in recycling rate.
- Within Projection D, the increased recycling performance from decrease in rejected recycling loads at the MRF, increased participation from residents and increased recycling of trade and RRC waste has a sustained beneficial impact on recycling performance. This would reach a c.40% household waste recycling rate by the end of the modelled period, but has significant recycling growth rates of included (as per table 2)
- In Projection D, another way to reach 40% recycling rate would be to increase recycling of the residual waste prior to disposal. A staggered contribution from residual waste recycling is also included to support achievement of a 40% recycling rate across North London, this comes in at 3% and rises to 5%, and could include

metals from the Incinerator Bottom Ash (on the waste from households recycling measure) or recycling from a dirty MRF or pre-treatment before EfW.

- In Projection E, the LACW targets set by the Mayor of London and the GLA have been projected and prescribed to all waste types and the tonnage has been shifted from the residual to the recycled waste streams.

The Mayor of London household waste recycling target of 50% by 2025 is modelled as met under Projection E, but not in the other projections.

2.2 Projection A – Borough-level

Figure 4 and Figure 5 summarise the waste arisings and recycling rates in each of the Boroughs for Projection A.

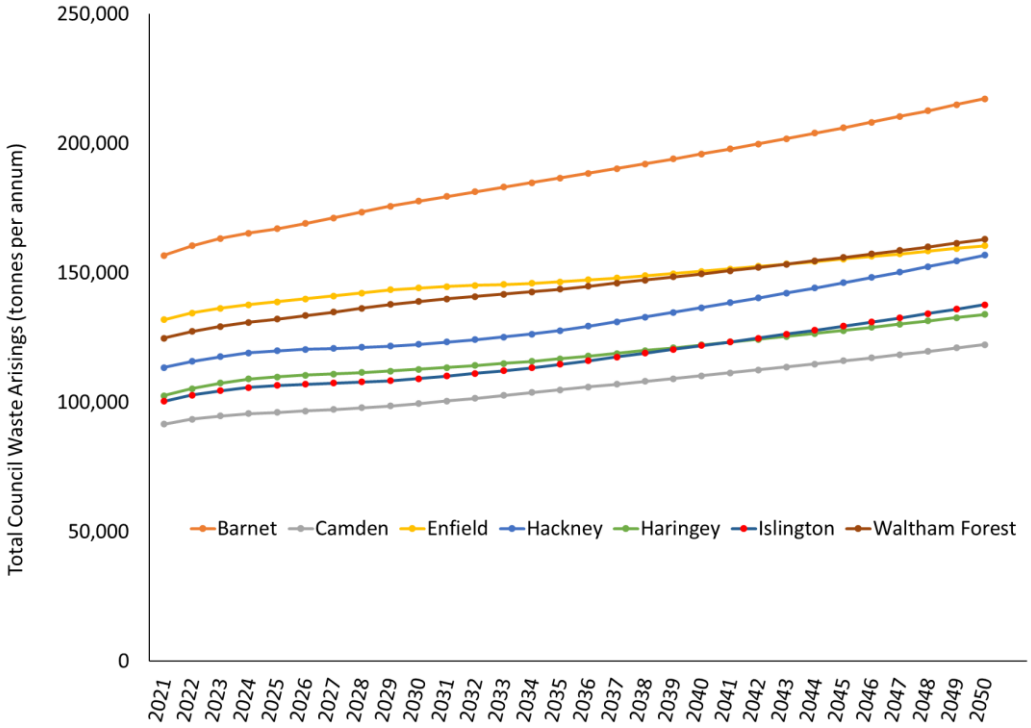

Figure 4 - Projection A: Total LACW arisings for each Borough

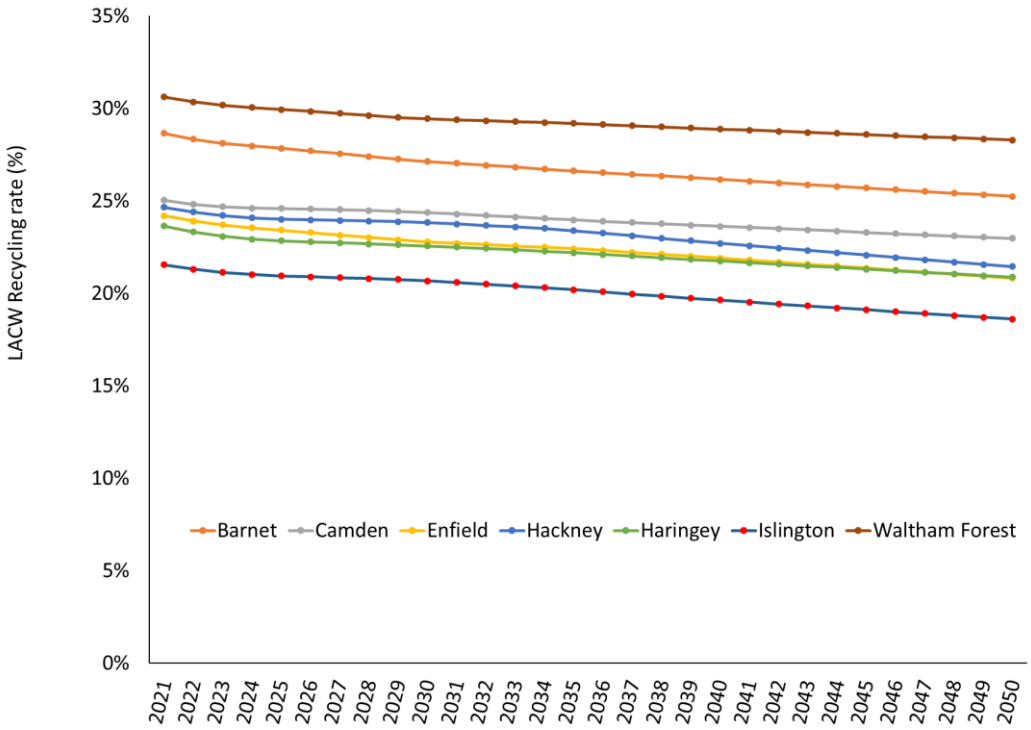

Figure 5 - Projection A: LACW Recycling rate for each Borough

Projection A shows:

- Increase in total arisings of all Boroughs is obtained, this is due to the population increase as well as GDP-related growth that impacts all waste streams.
- The recycling rate either remains relatively stable or decreases slightly. This is due to GDP-driven growth increasing the tonnage of waste types that are not recycled in some Boroughs (e.g., trade)

2.3 Projection B – Borough-level

Figure 6 and Figure 7 summarise the waste arisings and recycling rates in each of the Boroughs for Projection B.

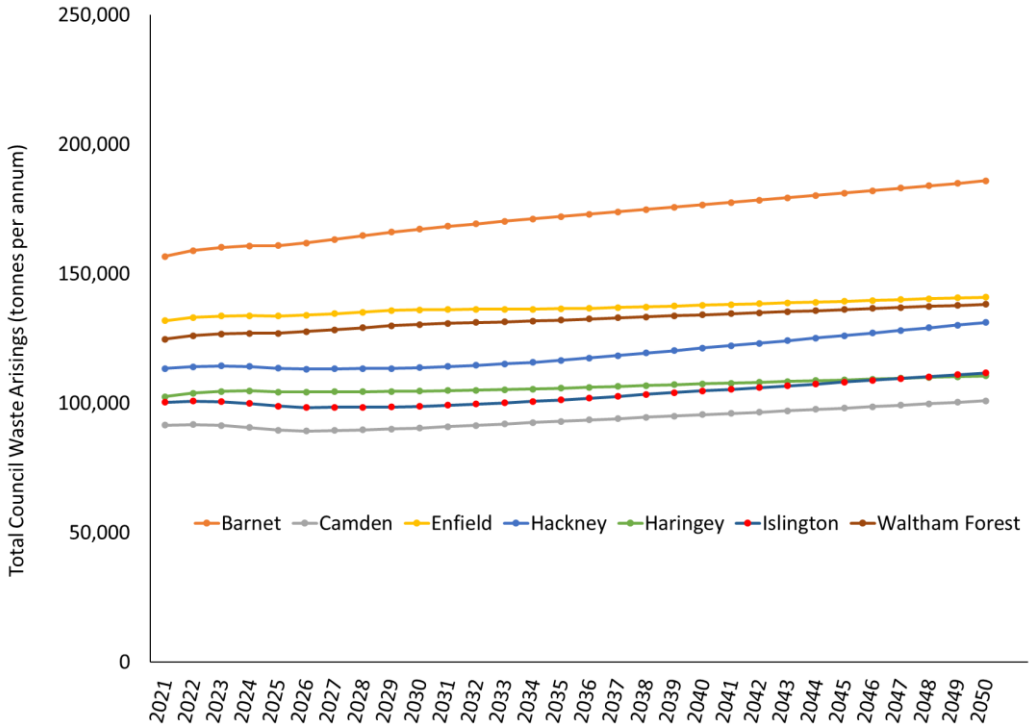

Figure 6 – Projection B: Total arisings for each Borough

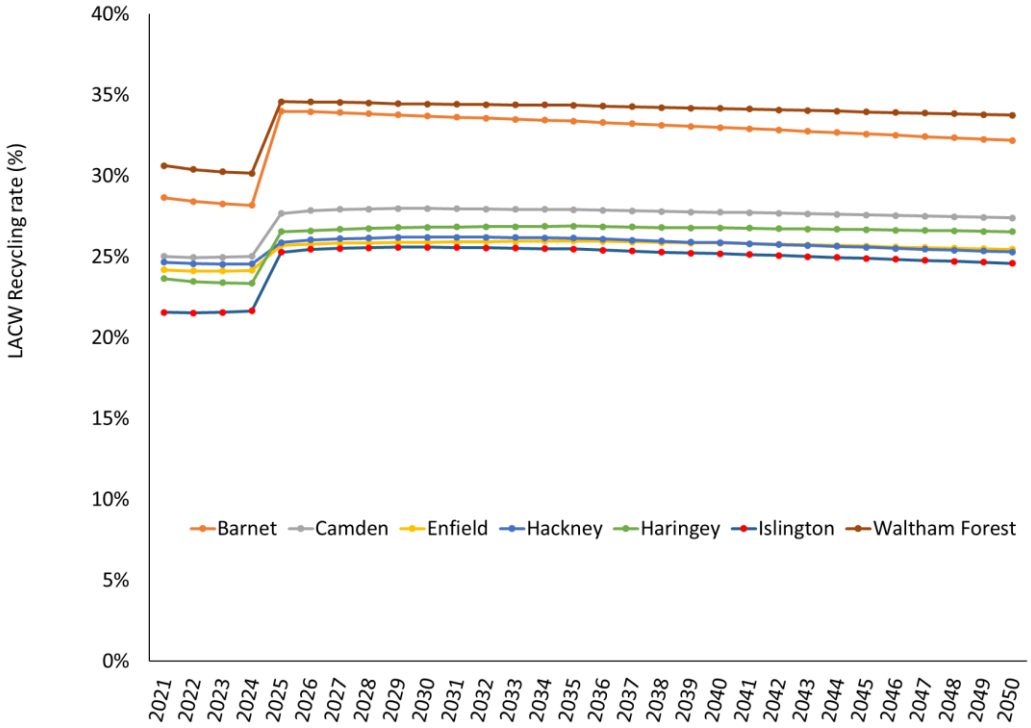

Figure 7 – Projection B: Recycling rate for each Borough

Projection B shows:

- Population projections increase the tonnage in all the Boroughs. However, public spending reductions measures that occur for the first 5 years of this projection have a significant moderating impact on tonnage for all Boroughs.
- Increasing food waste tonnages and EPR increase in dry recycling and decrease in residual waste beneficially impacts the recycling rate of all Boroughs. It is very much more pronounced as a step change in Boroughs that do not collect food waste currently or only collect a very low tonnage.

2.4 Projection C – Borough-level

Figure 8 and Figure 9 summarise the waste arisings and recycling rates in each of the Boroughs for Projection C.

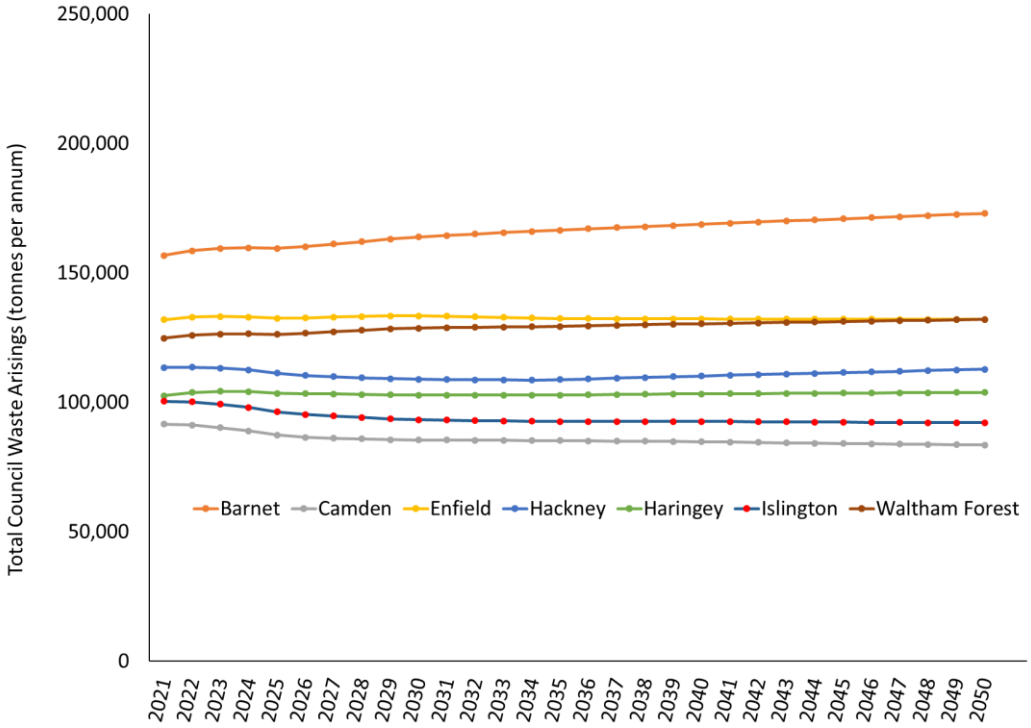

Figure 8 - Projection C: Total arisings for each Borough

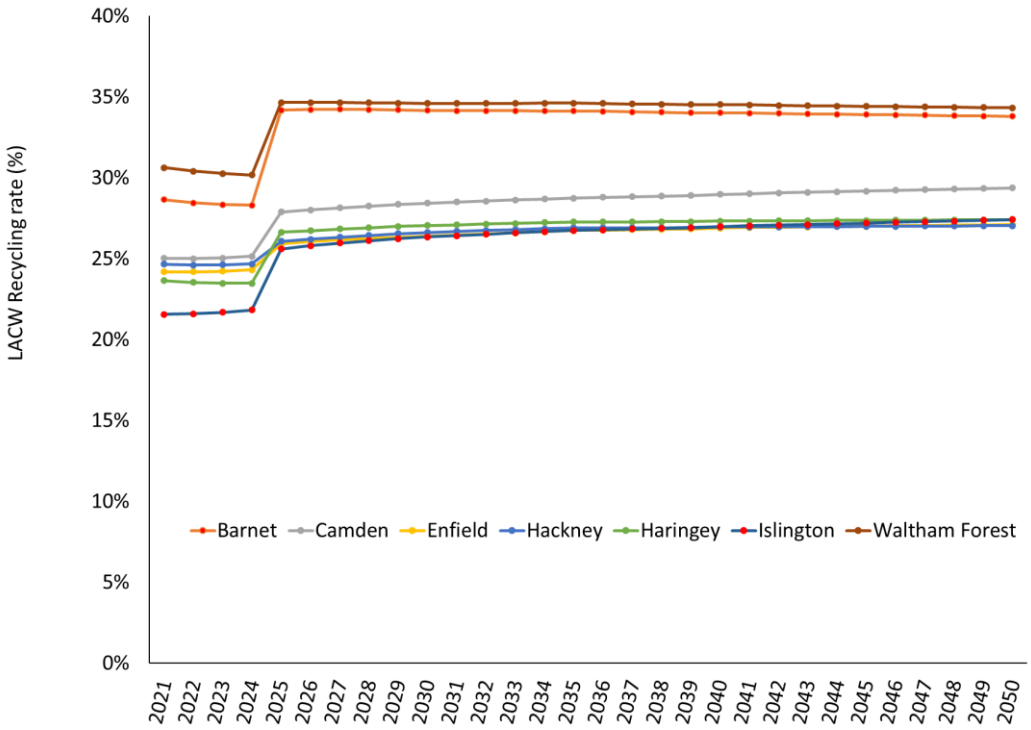

Figure 9 - Projection C: Recycling rate for each Borough

Projection C shows:

- Population projections increase the tonnage in all the Boroughs. However, public spending reduction measures that occur for the first 5 years of this projection paired with doubling resource productivity (waste minimisation measure) & lack of GDP-related growth have a significant moderating impact on tonnage for all Boroughs.
- Increasing food waste tonnages and the full suite of DRS & EPR-related measures result in an increase in increase in dry recycling and decrease in residual waste beneficially impacts the recycling rate of all Boroughs. It is very much more pronounced as a step change in Boroughs that do not collect food waste currently or only collect a very low tonnage.

2.5 Projection D – Borough-level

Figure 10 and Figure 11 summarise the waste arisings and recycling rates in each of the Boroughs for Projection D.

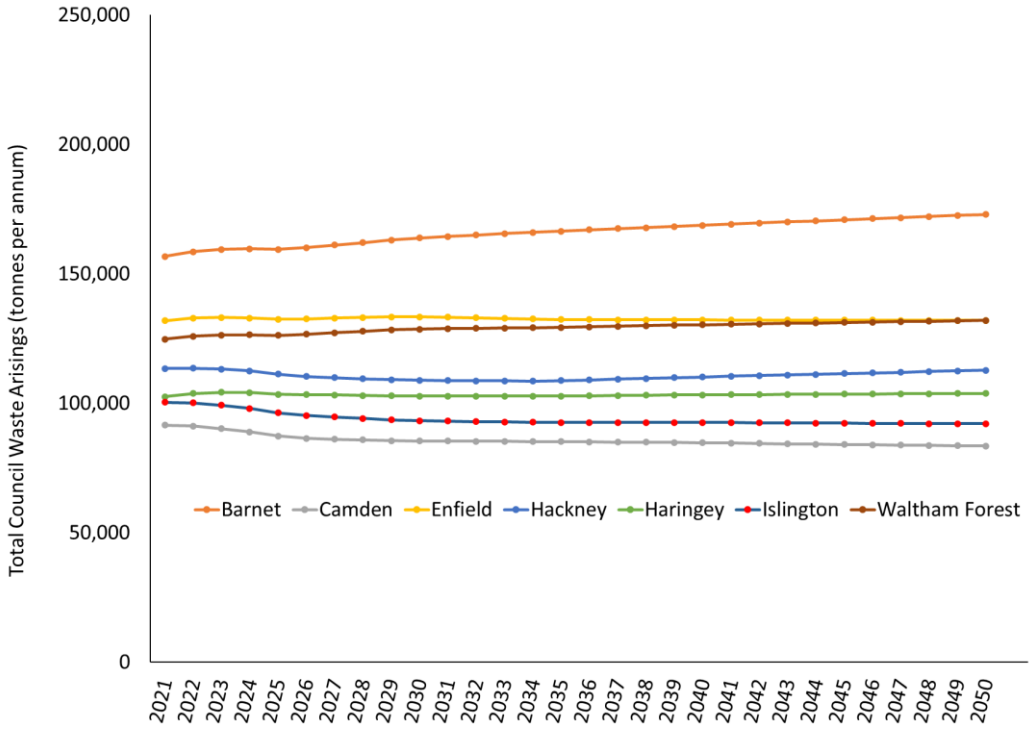

Figure 10 - Projection D: Total arisings for each Borough

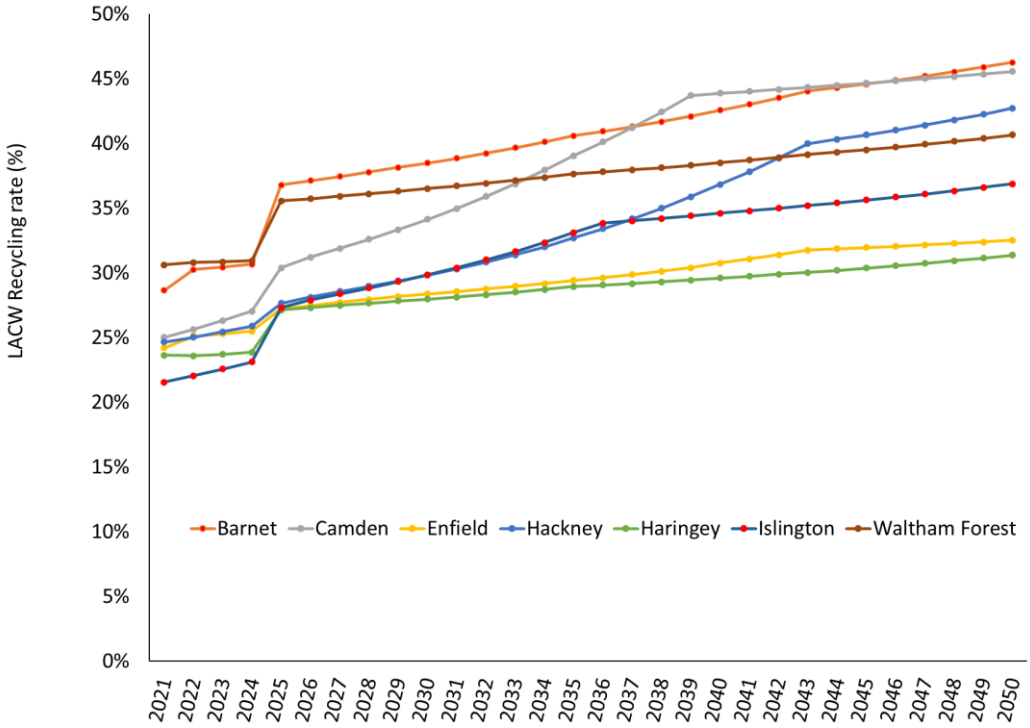

Figure 11 - Projection D: Recycling rate for each Borough

Projection D shows:

- Population projections increase the tonnage in all the Boroughs. However, public spending reduction measures that occur for the first 5 years of this projection paired with doubling resource productivity (waste minimisation measure) & lack of GDP-related growth have a significant moderating impact on tonnage for all Boroughs.
- Increasing food waste tonnages and increased recycling contribution from all waste streams has sustained beneficial impacts on the recycling rate. This is combined with some residual waste recycling to takes NLWA LACW recycling rate up to c. 40%.
- The differing rate of recycling growth between Councils is a factor of the current performance, housing growth, the performance of flats, the DRS / EPR differential (based on composition) and the food waste performance differential between the baseline to good practice levels.

2.6 Projection E – Borough-level

Figure 12 and Figure 13 summarise the waste arisings and recycling rates in each of the Boroughs for Projection E.

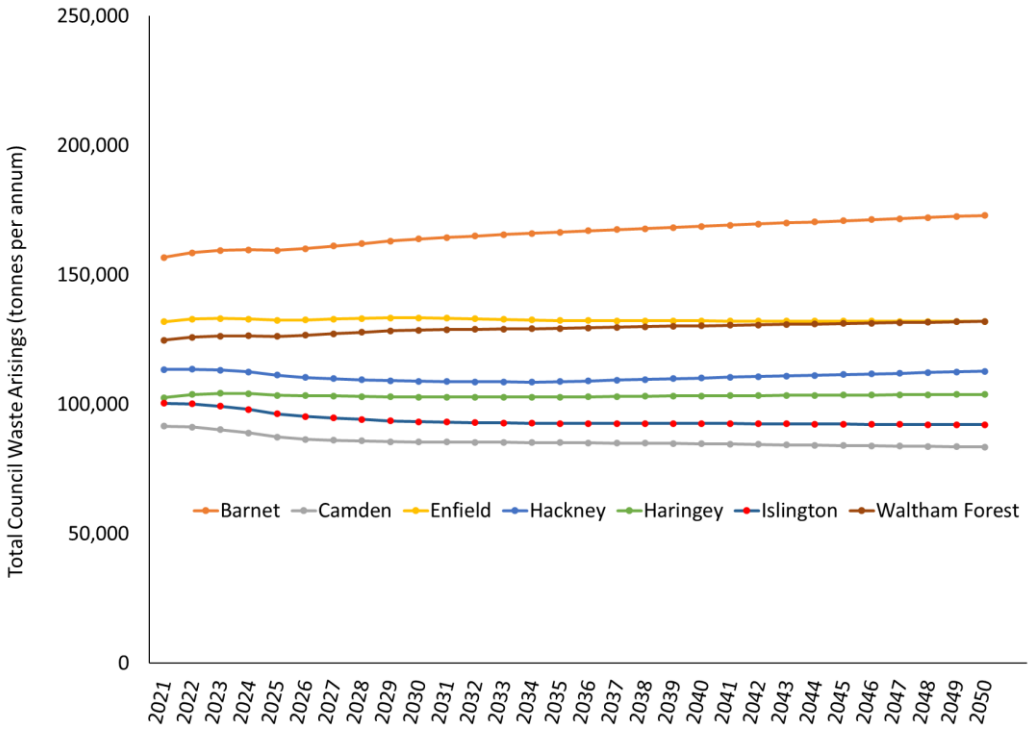

Figure 12 - Projection E: Total LACW arisings for each Borough

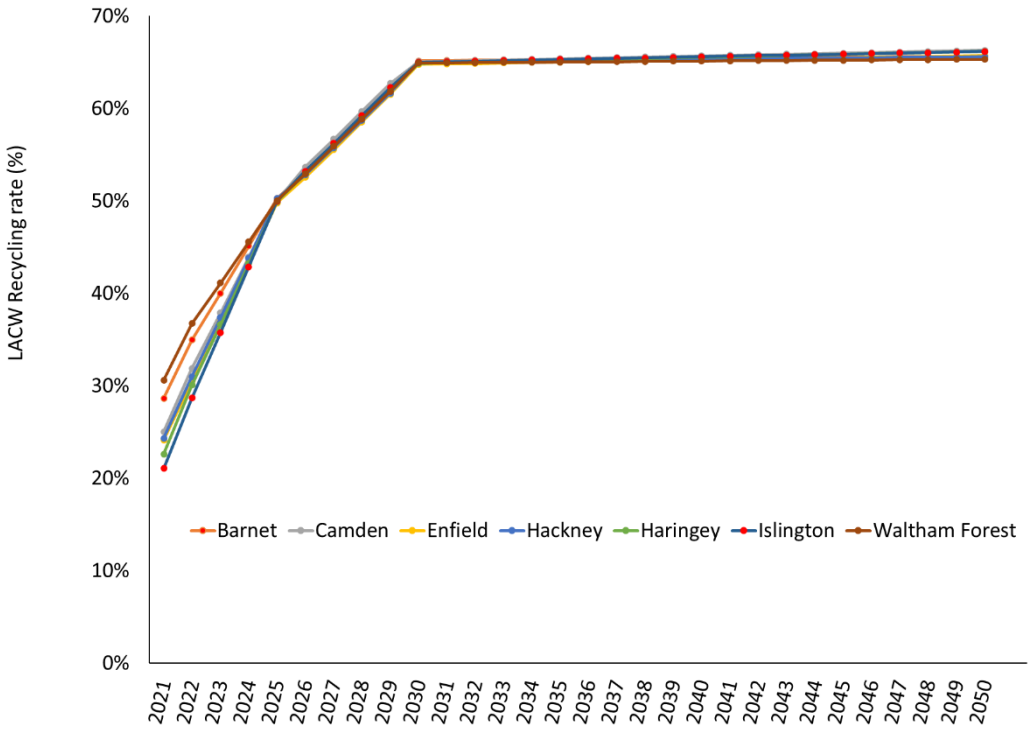

Figure 13 - Projection E: LACW Recycling rate for each Borough

Projection E shows:

- Tonnage for all Boroughs remains relatively steady. This is due to public spending reductions and doubling resource productivity acting as waste minimisation measures, whilst no GDP-related growth factors are included.
- The LACW recycling rate targets have also been met for all Boroughs by prescriptive application of the recycling rate target in the year by which it is supposed to come in. Linear increases up to the target levels are set. All waste streams contribute to the targets.

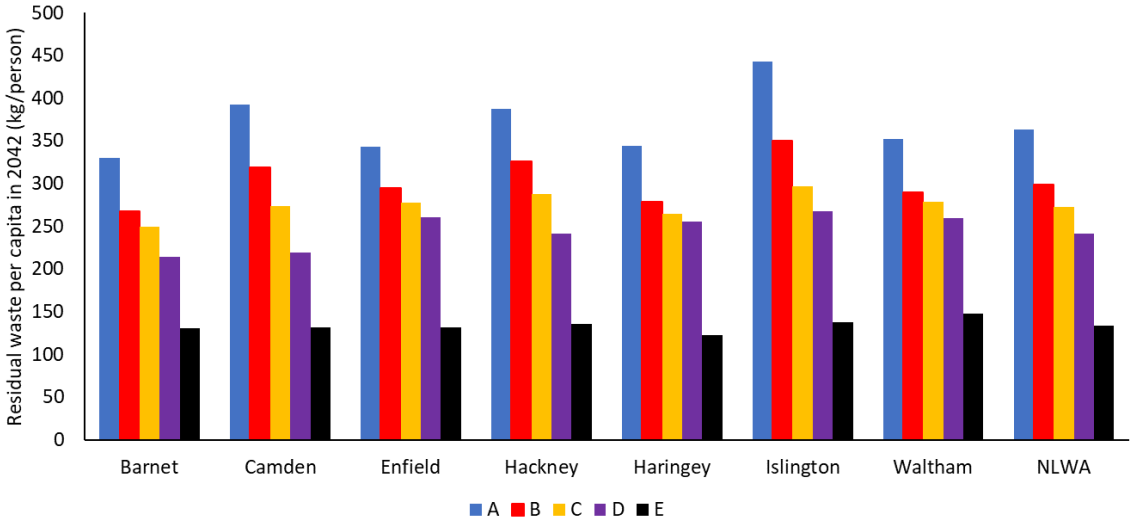

Figure 14 - Residual LACW per capita in 2042

3 Summary

This briefing note details the approach and assumptions used in the development of projections for NLWA's potential waste arisings up to 2050. The projections as modelled give a range of waste arisings and recycling rates. Potential total arisings range from current figures of c.820ktpa to over 1m tpa by 2050:

- In the low tonnage growth, high recycling rate projection (Projection E), total arisings are expected to remain relatively static, increasing from current levels of c.820ktpa to c.830ktpa over the modelled period, while achieving the LACW recycling rate and residual waste targets. Residual waste arisings are expected to halve from around 600ktpa to c.280ktpa.
- In the low tonnage growth, best-practice recycling rate projection (Projection D), total arisings increase from current levels to c.830ktpa over the modelled period. The LACW recycling rate increases to c.40%. Residual waste arisings are also low at c. 500ktpa.
- In the low tonnage growth, enhanced recycling rate projection (Projection C), total arisings increase from current levels to c. 830ktpa over the modelled period. The LACW recycling rate increases to c.30.3%. Residual waste arisings are expected to be c.575ktpa.

- In the medium tonnage growth, medium recycling rate projection (Projection B), total arisings increase from current levels to c.920ktpa over the modelled period. The LACW recycling rate falls to c.28%. Residual waste arisings are expected to be c. 650ktpa.
- In the high tonnage growth, modest recycling rate projection (Projection A), total arisings are expected to grow by c.15% from the current levels by 2050, to over 1m tpa, accompanied by a reduction in LACW recycling rate to c.23%, primarily driven by the assumption that all new households will be flats which have a lower recycling performance than street level properties. Residual waste arisings are modelled to increase to c.830ktpa, largely driven by the assumption that arisings would grow in line with GDP in this projection.

While economic growth may impact waste arisings, the primary waste growth factor is expected to be due to increases in population. Growth in waste can be moderated by increases in waste reduction, minimisation and recycling activities across all waste streams managed by NLWA and the respective Borough Councils.

I. Appendix A

A Projection modelling assumptions

3.1.1 Population growth

GLA provide population projections for all London Boroughs.[15] These have been taken into account for all the boroughs for projections.

3.1.2 Housing Stock Makeup

Housing stock breakdown has been received from the following Boroughs as shown in the table below. Housing stock and tonnage splits were received from Barnet, Enfield and Hackney. For the remainder of the Boroughs, the tonnage splits were assumed based on how closely they matched the split in properties with these three Boroughs for which data were received.

Table 3 - Property & Tonnage Splits

Authority	Property Type	Split of Properties (%)	Dry Recycling (%)	Residual waste (%)
Barnet	Flats	29	6.5	24
	Houses	71	93.5	76
Enfield, Haringey & Waltham Forest	Flats	31	38.8	38.8
	Houses	69	61.2	61.2
Hackney, Camden & Islington	Flats	50	39.71	62.7
	Houses	45	60.29	37.3
	Flats Above Shops	5	-	-

As seen above, there are significant differences between tonnage splits from flats and houses. It is reasonable to assume that in the coming years, the housing split may shift more towards flats and apartments as land space becomes further constrained. From the data above, generally lower levels of recycling are reported from flats, as presumably their capacity and ease of access when it comes to putting out recycling are slightly lower than those of houses. In general, flats also tend to have a smaller number of people per property.

Approach adopted for all projections is to use the housing stock and tonnage split data as above for all projections to demonstrate that all new properties are flats from 2022-2050.

3.1.3 Economic growth/GDP – all waste streams

Gross Domestic Product (GDP) projections up to 2050[16] suggest an approximate UK growth of 1.8% per annum. While there is little evidence that current waste arisings are related to GDP, a cautious approach has been adopted in the projections to provide a high estimate of arisings and this could be considered 'worst case'.

Approach adopted for Projection A is to apply 1.8% growth per annum in waste yields for all waste streams to 2050, and for Projection B to apply 1.8% per annum tonnage growth to trade waste only (in the absence of individual trade waste business plans).

[15] https://www.data.gov.uk/dataset/faff5c12-c85c-4639-875f-7b176027c51c/housing-led-population-projections

[16] https://www.pwc.com/gx/en/world-2050/assets/pwc-the-world-in-2050-full-report-feb-2017.pdf

3.1.4 Public spending reductions

Periods of public spending reductions and the cost of living, can have a direct impact on waste arisings, particularly from households. From a consumer perspective, public spending reductions may influence purchasing behaviours, scaling back on additional items. At a Local Authority level, public spending reductions can impact on the delivery of strategies, for example, reduced budgets to help achieve some objectives, reduced Central Government spending which may lead to a reduction in resources (for example, on communications budgets). We have carried out data analysis on published waste statistics for England from 2000 to 2020, which covers the previous 2009(??) recession. From the data, we have determined public spending reductions impacts on tonnage per person to be around 17% reduction for a period of 5 years from the start of public spending reductions.

Approach adopted for Projections B, C, D, E is to apply a 17% reduction in yield for a period of 5 years from 2022 for all waste streams.

3.1.5 Changes in buying habits (WEEE & paper)

The government has implemented a target for collection of WEEE for 2023, which is 1% higher than the amount of WEEE collected in 2022. These targets historically have fluctuated depending on national performance.

Adopted approach for Projections B, C, D, E is to apply a 1% composition change to WEEE which is taken from the residual for a period of 5 years from 2022-2025.

With changes in how consumers and residents receive their news, as well as generally lesser use of paper with advancement of technology, it is projected that consumption of paper is likely to decrease.

Adopted approach for Projections B, C, D, E is to apply a 3.5% reduction of total paper tonnage from 2021-2025.

3.1.6 Packaging EPR Measures

Reforming the UK packaging extended producer responsibility (EPR) system aims to achieve better design of packaging (e.g. through increasing recycled material content, improving recyclability of packaging products, light-weighting of material or producing refillable packaging). It is therefore assumed that more packaging items are able to be recycled and/or diverted from the residual waste stream. EPR for packaging is expected to come into effect from 2025.

The Resource and Waste Policy Impact Calculator (RAWPIC) [17] tool uses a series of assumptions to model the impact of a Deposit Return Scheme and packaging EPR, some inbuilt within the model and others which are 'user defined'. For the purposes of the waste projections, the RAWPIC tool has been used to calculate the percentage tonnage change on each of the Borough's kerbside dry recycling (by material) and residual collection services.

Adopted approach for Projections B, C, D, E is to apply packaging EPR impacts for kerbside waste from 2025.

3.1.7 Deposit Return Scheme

A Deposit Return Scheme (DRS) aims to improve overall recycling and resource recovery by placing a redeemable deposit on 'in scope' materials. For the purposes of this exercise, it has been

[17] This is a product developed by Suez and Anthesis with support from LARAC and Kent Waste Partnership

proposed that the DRS system implemented will exclude glass in-line with current thinking, and apply from 2025. The RAWPIC tool has been used to determine the impacts for each of the Boroughs.

Adopted approach for Projection C, D, E is to apply DRS impacts for kerbside waste from 2025, alongside impacts from packaging EPR.

3.1.8 Doubling Resource Productivity

It is projected as the UK economy gets greener, and raw materials are used less, and items are recycled and re-used more, that resource productivity is likely to increase. This has been taken into account as a waste minimisation measure.

Adopted approach for Projection C, D, E is to apply a 0.76% p.a. reduction to all waste streams.

3.1.9 Food waste collections

As part of the Circular Economy package and the Environment Act, the UK needs to improve it's municipal recycling rate considerably by 2035. As part of these measures and circular economy targets, Simpler Recycling of waste streams is likely to be implemented. As part of this, food waste collections for local authorities at the kerbside for households will be mandated.

Adopted approach for Projections B, C, D and E is to use WRAP's Ready Reckoner tool to estimate the increased tonnage of food waste that could be collected for each borough with consistent collections.

3.1.10 Increased performance to best practice urban levels

This measure applies to Projection D only and increases recycling performance to best practice urban levels (whilst recognising the high percentage of flats / estates in North London) by a combination of the following:

- Yield of mixed dry recycling from all properties to increase per property per annum from 2022/23 to 2035/36, with a moderated increase beyond 2035/36. The magnitude of increase was derived from a reduction in rejected loads, an increased participation / material recognition as a result of Simpler Recycling / national measures and some recycling of residual waste and street litter.
- Increasing levels of residual waste recycling.
- It should be noted that the increase above is moderated by the assumption that all new properties will be flats / estates (which have a lower observed recycling performance).
- Within this measure there is also an increase in recycling performance of RRCs across the period to 2035/36, to best practice levels, followed by a modest increase per annum post 2035/36. In addition, increase in trade waste recycling across the period to 2035/36, to best practice levels, followed by a modest increase per annum post 2035/26 is also included.
- Table 2 above details the exact figures used for each stream. Similar performance could be achieved by lower expectations of recycling improvement from householders combined with residual waste recycling by NLWA.
- Increased recycling via pre-treatment of residual waste prior to EfW and / or recycling of metals (on the waste from households recycling rate measure) also results in a sustained increase in recycling. A small increase in dry recycling yields from 2025-2030 (3% p.a.) is carried out. After this, this increases to 5% p.a. for the rest of the projection.

3.1.11 Meeting targets

The relevant targets for NLWA's waste are:

50% Reduction in Residual Waste Arisings per Capita by 2042

In November 2021, the Environment Act 2021 came into force. Alongside other measures such as separate food waste collections, the Act included a further statutory target relating to a reduction in waste arisings of 50% by 2042, i.e., 287 kilograms per capita by 2042. The modelling also reports residual waste per capita as an output (noting that the Environment Act target is wider than the wastes within this model).

Mayor of London's Targets

As stipulated in the London Environment Strategy the following targets for London Boroughs have been set[18]:

- LACW recycling rate of 50%
- Household recycling rate of 45% by 2025
- 65% MSW recycling rate target for London by 2030

Adopted approach for Projection E is to increase recycling levels such that the recycling targets are met. This is a notional adjustment to the recycling tonnages, and actual tonnages are likely to differ in reality.

[18] https://www.london.gov.uk/sites/default/files/rrp_guidance_note_economy_10feb2022.pdf

II. Appendix B

Data provided by all Boroughs for the modelling exercise is listed in the tables below for 2021-22:

Kerbside:	Barnet	Camden	Enfield	Hackney	Haringey	Islington	Waltham Forest
Residual	88,183	34,246	75,657	54,864	54,551	40,717	68,558
DMR	27,554	11,795	15,922	15,422	14,992	12,522	18,970
Garden	12,112	1,765	6,611	2,347	2,565	1748	12,810
Food	0	2,766	9,064	5,203	3,636	2,868	465
Bulky	1,030	3,690	0	0	2,113	0	2,007
Total	128,879	54,262	107,254	77,368	77,857	57,855	102,810
Recycling rate	**30.8%**	**30.1%**	**29.5%**	**29.5%**	**27.2%**	**29.6%**	**31.4%**
Other							
Street Litter	5,778	4,123	2,712	5,271	2,416	2,961	3,706
Bring banks	0	406	172	543	79	218	260
Flytipped	1,247	9,073	14,212	8,184	13,930	15,398	4,107
Total	7,025	13,602	17,096	13,998	16,425	18,577	8,073
Recycling rate	**0.0%**	**3.0%**	**1.0%**	**3.9%**	**0.5%**	**1.2%**	**3.2%**
Trade:							
Residual	9,472	15,280	7,263	16,086	2,288	18,214	1,497
DMR	0	3,748	0	2,662	515	2,545	0
Food	0	272	0	880	45	387	0
Bulky	0	0	0	0	0	0	0
Total	9,472	19,300	7,263	19,628	2,848	21,146	1,497
Recycling rate	**0.0%**	**20.8%**	**0.0%**	**18.0%**	**19.7%**	**13.9%**	**0.0%**
RRC:							
Residual	3,177	1,051	86	545	1,626	749	3,468
DMR	1,782	848	49	305	592	583	1,945
Garden	1,352	520	37	232	766	264	1,476
Bulky	8	11	0	1	77	7	8
Wood	2,765	1,036	75	474	1,383	658	3,018
Plasterboard	122	48	3	21	85	35	133
Rubble & soil	2,079	816	57	356	822	505	2,269
Misc	3	1	0	1	7	2	3
Total	11,288	4,331	307	1,935	5,358	2,052	12,321
Recycling rate	**34%**	**38.9%**	**34%**	**34%**	**29.9%**	**36.9%**	**34%**
Grand Total	156,664	91,494	131,920	112,929	102,487	99,630	124,701
Household Waste Recycling rate	**31.19%**	**30.3%**	**28.91**	**28.64%**	**27.88%**	**29.52%**	**32.69%**
LACW Recycling rate	**27.32%**	**24.18%**	**24.15%**	**24.02%**	**22.63%**	**21.21%**	**28.81%**