

City of London Corporation

Waste Arisings and Waste Management Capacity Study review 2016

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City of London Corporation

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Abbreviations and Glossary

Acronym	Definition
ABP	Animal By-Products
AD	Anaerobic Digestion
C&I	Commercial and Industrial Waste
CD&E	Construction, Demolition and Excavation Waste
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EIA	Environmental Impact Assessment
EWC	European Waste Code
GLA	Greater London Authority
HWDI	Hazardous Waste Data Interrogator
ILW	Intermediate Level Radioactive Waste
IVC	In-Vessel Composting
IWMF	Integrated Waste Management Facility
LACW	Local Authority Collected Waste
LDF	Local Development Framework
LLW	Low Level Radioactive Waste
LWPF	London Waste Planning Forum
MBT	Mechanical Biological Treatment
MHT	Mechanical Heat Treatment
MRF	Materials Recycling Facility
MSW	Municipal Solid Waste
SOC	Substance Oriented Classification
TfL	Transport for London
tpa	Tonnes Per Annum
VLLW	Very Low Level Radioactive Waste
WDI	Waste Data Interrogator
WEEE	Waste Electrical and Electronic Equipment
WPA	Waste Planning Authority

Term	Definition
Agricultural Waste	Waste from a farm or market garden, consisting of matter such as manure, slurry and crop residues.
Anaerobic Digestion	Organic matter broken down by bacteria in the absence of air, producing a gas (methane) and solid (digestate). The by-products can be useful, for example biogas can be used in a furnace, gas engine, turbine or gas-powered vehicles, and digestates can be re-used on farms as a fertiliser
Commercial Waste	Controlled waste arising from trade premises.
Construction, Demolition & Excavation Waste	Controlled waste arising from the construction, repair, maintenance and demolition of buildings and structures.
DEFRA – Department for Environment, Food and Rural Affairs	Defra is a UK Government department. Its mission is to enable everyone to live within our environmental means. This is most clearly exemplified by the need to tackle climate change internationally, through domestic action to reduce greenhouse gas emissions, and to secure a healthy and diverse natural environment.
Energy from Waste	The conversion of waste into a useable form of energy, often heat or electricity.
Environment Agency	A government body that aims to prevent or minimise the effects of pollution on the environment and issues permits to monitor and 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 advice.
Hazardous Landfill	Sites where hazardous waste is landfilled. This can be a dedicated site or a single cell within a non-hazardous landfill, which has been specifically designed and designated for depositing hazardous waste.
Hazardous Treatment	Sites where hazardous waste is treated so that it can be landfilled.
Hazardous Waste	Waste that poses substantial or potential threats 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	Refuse from household collection rounds, waste from street sweepings, public litter bins, bulky items collected from households and wastes which householders themselves take to household waste recovery centres and "bring sites".
Incineration	The controlled burning of waste. Energy may also be recovered in the form of heat (see Energy from Waste).
Industrial Waste	Waste from a factory or industrial process.
Inert waste	Waste not undergoing significant physical, chemical or biological changes following disposal, as it does not adversely affect other matter that it may come into contact with, and does not endanger surface or groundwater.
Inert Landfill	A landfill site that is licensed to accept inert waste for disposal.
In-Vessel Composting	A system that ensures composting takes place in an enclosed but aerobic environment, with accurate temperature control and monitoring. There are many different systems, but they can be broadly categorised into six types: containers, silos, agitated bays, tunnels, rotating drums and enclosed halls.
ILW - Intermediate level radioactive waste	Radioactive wastes exceeding the upper activity boundaries for LLW but which do not need heat to be taken into account in the design of storage or disposal

Term	Definition
	facilities.
Local Authority Collected Waste (LACW)	Household waste and any other waste collected by a waste collection authority such as municipal parks and gardens waste, beach cleansing waste and waste resulting from the clearance of fly-tipped materials.
Landfill	The permanent disposal of waste into the ground, by the filling of man-made voids or similar features.
Landfill Directive	European Union requirements on landfill to ensure high standards for disposal and to stimulate waste minimisation.
LLW – low level radioactive waste	Lightly contaminated miscellaneous scrap, including metals, soil, building rubble, paper towels, clothing and laboratory equipment.
Materials Recycling Facility (MRF)	A facility for sorting and packing recyclable waste.
Mechanical Biological Treatment (MBT)	The treatment of residual waste using a combination of mechanical separation and biological treatment.
Non Hazardous Landfill	A landfill which is licensed to accept non-inert (biodegradable) wastes e.g. municipal and commercial and industrial waste and other non-hazardous wastes (including inert) that meet the relevant waste acceptance criteria.
Non Inert	Waste that is potentially biodegradable or may undergo significant physical, chemical or biological change once landfilled.
Organic Waste	Biodegradable waste from gardening and landscaping activities, as well as food preparation and catering activities. This can be composed of garden or park waste, such as grass or flower cuttings and hedge trimmings, as well as domestic and commercial food waste.
Open Windrow Composting	A managed biological process in which biodegradable waste (such as green waste and kitchen waste) is broken down in an open air environment (aerobic conditions) by naturally occurring micro-organisms to produce a stabilised residue.
Proximity Principle	Requires that waste should be managed as near as possible to its place of production, reducing travel impacts.
Recovery	Value can be recovered from waste by recovering materials through recycling, composting or recovery of energy.
Recycled Aggregates	Aggregates produced from recycled construction waste such as crushed concrete and planings from tarmac roads.
Recycling	The reprocessing of waste either into the same product or a different one.
Residual Waste	Waste remaining after materials for re-use, recycling and composting have been removed.
Waste Electrical and Electronic Equipment (WEEE)	Sites for the depollution, disassembly, shredding, recovery or preparation for disposal, and any other operation carried out for the recovery or disposal of Waste Electrical and Electronic Equipment.
Waste Hierarchy	A framework for securing a sustainable approach to waste management. Waste should be minimised wherever possible. If waste cannot be avoided, then it should be re-used; after this it should be prepared for recycling, value recovered by recycling or composting or waste to energy; and finally disposal.
Waste Local Plan	A statutory development plan prepared (or saved) by the waste planning

Term	Definition
	authority, under transitional arrangements, setting out policies in relation to waste management and related developments.
Waste Minimisation / Reduction	The most desirable way of managing waste, by avoiding the production of waste in the first place.
Waste Planning Authority (WPA)	The local authority responsible for waste development planning and control. They are unitary authorities, including London Boroughs and the City of London, National Park Authorities, and county councils in two-tier areas.
Waste Regulation Authority	The Environment Agency has responsibility for authorising waste management licenses for disposal facilities, and for monitoring sites.
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.

Sources: Planning Portal, SEPA, Anthesis

Executive summary

ES1 Introduction

ES1-1 The City of London Corporation (“the City”) is a waste planning authority (WPA) and as such, has a statutory duty to prepare a waste local plan in line with article 28 of the Waste Framework Directive (2008). This is being fulfilled through the inclusion of waste policies in the City of London Local Plan.

ES1-2 The Local Plan relating to waste should identify sufficient opportunities to meet the identified needs of an area for the management of waste, aiming to drive waste management up the waste hierarchy. It should ensure that suitable sites and areas for the provision of waste management facilities are identified in appropriate locations. However, the City is unique, comprising of just one square mile, with a residential population of 7,900 and a working population in excess of 400,000 within a central business district of national and international importance. There is only one designated waste site: a waste transfer station at Walbrook Wharf, and no waste management sites. Close co-operation is therefore required to ensure a suitable and sustainable network of waste management facilities in place.

ES1-3 This study is intended to inform and support the preparation of the City’s Local Plan documents, and as such needs to be robust and defensible at Examination. The following stages have been undertaken in which to develop this study:

- Existing waste arisings;
- Future waste projections;
- Routes and destinations for waste management;
- Waste management capacity in the City; and
- Analysis of options for compliance with the EU Waste Framework Directive.

ES2 Waste arisings estimates and destinations

ES2-1 This study considers different types of waste generated within the City, the most significant streams being that generated by construction and commercial activity. A variety of data sources have been used to ascertain waste arisings and their current destinations for treatment and/or disposal. These include that provided by the City’s Waste Management team and the Environment Agency, supplemented with some primary research including a survey of businesses and engagement of both waste and construction contractors operating within the City.

ES2-2 **Local authority collected waste (LACW)** is a very small proportion of the overall waste arisings in the City. In 2014, 3,949 tonnes were generated, of which 2,337 tonnes were sent via City’s Walbrook Wharf transfer facility to Cory Environmental’s Riverside Resource Recovery facility in the London Borough of Bexley. Organic waste amounted to 229 tonnes and was sent to Kent for composting. In 2014 there were 1,262 tonnes of commingled dry recyclables which were sorted in the London Borough of Southwark, with the sorted recyclable materials transported to destinations around the country for reprocessing.

ES2-3 **Commercial and industrial (C&I)** waste has been estimated and benchmarked using a variety of sources, including the Environment Agency’s Waste Data Interrogator (WDI) tool, as well as primary data gathering from a restricted survey of City of London based waste producers, and interviews with a number of

prominent waste management contractors in the Borough to better understand the local waste market. In 2014 it is estimated that 186,891 tonnes of waste were generated within the City, comprising of 57,936 tonnes of residual waste, 99,427 tonnes of dry recycling and 29,257 tonnes of organics.

ES2-4 Of the residual waste:

- 62% is bulked at Walbrook Wharf in the City and then sent to Cory's Riverside Resource Recovery facility in Bexley by river;
- 28% is being sent to other destinations in London (Hillingdon, Newham and Waltham Forest);
- 8% is sent to sites in the South East of England; with
- the remainder being sent to sites in other regions.

ES2-5 The destinations of both organics and dry recyclables have been difficult to identify. Dry recyclables collected separately are likely to be taken directly to brokers or reprocessors, and many organic treatment facilities operate under exemptions rather than permits. This means that it is likely that these types of waste have been transported directly to facilities not under the remit of WDI (which records waste returns from permitted sites) and therefore the destinations are unknown.

ES2-6 **Construction, demolition and excavation (CD&E)** waste was estimated to total 451,860 tonnes in 2014. This was calculated using WDI and benchmarked using data received from some of the prominent contractors operating within the City. This is the most significant waste stream, and is generated through general construction activities across the City (e.g. construction of new offices, housing, retail units etc.) as well as some large infrastructure projects, such as Crossrail. The breakdown in tonnage is as follows:

- Inert waste: 352,800 tonnes;
- Non-hazardous: 91,190 tonnes; and
- Hazardous: 1,870 tonnes.

ES2-7 WDI shows that 96% of CD&E waste is sent to transfer stations, sorting facilities or for re-fill applications, with only 4% being sent to landfill. The London Borough of Newham was shown to have received approximately half of the waste in 2014, the vast majority of which was inert. While it is not possible to ascertain the destination of the waste after it passes through transfer stations and sorting facilities, data received from major construction firms in the City show upwards of 95% of CD&E waste being diverted from landfill for reuse or recycling.

ES2-8 **Low level radioactive waste** is currently generated only by St Bartholomew's Hospital (Bart's Hospital), which generates very small quantities, as waste from its cancer treatment services, which have expanded in recent years. Therefore the waste has increased from nothing in 2013, to 26.5kg in 2014 and 152.8kg in 2015. Collections are made by a specialist healthcare waste contractor and the material is taken directly to their licenced incineration plant in Ashford, Kent.

ES2-9 **Agricultural waste** generated in the City is negligible, with 5 tonnes of 'plant tissue waste', coded as from agricultural sources (i.e. EWC 02 01) in WDI in 2014. This waste stream has a minimal impact on overall estimates of waste arisings and future waste strategy and has therefore been given no further consideration.

ES2-10 **Hazardous waste**: In 2014, 3,038 tonnes of hazardous waste were generated, according to WDI. This includes 1,124 tonnes reported through the Hazardous Waste Data Interrogator. The largest fractions of these were 'oil wastes and wastes of liquid fuels' and 'human and animal health care waste', the latter which

is likely to have been generated by Bart’s Hospital. Most of the hazardous waste is being treated either in other London Boroughs or the South East of England e.g. Star Works Treatment Plant in Wokingham receives the waste from Bart’s Hospital.

ES2-11 In addition to this, 27,360 tonnes of end of life vehicles were reported in WDI to be arising in the City. The majority (i.e. 95%) of these are treated at a facility in Haringey, with the remaining being treated at facilities in Enfield and West Sussex. These have been excluded from the hazardous waste projections (but are included in the C&I waste projections).

ES2-12 Hazardous waste requires a range of specialist facilities for treatment and disposal, but it is not anticipated that substantial additional need for new capacity within the City of London will develop, and as such, opportunities for additional hazardous waste management capacity have not been identified in as part of this study.

ES2-13 **Wastewater:** Thames Water Limited is responsible for wastewater and sewage sludge treatment in London, and manages sewerage infrastructure as well as sewage treatment works. Thames Water was contacted to ascertain whether estimates with regards to the quantity of wastewater attributed to the City of London could be provided, however no data was received. It has been estimated that approximately 3.8 million m³ of wastewater is generated in the City. The City’s wastewater is treated at the sewage treatment works (STW) in Beckton, in the London Borough of Newham, which is the largest in Europe, and treats the waste of a population of 3.5 million people (with upgrade works to increase capacity to 3.9 million). The City’s proportion of the wastewater treated at Beckton is therefore very small, and the increase in treatment capacity at Beckton STW is around 11%, which more than accounts for increases in anticipated population of the City.

ES3 Waste arisings forecasts

ES3-1 Scenarios were developed for each of LACW, C&I, CD&E and hazardous waste streams, and the table below shows these projections. These take account of employment, population and land use projections. The scenarios used are explained in more detail in the body of this report. These forecasts have identified potential ranges for each of these streams, over the lifetime of the Plan. Although care should be taken when projecting any waste streams this far into the future, it should be noted, that due to the completion of infrastructure projects and current large developments in the planning pipeline, with no information available on future large development schemes (as well as potential waste reduction due to increased refurbishment), CD&E waste decreases significantly over the period and becomes less significant than the C&I waste stream. However, this does not take into account any unforeseen major development projects which have yet to enter the planning system.

Table ES1: Waste arisings and forecasts (tonnes unless otherwise indicated)

Waste type	2014 (baseline)	2021	2031	2036
Local authority collected	3,949	3,717 - 4,457	3,382 - 4,947	3,382 - 5,094
Commercial & Industrial	186,891	186,210 - 187,660	173,700 - 207,360	169,350 - 214,120
Construction, Demolition & Excavation	451,860	147,065	101,730 - 128,610	77,130 - 114,840
Low level radioactive	Negligible (26.5kg)	N/A	N/A	N/A
Agricultural	5	N/A	N/A	N/A
Hazardous	3,038	2,951 – 3,168	2,824 – 3,371	2,753 – 3,481
Wastewater	3.8 million m ³	N/A	N/A	N/A

Waste type	2014 (baseline)	2021	2031	2036
Total	645,743	339,943-342,350	281,636-344,288	252,615-337,535

Source: Anthesis

ES3-2 For LACW and C&I waste, the estimates of the likely proportions of residual waste, dry recycling and organic components are presented below.

Table ES2: LACW and C&I waste totals by waste type (tonnes)

Waste type	2014 (baseline)	2021	2031	2036
Residual waste	60,276	56,644 – 61,098	54,089 – 65,382	52,838 – 67,506
Dry Recycling	100,807	99,356 – 107,257	94,955 – 114,634	92,605 – 118,367
Organics	29,486	29,128 – 31,366	27,838 – 33,485	27,148 – 34,579

Source: Anthesis

ES3-3 Although not forecast, it is likely that waste water volumes will increase as population and employment increases within the City, and climate change results in more extreme weather events including heavy rainfall, although water saving initiatives such as grey water recycling may have an impact upon this.

ES4 Waste management capacity

ES4-1 Walbrook Wharf is the City's only waste site and is used primarily as a waste transfer facility transporting waste by river to other river served waste management facilities. It is permitted to transfer 110,000tpa, but is limited to 85,000tpa for safety reasons. It occupies a footprint of 0.66ha. Therefore, the City itself has no actual large scale waste treatment capacity and therefore relies entirely on cooperation from other WPAs.

ES4-2 In an area with limited available development land and very high land prices, the availability of a site for additional waste management capacity is highly unlikely, and operation of such a facility likely to be economically unviable. Table ES2 above indicates the likely tonnages to be generated of residual waste, dry recycling and organic waste. Technologies to treat these types of waste can be designed at a variety of scales. However, it is considered that the space and infrastructure available at Walbrook Wharf is insufficient to accommodate a suitably sized residual waste treatment facility, and engineering modifications required for such a facility would be substantial. Smaller scale anaerobic digestion or MRF may be feasible, although processing more waste streams at the Wharf is likely to impact on vehicle access and cause potential queueing, and with 141,500tpa AD capacity and 2.01 million tpa of MRF capacity already operational within London, such smaller scale facilities are unlikely to be financially viable from an operational cost and gate fee view point.

ES4-3 However, there is scope for dedicated or shared waste treatment facilities, particularly for food waste, within existing and new commercial developments, of which there are already examples within the City (e.g. Broadgate Estate). Such facilities could broaden the service offer to building tenants, whilst reducing load on the established waste management infrastructure and reduce road miles of current waste to facilities outside of the City.

ES4-4 Although a high proportion of CD&E waste generated in the City is already recycled having been processed outside of the Borough, there may be scope for more on-site recycling within future projects to reduce transport. However, it is recognised that there are space, dust (air quality) and noise issues in on-site processing which would need to be addressed.

ES5 Conclusions & Recommendations

ES5-1 The City of London relies upon other WPAs within London and beyond, to deal with its waste. Major receptors (i.e. those receiving more than 1,000 tonnes per year) of City of London wastes are shown below, and the City has consulted with them to identify any challenges or barriers to continuing with this waste movement and processing in the future. The City should continue to engage on an ongoing basis. The destinations of waste changes regularly as it a competitive market, and therefore this list of authorities for engagement should be reviewed regularly after completion of the City's Monitoring Report. Public participation in the form of consultation on the Local Plan is a further requirement of the Waste Framework Directive and this will need to be delivered as part of the Local Plan Regulations (2012).

Table ES3: Major Recipients of City of London waste (by WPA)

Construction & Demolition Wastes		Local Authority and Commercial & Industrial wastes	
Local Authority	Waste Planning Authority	Local Authority	Waste Planning Authority
Newham	East London Waste Authority	Bexley	Bexley
Barking and Dagenham	East London Waste Authority	Hillingdon	West London Waste Authority
Thurrock	Thurrock	Newham	East London Waste Authority
Greenwich	Greenwich	Waltham Forest	North London Waste Authority
Hillingdon	West London Waste Authority	Slough	Slough
Havering	East London Waste Authority	Havering	East London Waste Authority
Merton	South London Waste Authority	Thurrock	Thurrock
Surrey	Surrey County Council		
Waltham Forest	North London Waste Authority		
West Sussex	West Sussex		
Barnet	North London Waste Authority		

In addition, Wokingham WPA receives over 1,000 tpa collectively across all the waste streams.

Source: Anthesis

ES5-2 The policies within the current City of London Local Plan (2015) are still relevant, and could be strengthened with the addition of ensuring on-site food waste treatment is incorporated into new developments and that on-site management of CD&E waste is carried out, wherever possible. The development of a Waste Minimisation Plan could also be considered.

ES5-3 The data used to estimate baseline waste arisings is the best available at the time of writing for each waste source. To improve veracity, the results have been benchmarked using other data sources, including the collection of some primary data in the City from businesses and contractors, on a moderate scale. With the lack of any national or regional aspiration to collect such business waste data in the future, it is suggested that a survey of City businesses is carried out at sufficient scale to be representative, on a regular basis, to further improve the reliability of estimates and forecasts.

ES5-4 The City should engage with TfL and the GLA regularly through the London Waste Planning Forum, to ensure visibility of any future infrastructure projects which would likely result in increased CD&E waste quantities, and update the CD&E waste projections both from this engagement and using the GLA's waste arisings reports.

ES5-5 This Evidence Base Report fulfils the requirements of Article 28 is setting out the current waste management situation including the type, quantity and source of waste arising, existing waste management approaches and an assessment of the need for new collection schemes and additional waste infrastructure.

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1 Introduction

1.1 Background

1.1-1 The City of London Corporation (“the City”) is a waste planning authority (WPA) and as such, has a statutory duty to prepare a waste local plan in line with Article 28 of the Waste Framework Directive (2008). This is being fulfilled through the inclusion of waste policies in the City of London Local Plan.

1.1-2 The Local Plan relating to waste should identify sufficient opportunities to meet the identified needs of an area for the management of waste, aiming to drive waste management up the waste hierarchy (see Figure 1). It should ensure that suitable sites and areas for the provision of waste management facilities are identified in appropriate locations.

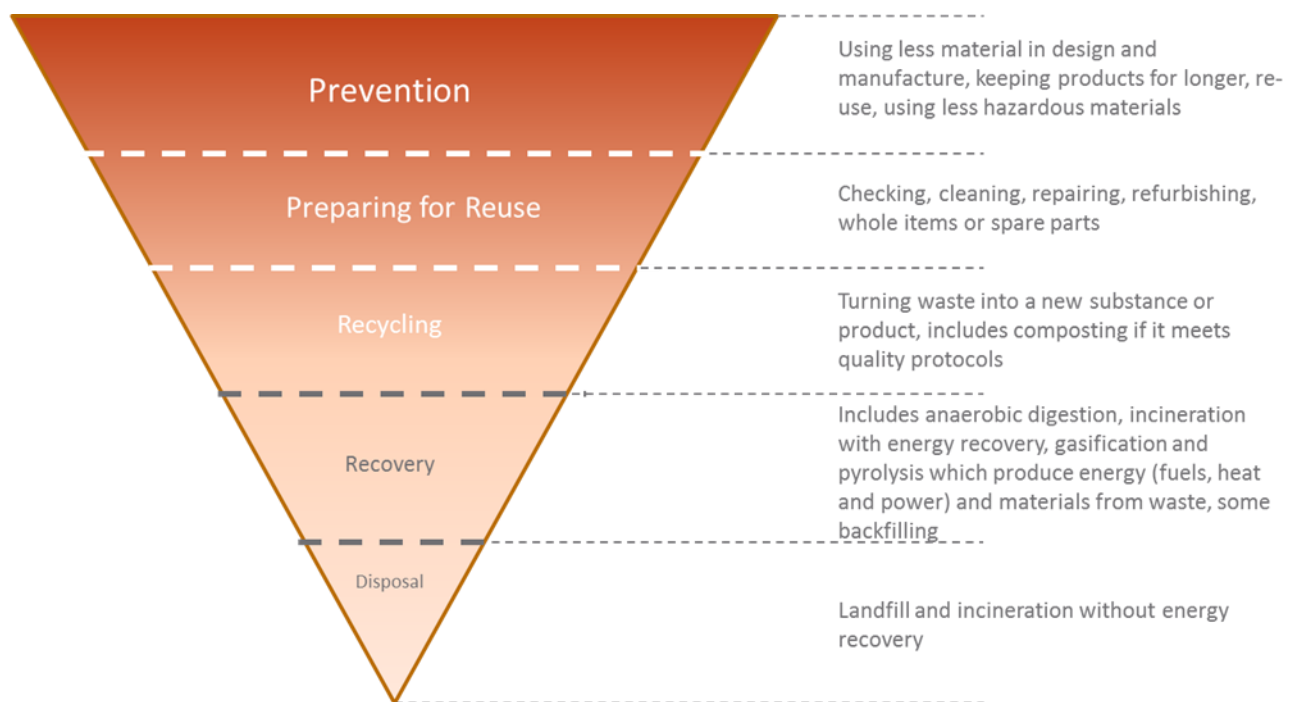


Figure 1: The Waste Hierarchy

1.1-3 The City of London covers just over one square mile comprising the central business district in central London. The City’s 2014 resident population is 7,900¹, with 414,600 people commuting to the City to work each day²). There is also one designated waste site: a waste transfer station at Walbrook Wharf in the City, and no waste management sites. As a strategic issue, close co-operation between waste planning authorities and other local planning authorities and public bodies are required to ensure a suitable and sustainable network of waste management facilities is in place. This is particularly important for the City of London where co-operation with other waste authorities is essential for the management of the City’s waste.

¹ GLA Population Projections 2014 Round SHLAA

² Office for National Statistics – Business Register Employment Survey 2014

1.1-4 As well as national planning policy, as a London authority, the City will have to ensure compliance with the London Plan.

1.2 Scope of this work

1.2-1 This study is intended to inform and support the preparation of the City’s Local Plan documents, and as such needs to be robust and defensible at Examination. This study provides evidence for the preparation of the waste and the circular economy section of the City of London Local Plan Review and will inform discussions with other waste planning authorities and the GLA on the strategic level approach to waste management. The following stages have been undertaken in development of this study.

Existing waste arisings

1.2-2 In developing an evidence base for the City, the first key stage is to gain an understanding of how much waste requires management, and where it comes from. Baselines for each of the waste types shown in Table 1 have been developed using a variety of data sources of varying quality, as well as some primary data collection:

Table 1: Waste types and data sources

Waste stream	Data sources
Municipal/household (MSW) or Local Authority Collected Waste (LACW)	City’s Waste Management Team, WasteDataFlow
Commercial & Industrial waste (C&I)	Waste Data Interrogator (EA), waste contractor interviews, survey of businesses
Construction, Demolition & Excavation waste (CD&E)	Waste Data Interrogator (EA), construction contractor data and interviews
Low level radioactive waste	EA dataset
Agricultural waste	Waste Data Interrogator (EA)
Hazardous waste	Waste Data Interrogator and Hazardous Waste Data Interrogator (EA)
Wastewater	City of London Employment and Population Estimates Metering - How much water does an 'average' person/household use?, Consumer Council for Water

Source: Anthesis

Future waste projections

1.2-3 Forecasting how much waste will be generated in the future is a process that involves estimating future behaviour of individuals and businesses and the markets within which they operate. Baseline waste arisings and forecast arisings to 2036 and projections for interim years 2021, 2026 and 2031, are presented. These are calculated based on differing data depending on the waste type e.g. population predictions, employments projections, forecasted commercial development, construction activities etc.

Routes and destinations for waste management

1.2-4 This study ascertains current routes (including transport mode e.g. road, rail, river barge etc.) and destinations for further management and/or disposal of each of the waste streams.

Waste management capacity in the City

1.2-5 As the only waste site within the City, the potential to develop Walbrook Wharf for further waste management operations has been reviewed and other sites have been considered. Other options, such as the potential for on-site waste management for large City buildings and development sites, have also been explored.

Analysis of options for compliance with the EU Waste Framework Directive

1.2-6 Anthesis has reviewed the waste management options in line with the EU Waste Framework Directive, to ensure that it is compliant with its requirements.

2 Policy Context

2.1 Policy context background

2.1-1 Waste management in the UK has been significantly driven by European policy in recent years. The waste management policies in the Local Plan will need to comply with EU and Government policy as follows:

- Revised European Waste Framework Directive 2008;
- EU Review of Waste Policy and Legislation 2014;
- Planning Act 2008;
- Localism Act 2011;
- National Planning Policy Framework (2012);
- Waste Management Plan for England 2013 (and predecessor documents); and
- National Planning Policy for Waste.

2.1-2 There are also a number of National Policy Statements (NPS) that will need to be taken into account such as the NPS on Hazardous Waste.

2.2 Revised European Waste Framework Directive 2008 and Review of Waste Policy

2.2-1 Article 28 of the Waste Framework Directive 2008 sets out the requirement for each Member State to produce a Waste Management Plan. This Plan must set out an analysis of the current waste management situation and sufficient information on the locational criteria for site identification and on the capacity of future disposal or major recovery installations. These locational criteria are contained in the Local Plans or Waste Plans of local authorities in the UK. The City of London Local Plan will form part of the UK's Waste Management Plan and will need to contain locational criteria in order to meet the requirements of the Directive.

2.2-2 A recently published Review of Waste Policy and Legislation by the EU has introduced a range of higher targets for recycling and the phasing out of landfilling organic and recyclable materials. This Review means that facilities for the management of waste in accordance with these new targets will be required and should be planned for as part of the Local Plan.

2.3 Localism Act 2011

2.3-1 The Localism Act 2011 gave the responsibility for strategic planning back to local authorities acting individually. However, section 110 of the Localism Act prescribes the “Duty to Co-operate” between local authorities in order to ensure that they work together on strategic issues such as waste planning. The duty is “to engage constructively, actively and on an on-going basis” and must “maximise the effectiveness” of all authorities concerned with plan-making. For matters such as waste planning, it is therefore important that local authorities can show that they have worked together in exchanging information and reaching agreement on where waste management facilities will be built.

2.3-2 However, engagement is not an end in itself. The objective is to develop a Local Plan that is deliverable for all parties. In the context of planning for waste management, it is necessary to understand waste flows between local authority areas and to ensure that all local plans take account of these flows. If a facility in one Waste Planning Authority Area can easily manage imports from another WPA Area, then neither Waste Plan is destabilised by such imports. If however, a facility that has historically been used by another WPA Area, which does not have capacity to handle continuing imports, or is closing, then alternative provision must be sought.

2.4 Regional Context

London Plan

2.4-1 The most recent waste policies in the London Plan were adopted in 2015 following the “Further Alterations to the London Plan”. Policy 5.16 states that the Mayor will work with London Boroughs and others to “manage as much of London’s waste within London as practicable, working towards managing the equivalent of 100% of London’s waste within London by 2026.”

2.4-2 This will be achieved by:

- a) minimising waste;
- b) encouraging the reuse of and reduction in the use of materials;
- c) exceeding recycling/composting levels in local authority collected waste of 45 per cent by 2015, 50 per cent by 2020 and aspiring to achieve 60 per cent by 2031;
- d) exceeding recycling/composting levels in commercial and industrial waste of 70 per cent by 2020;
- e) exceeding recycling and reuse levels in construction, demolition and excavation waste of 95 per cent by 2020;
- f) improving London’s net self-sufficiency through reducing the proportion of waste exported from the capital over time; and
- g) working with neighbouring regional and district authorities to co-ordinate strategic waste management across the greater south east of England.

2.4-3 Policy 5.17 states that Boroughs must allocate sufficient land and identify waste management facilities to provide capacity to manage the tonnages of waste apportioned in the Plan. The arisings projection presented for the City of London is 4,000 tonnes of household waste and 210,000 tonnes of C&I waste in the year 2016 and 4,000 and 213,000 tonnes respectively in 2036, with a tonnage apportionment

i.e. the tonnage City of London needs to plan for, of 100,000 tonnes each year from 2016 to 2030. The London Plan does not specify that “management” must include the treatment of residual waste however, and the transfer of waste is not considered to comprise “management” within the terms of the London Plan. Waste transfer cannot count towards the City’s waste apportionment target. Waste is deemed to be managed in London if it:

- is used in London for energy recovery;
- relates to materials sorted or bulked in London facilities for reuse, reprocessing or recycling;
- is material reused, recycled or reprocessed in London; or
- is a “biomass fuel” as defined in the Renewable Obligation Order³

2.4-4 Policy 5.18 of the London Plan encourages the sustainable management of construction and demolition waste, seeking on-site management where possible to reduce vehicle movements. The policy also states that “LDFs should require developers to produce site waste management plans to arrange for the efficient handling of CE&D⁴ waste and materials.”

2.4-5 Policy 5.19 deals with the management of Hazardous Waste and requires Boroughs to identify suitable sites for the storage, treatment and reprocessing of relevant or a range of hazardous waste streams and also to identify sites for the temporary storage, treatment and remediation of contaminated soils and demolition waste during major developments.

2.4-6 The London Plan also contains a policy on aggregates to encourage the re-use and recycling of construction, demolition and excavation waste within London and to import aggregates to London by sustainable transport modes. There are targets for the 95% recycling/re-use of construction, demolition and excavation waste by 2020 and the 80% recycling of that waste as aggregates by 2020.

2.4-7 In order to meet the policy requirements of the London Plan many Waste Planning Authorities in London work together in formal groupings to pool their apportionments. The City of London is very constrained with regard to the availability of suitable land for waste management activity and would benefit from the development of agreements with other London Councils to work jointly on the provision of waste management facilities. The City Corporation currently co-operates with the South East London Waste Planning Group⁵ contributing to the joint evidence paper which demonstrates that the group can collectively satisfy its waste apportionments.

Co-operation between London Waste Planning Authorities

2.4-8 In order to deliver the requirements of both national policy and the London Plan, Waste Planning Authorities in London need to work together to plan for the sustainable management of the waste arising in their areas. The London Waste Planning Forum (LWPF) is a meeting of council officers with an interest in waste planning where data is shared and policies discussed. It is a key element of delivering the Duty to Co-operate and active participation by City of London officers shows a commitment to joint working. The

³ London Plan paragraph 5.79

⁴ Referred to as CD&E waste in this report.

⁵ Collaborative waste planning group comprised of the London boroughs of Bexley, Greenwich, Lewisham, Southwark, Bromley and the City of London

London Waste Planning Forum contributes to the delivery of the waste policies in the London Plan including through the production of an Annual Monitoring Report which provides information on the extent to which London Boroughs and the City of London are moving towards meeting their annual apportionment.

2.4-9 Direct liaison between the City of London and other WPAs will however be necessary in addition to participation at the LWPF since waste arising in the City is managed at a number of facilities located in other council areas as described below.

2.5 Local Context

2.5-1 The City of London Local Plan was adopted in January 2015. It contains the over-arching strategy and policies for planning in the City of London and Core Strategic Policy CS17 sets out the key policies and targets for Waste Management. Policies DM 17.1, 17.2, 17.3 and 17.4 provide a more detailed approach as to how waste should be managed as part of the development process and the approach to new waste management sites.

2.5-2 The 2015 Plan is now under Review and more up to date information is required on waste arisings in the City of London and how they are managed.

2.5-3 The Local Plan identifies the particular characteristics of the City and the challenges in finding sites for waste management uses. In particular, the vast majority of the waste arising in the City of London is from commercial sources rather than households. This means that the City has little control of the destination of the waste arising from the Plan Area and that a Municipal Waste Management Strategy would have little relevance.

2.5-4 The City will therefore need to continue to work with partners to implement the waste management policies in the Local Plan and to ensure that the waste policies in the Review can be delivered in partnership with business in the City and in co-operation with other Waste Planning Authorities.

3 Waste arisings estimates, destinations and forecasts

3.1 Waste arisings background

3.1-1 The first stage of this study is to review the available data on waste arisings from a variety of sources, and then use this data, along with factors which are likely to influence arisings in the future, to generate arisings estimates per waste type to 2036.

3.2 Introduction to arisings, destinations, and forecasts

3.2-1 The term 'municipal waste' has historically been used in waste policy to describe all waste which is managed by or on behalf of a local authority.

3.2-2 However, the Landfill Directive defines municipal waste as waste from households as well as other waste that, because of its nature or composition, is similar to waste from households. This includes a significant amount of waste that is generated by businesses and which is not collected by local authorities.

3.2-3 For planning purposes, it is important to know how much waste in total requires management. Local authorities have established systems for measuring the quantities of waste that they manage and this is reported to Defra through the WasteDataFlow reporting system which has been established since 2004. Due to this reporting mechanism, robust data are held by local authorities, which they then use to report on WasteDataFlow.

3.2-4 The remainder of waste arisings, whether similar to household waste or more homogeneous, is not measured through a systematic or robust system, but in periodic surveys that have been carried out to understand the quantities arising.

3.2-5 To ensure consistency with the terminology used by National Government, the term 'Local Authority Collected Waste' (LACW) will be used for the waste recorded by the City, and the remainder of the non-hazardous waste which is collected from business will be referred to as commercial & industrial (C&I) waste. This terminology originates from Defra's response to the consultation on meeting the EU Landfill Diversion Targets in England in 2010 and ensures that LACW data is consistent with data on LACW in previous work.

3.2-6 The City is unusual in that LACW makes up a very small proportion of the overall waste generated. This is due to the relatively small residential population, within a business district of national and international importance, which means that the most significant waste streams are produced by businesses i.e. C&I, and construction, demolition and excavation (CD&E) wastes. Comprehensive datasets are not available for these types of wastes. However, estimates have been made in the production of this study, using a variety of data sources, stakeholder engagement and benchmarking exercises.

3.3 Local Authority Collected Waste (LACW)

What is this waste?

3.3-1 LACW waste consists of waste which comes into the possession of, or under the control of, the local authority. The City is somewhat unique in that the LACW makes up a small proportion of the overall waste, due to a relatively small number of residents, compared to large number of businesses, within the square mile. The LACW collected by the City's contractor includes household waste (residual, dry mixed recycling and food waste), street sweepings, green waste from upkeep of the City's open spaces, and a small quantity of clinical waste⁶. The City's trade waste service is delivered by a private contractor, and therefore the majority of this is reported under the C&I section of this study.

3.3-2 Local authorities are required to make detailed returns to Defra of the quantity of waste arisings collected from municipal sources and how the materials are subsequently managed. The accuracy of this data is therefore high.

Current Arisings

3.3-3 Quantities of LACW ascertained from data provided by the Waste Management team of the City show that waste arisings have been fairly consistent, varying less than 1% up or down between 2013-2015; with arisings of 3,938 tonnes in 2013, 3,949 tonnes in 2014, and 3,919 tonnes in 2015 (see Table 2). The recycling rate has decreased from 42% to 35% over this period, due largely to the fact that, in 2015, the City removed all street recycling bins due to high levels of contamination, and also saw a 55% decrease in manual street recycling since 2013; this has resulted in a proportional increase in the residual street arisings. Despite the decrease in street recycling, commingled household recycling collected increased by 9.6% from 2013 to 2015, and the separate food waste collection yield has increased by 22%.

⁶ Household clinical waste is not deemed hazardous unless a particular risk has been identified (based on medical diagnosis)

Table 2: Local authority waste arisings (in tonnes per annum)

Waste Stream	Calendar Year		
	2013	2014	2015
Household Residual	1,512	1,528	1,497
Household Bulky	125	132	110
Clinical	3	3	3
Streets/Parks Residual	618	677	902
Total Disposal	2,258	2,340	2,512
Household comingled recycling	778	799	853
WEEE	12	14	18
Textiles	15	11	20
Streets/Parks Recycling	489	438	136
Street Sweepings	178	118	151
Food	106	103	122
Green	102	126	108
Total Recycling	1,680	1,609	1,408
Total	3,938	3,949	3,919

Source: City of London Corporation Waste Management Team

Destination of City of London LACW

3.3-4 The different streams which make up the LACW (as shown in Table 2) undergo different management routes:

- Residual waste: taken to Walbrook Wharf (which is currently operated by AmeyCespa) by road, from where it is taken to Cory Environmental’s Riverside Resource Recovery facility in the London Borough of Bexley, by barge for energy recovery;
- Dry recycling: transported by road to Veolia’s Integrated Waste Management Facility (IWMF) in Southwark where it is sorted before being sent to reprocessors. Prior to 2015, dry mixed recycling was taken to the Ideal Waste facility in Swanley via the Walbrook Wharf transfer station. The destinations of separated materials (the output of the IWMF) can be tracked using WasteDataFlow, and are shown in Table 4;
- Food waste: currently transported by road to Veolia’s IWMF in Southwark, where it is bulked before being sent to a Biogen AD facility in Milton Ernest, Bedfordshire. Tonnages in Table 3 refer to 2014, where the food waste was sent to an IVC facility in Kent;
- Street sweepings: transported by road to Smuggler’s Way transfer station in Wandsworth, then transferred to Sweeptech in Henfield, West Sussex;
- Green waste: transported by road for bulking at a transfer station in Lambeth, then transported to Countrystyle’s In-Vessel Composting (IVC) facility in Kent;
- Clinical waste: transported by road to Smuggler’s Way transfer station in Wandsworth, then transferred to North London Waste Authority’s clinical waste incinerator at Edmonton; and
- Textiles received at City textile banks are collected directly by the Salvation Army.

3.3-5 These were the destinations waste was being sent to at the time of writing. However waste management routes used are subject to market forces and therefore they can change, depending on contractual agreements and other commercial drivers.

3.3-6 Table 3 shows that the majority of the LACW is managed within Greater London and the South East of England. Residual waste is being sent to energy recovery within London. All organic waste used to be sent to Kent (2014); however food is now going to Bedfordshire to an AD facility. Table 4 shows the tonnages and destinations of the waste which is segregated for either recycling or composting. Dry recycling materials are sorted within London but then the output materials are sent for reprocessing around the country, primarily in the North West and South East of England. It should be noted that these are relatively small waste streams in comparison to other waste generated in the City, and also in comparison with that generated by other London Boroughs. The most recent available WDF statistics show that on average, a London Borough produces 111,300 tpa of LACW, with nearly 3.6 million tpa of LACW being produced in Greater London as a whole. The City of London produces just 0.1% of the total LACW in Greater London, and less than 1/27th the amount of LACW as the average London Borough.

Table 3: Summary of LACW streams and management destinations

Waste type	WPA of transfer / sorting of waste	Region of transfer / sorting of waste	WPA of waste treatment / reprocessing	Region of waste treatment	Tonnes (2014)
Residual waste	City of London	Greater London	London Borough of Bexley	Greater London	2,337
Dry recycling	London Borough of Southwark	Greater London	See Table 4 for full details	Over 60% going either to North West of England, or remaining in the South East	1,262
Food waste	London Borough of Southwark	Greater London	Kent County Council, now Bedfordshire	South East	103
Street sweepings	London Borough of Wandsworth	Greater London	West Sussex County Council	South East	118
Green waste	London Borough of Lambeth	Greater London	Kent County Council	South East	126
Clinical waste	London Borough of Wandsworth	Greater London	London Borough of Enfield	Greater London	3

Source: City of London Waste Management Team & WasteDataFlow

Table 4: Destinations of the City's LACW recycling streams, 2014 (tonnes)

Waste Planning Authority	Paper & card	Mixed glass	Waste food	Plastics	Metals	WEEE	Textiles & footwear	Composite food and beverage cartons	Post-consumer, non-automotive batteries	Grand Total
Cheshire East	493.68									493.68
Southampton		227.93								227.93
Kent			102.77							102.77
Nottingham	81.29									81.29
Flintshire	72.82									72.82
Wakefield		69.03								69.03
Barking and Dagenham				53.87						53.87
Doncaster					30.38					30.38
Essex	29.94									29.94
Lincolnshire				18.78						18.78
Unknown (Other/Exempt)						3.89	11.40	0.67		15.96
Coventry	14.35									14.35
Manchester	12.20									12.20
Cambridgeshire						10.79			0.43	11.22
Lancashire					10.70					10.70
Outside UK	3.76							2.42		6.18
Havering				4.40						4.40
Warrington					1.26					1.26
West Berkshire				1.17						1.17
Swansea					0.21					0.21
Total	708.0	297.0	102.7	78.2	42.6	14.7	11.4	3.1	0.4	1,258.1

Source: Defra WasteDataFlow (Note, dry recyclables do not necessarily total those in above sections, due to contamination)

Table 5: Destinations of City's LACW recycling streams by region (tonnes)

Region	Paper & card	Mixed glass	Waste food	Plastics	Metals	WEEE	Textiles & footwear	Composite food and beverage cartons	Post consumer, non-automotive batteries	Region Total	Proportion of waste stream
North West	505.9	0.0	0.0	0.0	12.0	0.0	0.0	0.0	0.0	517.8	41%
South East	0.0	227.9	102.8	1.2	0.0	0.0	0.0	0.0	0.0	331.9	26%
East Midlands	81.3	0.0	0.0	18.8	0.0	0.0	0.0	0.0	0.0	100.1	8%
Yorks & Humber	0.0	69.0	0.0	0.0	30.4	0.0	0.0	0.0	0.0	99.4	8%
Wales	72.8	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	73.0	6%
Greater London	0.0	0.0	0.0	58.3	0.0	0.0	0.0	0.0	0.0	58.3	5%
East of England	29.9	0.0	0.0	0.0	0.0	10.8	0.0	0.0	0.4	41.2	3%
Unknown	3.8	0.0	0.0	0.0	0.0	3.9	11.4	3.1	0.0	22.1	2%
West Midlands	14.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.4	1%
Material Total	708.0	297.0	102.8	78.2	42.6	14.7	11.4	3.1	0.4	1,258.1	

Source: Defra's WasteDataFlow

Future Arisings

3.3-7 In order to account for a range of different circumstances that may affect LACW arisings in the City through to 2036, a number of different scenarios have been modelled in order to give an indication of the range of waste arisings likely to occur. Four different arisings scenarios were modelled, as described in Table 6 and illustrated in Figure 2. They have been chosen to cover what are considered the most likely changes to population i.e. increase based on GLA projections compared to no growth in population. The City considers the GLA population projections used are likely to be realised. They also consider the likely outcomes of and targets for waste management policy ⁷ which aims to reduce waste overall but increase the portion which is segregated for recycling and composting.

Table 6: Modelled Local Authority Collected Waste scenarios

Scenario	Description	Growth Data Source
Scenario 1 Population growth	Overall waste increases in-line with population growth delivered through new housing	GLA population projections based upon SHLAA – Strategic Housing Land Availability Assessment, produced by the City of London using Resident Estimates and Projections, December 2015
Scenario 2 Waste reduction target	Waste reduction target of 14% from 2015 to 2031 achieved, assuming no growth in population ⁸ and static recycling rate	The Mayor of London's 2011's Waste Strategy*
Scenario 3 Waste reduction target & population growth	Incorporates population growth and waste reduction targets as per Scenarios 1 & 2	GLA population projections based upon SHLAA – Strategic Housing Land Availability Assessment, produced by the City of London using Resident Estimates and Projections, December 2015; The Mayor of London's 2011 Waste Strategy
Scenario 4 Population growth & recycling rates achieved	Incorporates population growth as per Scenario 1, and shows City meeting targets to recycle or compost at least 45% of municipal waste by 2015, 50% by 2020 and 60% 2031	GLA population projections based upon SHLAA – Strategic Housing Land Availability Assessment, produce by the City of London using Resident Estimates and Projections, December 2015; The Mayor of London's 2011 Waste strategy

⁷ Planning a sustainable future for the City of London: Waste Strategy 2013-2020 (City of London, January 2014)

⁸ The Mayor's waste strategy targets reducing household waste from 970kg per household in 2008 to 790kg per household in 2031 – as City of London is at 558kg per household in 2015, reduction has been applied proportionately to achieving the targets in the Mayor's waste Strategy (14% reduction from 2015-2031)

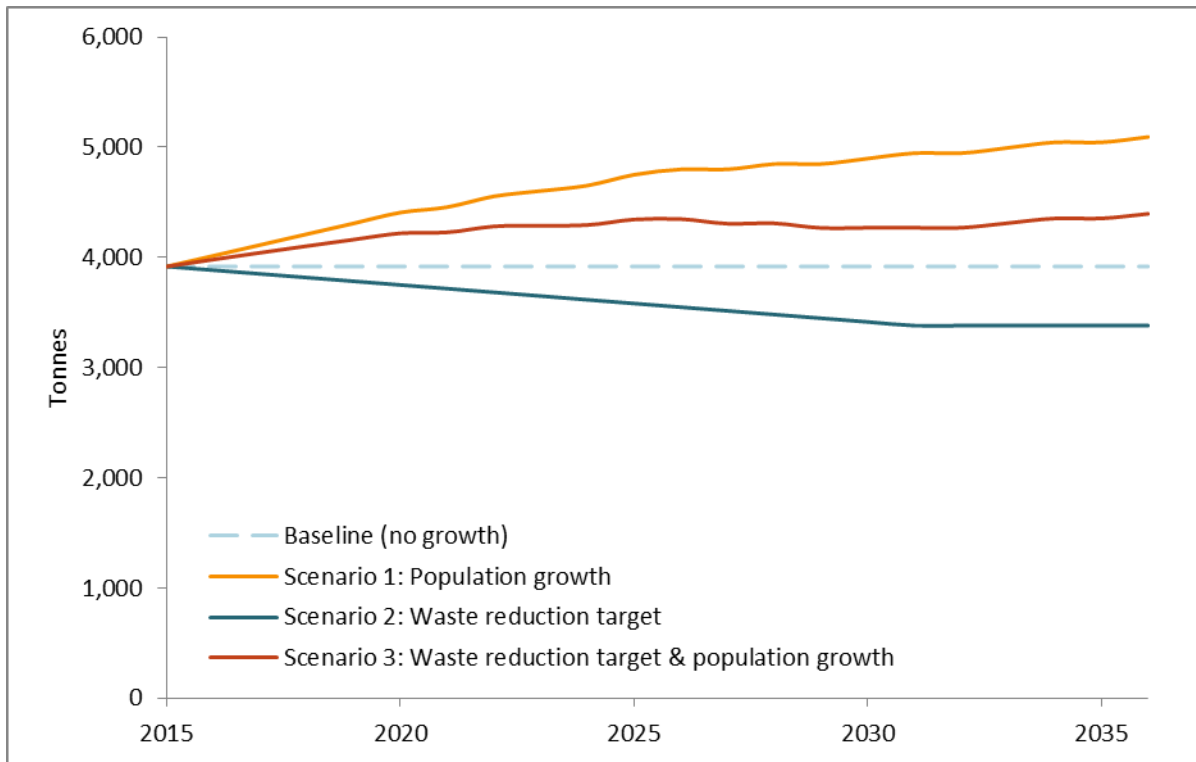


Figure 2: Total LACW projection results from key scenarios (2015-2036). Note: Scenario 4 is not shown in Figure 1, as total waste volume is the same as for Scenario 1.

3.3-8 Estimated waste tonnages by each major stream (residual, dry recycling, organics) at key years for the selected scenarios are given in Table 7 below.

Table 7: Estimated LACW tonnages by stream for all scenarios in key years

Scenario	Stream	2021	2031	2036
Scenario 1 Population growth	Residual	2,858	3,172	3,266
	Dry Recycling	1,338	1,485	1,529
	Organics	261	290	298
	Total Waste	4,457	4,947	5,094
Scenario 2 Waste reduction target	Residual	2,384	2,169	2,169
	Dry Recycling	1,116	1,015	1,015
	Organics	218	198	198
	Total Waste	3,717	3,382	3,382
Scenario 3 Waste reduction target & population growth	Residual	2,711	2,738	2,819
	Dry Recycling	1,270	1,282	1,320
	Organics	248	250	258
	Total Waste	4,229	4,270	4,397
Scenario 4 Population growth & recycling rates achieved	Residual	2,154	1,979	2,038
	Dry Recycling	1,927	2,484	2,557
	Organics	376	485	499
	Total Waste	4,457	4,947	5,094

Scenario	Stream	2021	2031	2036
Range	Residual	2,154 - 2,858	1,979 - 3,172	2,038 - 3,266
	Dry Recycling	1,116 - 1,927	1,015 - 2,484	1,015 - 2,557
	Organics	218 - 376	198 - 485	198 - 499
	Total Waste	3,717 - 4,457	3,382 - 4,947	3,382 - 5,094

Source: Anthesis

3.3-9 The four scenarios described above represent a wide range of possible waste arisings by each stream. Figure 3 illustrates the range of expected arisings for each stream, corresponding to the tonnages given in Table 7.

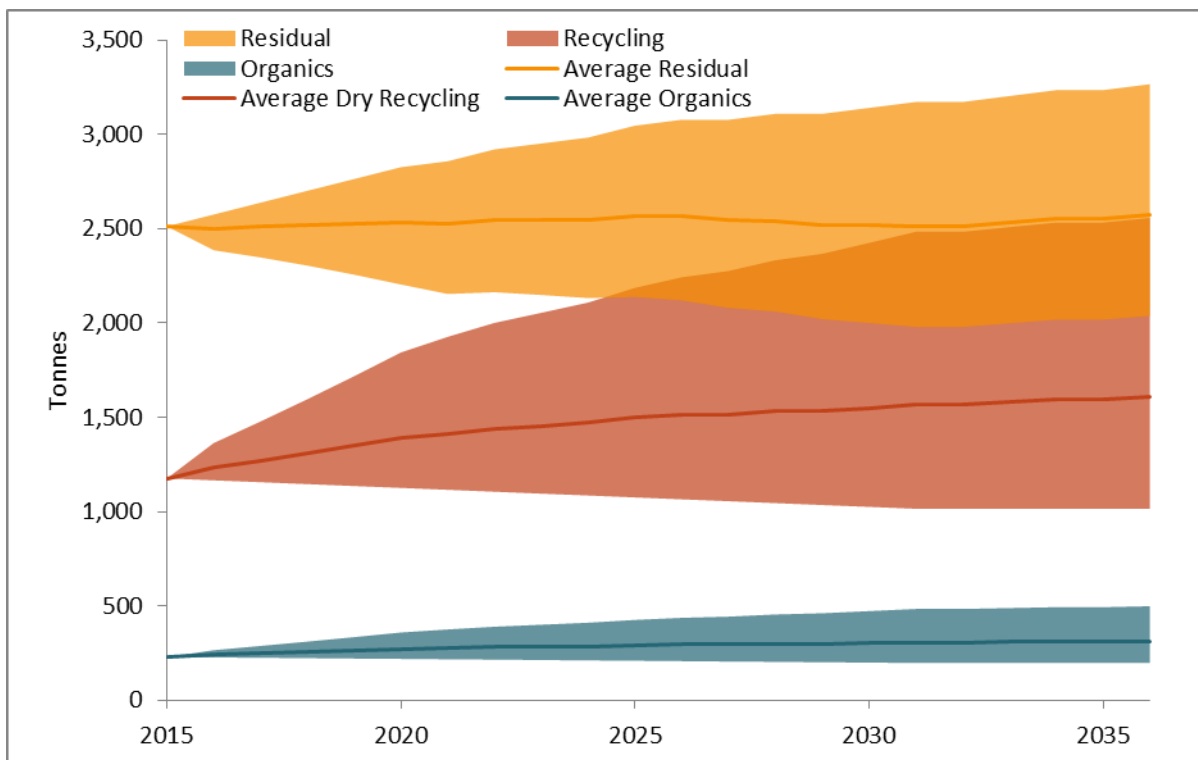


Figure 3: Range and average of arisings estimates by stream for all projected scenarios (2015 - 2036)

3.3-10 The range represented in these projections is quite broad, which reflects the uncertainty associated with long-term waste projections. Factors such as demographics, consumer behaviour, retailer behaviour, product design, and the split between permanent/temporary residents could have significant impacts on waste and recycling arisings, and may change over time. Likelihood of changes to these parameters has not been investigated, but as the population of the City is quite small, overall arisings tonnage in absolute terms is unlikely to vary significantly over the foreseeable future.

3.4 Commercial and Industrial waste

What is this waste?

3.4-1 Commercial and industrial (C&I) waste is waste generated from the following activities:

- Industrial Sectors
 - Food, drink and tobacco manufacturing businesses

- Textiles/wood/paper/publishing businesses
- Power and utilities companies
- Chemical/non-metallic minerals manufacturing businesses
- Metal manufacturing businesses
- Machinery & equipment (other manufacturing) businesses
- Commercial Sectors
 - Retail and wholesale
 - Hotels and catering
 - Public administration and social work
 - Education
 - Transport and storage
 - Other services

3.4-2 To put this in the context of the City, as Figure 4 demonstrates, according to the 2011 census the largest sectors by workforce are the service sectors of financial and insurance, and professional and estate. Therefore there are limited 'Industrial' sectors as listed above, however there are some key sites to note.

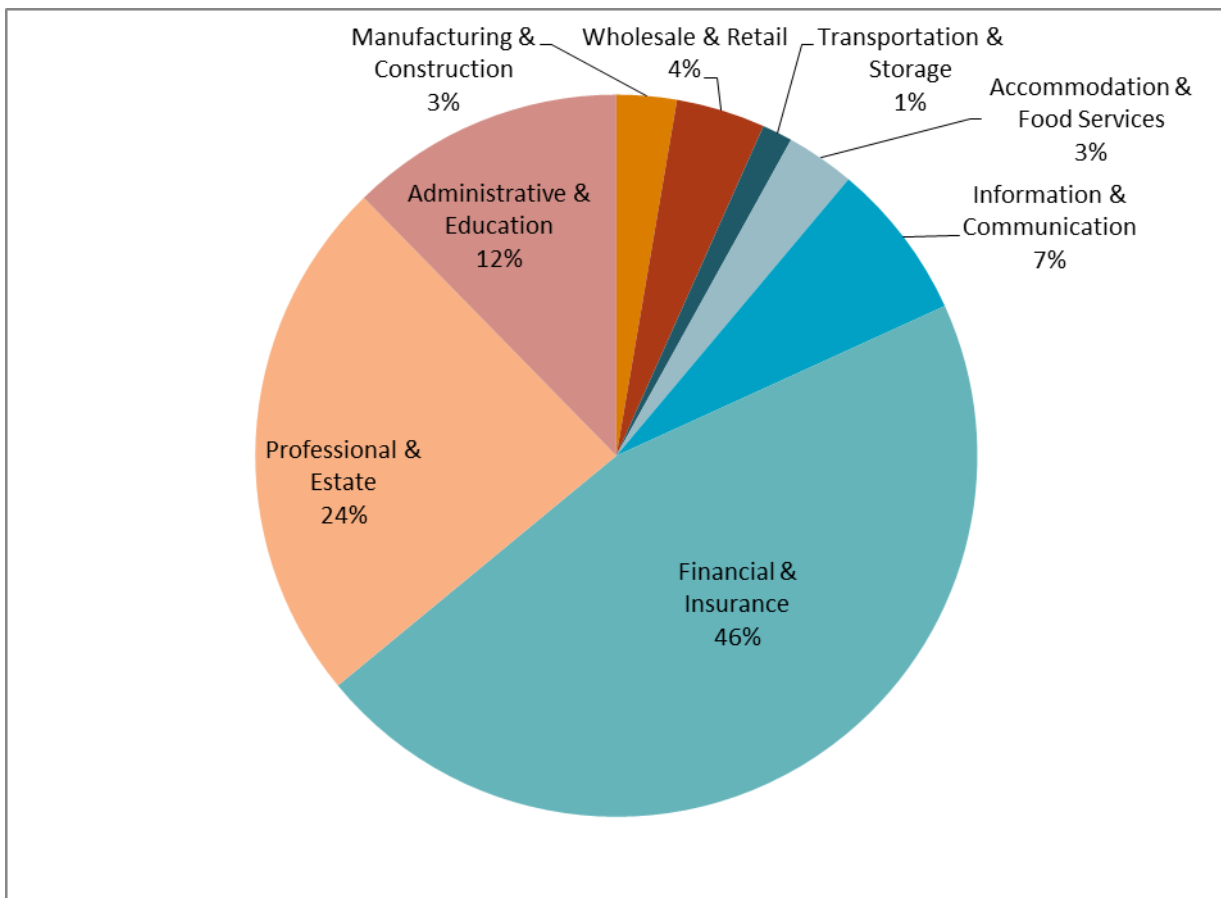


Figure 4: Sectors of City of London workforce, CENSUS 2011

3.4-3 Smithfield Market is the UK's largest wholesale meat market and is located within the City. This site generates waste that falls under the Animal By-Products Regulations, which, depending on the category, imposes requirements on the disposal of the waste. Smithfield Market will generate category 3 waste i.e. not for human consumption. This means that wastes must be treated in one of the following ways:

- incineration or co-incineration;
- sending them to landfill after they've been processed;
- processing them, if they're not decomposed or spoiled, and using them to make feed for farm animals (where allowed by the TSE/ABP regulations);
- processing them and using them to make pet food;
- processing them and using them to make organic fertilisers and soil improvers;
- using them in composting or anaerobic digestion;
- ensiling (turning them into silage) if they come from aquatic animals;
- applying them to land as a fertiliser, in some cases;
- using them as fuel for combustion; or
- using them to make cosmetic products or medical devices⁹

3.4-4 St Bartholomew's Hospital (Bart's) is a leading, internationally renowned teaching hospital based in the City of London. A range of local and specialist services are provided, including centres for the treatment of cancer, heart conditions, fertility problems, endocrinology and sexual health conditions. This waste has not been addressed specifically in this section, however low level radioactive waste and hazardous waste streams originating from Bart's have been addressed in the relevant sections.

Current Arisings

3.4-5 There is significant uncertainty surrounding C&I waste arisings, as there are no formal reporting requirements.

3.4-6 The last C&I arisings estimates for the City of London, produced in 2013¹⁰, and those used by the GLA in the London Plan, were based upon data from the Defra England C&I waste arisings survey delivered in 2010, collecting data for 2009. There has been no survey of C&I arisings since that date, either at England national or London regional level. As this data is now quite old, national C&I arisings reporting¹¹ is based upon use of data from the Environment Agency's Waste Data Interrogator. Therefore the same data source (for 2014, the latest available) was used as the basis for this study.

3.4-7 The Waste Data Interrogator (WDI) is based upon waste returns data from permitted (i.e. non-exempt) waste management sites across England. The interrogator accesses data on inputs and outputs to

⁹ Gov UK website, categories, site approval, hygiene and disposal

¹⁰ "Present and Future Waste Arisings", Review for the City of London 2013

¹¹ "A method to estimate waste generation by the in commercial and industrial sectors in England", Jacobs for Defra, 2014

such facilities, including quantities (in tonnes), waste type (as EWC or SOC waste classifications), and source of waste as WPA area. There are, however, significant gaps in this data, which means the dataset cannot be used to estimate arisings alone. Gaps include the fact that exempt (i.e. non-permitted) facilities do not provide returns into the Environment Agency, meaning that a large proportion of recyclates collected (for instance bulked under T4 exemptions or transported directly from producing site to reprocessing site without passing through a permitted waste facility) are not included. Therefore, the WDI is usually accurate for residual waste disposal whereas data for recycling can be sparse. Similarly, there are potential problems with double counting material passing through waste transfer stations, which also needs eliminating.

3.4-8 There are also challenges in identifying waste originating in a small area such as the City of London, as the accuracy of this origin data depends upon those waste management facility operators providing the data breaking down the incoming waste data at a sufficient granularity to identify individual WPAs, and to use the correct WPA names rather than that of neighbouring WPAs or a generic “Central London”.

3.4-9 Overall, WDI for 2014 identified 21,927 tonnes of residual C&I waste originating within the City of London and only 3,938 tonnes of dry recycling. However, we know that segregated materials are likely to go direct to brokers or reprocessors, and therefore would not appear in WDI figures.

Table 8: Waste streams identified through WDI

Waste Stream	2014 tonnage
Residual waste identified in WDI as originating in the City	21,927
Residual waste, identified as being transported through Walbrook Wharf and expected (but not assigned in WDI) to have originated from the City	36,009
Residual waste from LACW*	2,513
Total C&I residual waste	57,936
Recycling	3,938

Source: Environmental Agency, WDI, 2014. *Not included in the C&I residual waste total

3.4-10 To augment the data from the WDI, Anthesis also carried out a restricted survey of City of London based waste producers, including members of the Clean City Awards, and interviewed a number of prominent waste management contractors in the City to better understand the local waste market. It is known through discussions with the City and waste contractors that a significant portion of the residual waste arising in the City is sent through Walbrook Wharf; however WDI did not identify any waste at Walbrook Wharf as originating within the City. Through conversations with the City Waste Team and some major Waste Contractors, it was estimated that 36,009 tonnes of the total 55,173 tonnes of residual C&I waste being transported via the Wharf originated within the City of London.

3.4-11 The results of the Anthesis business survey (17 responses) estimated an overall recycling rate of approximately 69%, with dry recyclate comprising approximately 53% of the total waste stream, and organics waste (such as food and kitchen waste) comprising a further 16%. Therefore it was assumed that the residual waste figure of 57,936 tonnes represented 31% of the total C&I waste stream, and the overall total was factored up using this residual waste figure. The additional 69% of dry recycling and organics was calculated therefore to be 128,684 tonnes, making the total 186,891 tonnes (see Table 9).

Table 9: C&I baseline estimate for 2014

Waste Stream	2014 tonnage
Residual Waste	57,936
Dry Recycling	99,636
Organics Waste	29,319
Total	186,891

Source: Anthesis

3.4-12 Although a 69% recycling rate could be considered high, this is the only data available as to the current recycling rate in the City. The WRAP Green Office Guide specifies that between 60-70% recycling rates are achievable for those operating efficient recycling schemes¹². The latest publicly available information on C&I recycling rates is the 2009 Defra C&I waste survey figures which reported London’s recycling rate as 52% - across all of the boroughs and all of the business sectors operating within Greater London. With the City comprising mostly of office based businesses, it is likely that overall recycling rate for the City in 2009 was higher than this. In addition it is likely that the recycling rate has improved over recent years, working towards The Mayor of London’s target of 70% recycling by 2020¹³. Using the methodology outlined above, assuming a higher recycling rate also means the overall estimation of C&I waste is considered a ‘worst case’.

3.4-13 The figure of 187,000 roughly aligns with estimates in the GLA’s latest waste estimations which projected the City’s C&I waste arisings to be 210,000 in 2016. The overall estimate was also verified with a waste contractor, identified as servicing a significant proportion of the businesses in the survey.

Destinations of City of London’s C&I waste

3.4-14 WDI provides an accurate view of where residual C&I waste is treated or transported through, but does not capture much of the recycle material that is either delivered directly to reprocessors, or sent through exempt sites. Destinations of residual C&I waste originating within the City of London are presented in Table 10.

¹² WRAP Green Office Guide

¹³ The Mayor of London’s Business Waste strategy

Table 10: Destination of residual C&I waste from the City of London

Local Authority	Waste Planning Authority	Facility type	Waste (tonnes)
City of London	City of London	Transfer	36,009 ¹⁴
Hillingdon	West London Waste Authority	Material Recycling Facility	10,557
Newham	East London Waste Authority	Transfer	114
		Treatment	2,376
Waltham Forest	North London Waste Authority	Transfer	1,562
Slough	Slough	Transfer	1,461
Havering	East London Waste Authority	Transfer	1,355
		Landfill	20
Thurrock	Thurrock	Material Recycling Facility	1,268
Wokingham	Wokingham	Treatment	740
		Landfill	5
Somerset	Somerset	Treatment	601
West Sussex	West Sussex	Recycling	406
		Transfer	79
Surrey	Surrey	Landfill	380
Hampshire	Hampshire	Treatment	317
		Transfer	<1
Enfield	North London Waste Authority	Transfer	198
Bristol City	Bristol	Treatment	105
Other WPAs		Transfer	195
		Treatment	182
		Landfill	6
		Material Recycling Facility	<1
Total			57,936

Source: Environmental Agency, WDI, 2014

3.4-15 Over 90% of the residual C&I waste arisings from the City of London are classified under EWC Chapter 20. Of the City’s residual C&I waste arisings:

- 62% are bulked at Walbrook Wharf in the City and then sent to Cory's Riverside Resource Recovery facility in Bexley by river;
- 28% is being sent to other destinations in London (Hillingdon, Newham and Waltham Forest);
- 8% is sent to sites in the South East of England; with
- the remainder being sent to sites in other regions

¹⁴ As described in section 0

3.4-16 Very little organic waste was identifiable in WDI, but 40% was shown to be taken to Veolia’s IWMF in Southwark and 38% being taken to a facility in Thurrock. A significant number of organic treatment facilities operate under exemptions, rather than waste permits, and therefore do not come under the remit of WDI.

3.4-17 Only 2 tonnes of animal-tissue waste has been identified in WDI, potentially arising from Smithfield Market. This is being sent to a clinical and hazardous waste incinerator facility in Wokingham, run by Grundon Waste Management, and so is being treated in accordance with the Animal By-Product Regulations, as mentioned in Section 0.

3.4-18 While it is not possible to identify tonnages of recyclate material sent to specific sites, anecdotal information from discussions with local contractors, suggests that the majority of commingled dry mixed recyclate material collected in the City of London is sent to either the Bywater’s MRF in Tower Hamlets, or the Veolia MRF in Southwark. However, we know that segregated materials are likely to go direct to brokers or reprocessors.

Future Arisings

3.4-19 In order to account for a range of different circumstances that may affect C&I waste arisings in the City through to 2036, a number of different scenarios have been modelled in order to give an indication of the range of waste arisings likely to occur. Four different arisings scenarios were modelled, as described in Table 11 and illustrated in Figure 5. The scenarios take into account two different employment projection scenarios. They also overlay waste policy objectives i.e. waste prevention, and a slight increase in the overall recycling rate up to 70% by 2020. It is thought that waste prevention measures may either be met by employees reducing the waste they each generate, or due to an increasing number of workers working from home some of the week, and therefore not generating as much waste in the office.

Table 11: Modelled C&I waste scenarios

Scenario	Description	Source
Scenario 1 City of London employment growth	Waste arisings increase in-line with City of London employment projections	(a) ABI and BRES 2005 to 2014 (b) GLA Projection Working Paper 52 (c) Extrapolation of published GLA Projection
Scenario 2 City of London employment growth w/ waste reduction	Waste arisings increase in-line with City of London employment projections, while decreasing waste generation per employee by 1% per annum.	(a) ABI and BRES 2005 to 2014 (b) GLA Projection Working Paper 52 (c) Extrapolation of published GLA Projection
Scenario 3 GLA employment growth	Waste arisings increase in-line with GLA employment projections for the City of London	Updated employment projections for London by sector and trend-based projections by borough (GLA, 2015)
Scenario 4 GLA employment growth w/ waste reduction	Waste arisings increase in-line with GLA employment projections for the City of London, while decreasing waste generation per employee by 1% per annum.	Updated employment projections for London by sector and trend-based projections by borough (GLA, 2015)

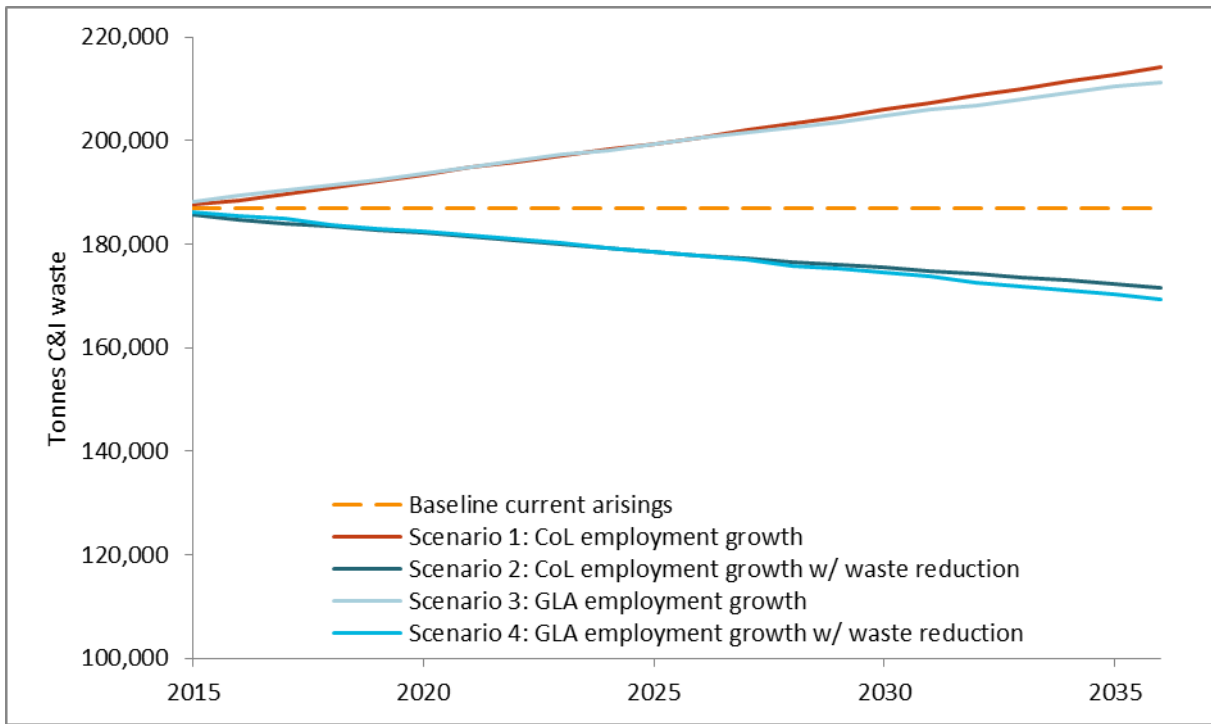


Figure 5: Total C&I waste projection results from key scenarios (2015-2036)

3.4-20 Estimated waste tonnages by each major stream (residual, dry recycling, organics) at key years for the selected scenarios are given in Table 12 below. Figure 6 shows the ranges of each of the waste streams over the period of the plan.

Table 12: Estimated C&I waste tonnages by stream for all scenarios in key years

Scenario	Stream	2021	2031	2036
Scenario 1 City of London employment growth	Residual	57,930	62,210	64,240
	Dry Recycling	100,230	112,150	115,810
	Organics	29,490	33,000	34,080
	Total Waste	187,660	207,360	214,120
Scenario 2 City of London employment growth w/ waste reduction	Residual	57,350	52,440	51,490
	Dry Recycling	99,230	94,540	92,840
	Organics	29,200	27,820	27,320
	Total Waste	185,780	174,800	171,650
Scenario 3 GLA employment growth	Residual	58,060	61,820	63,380
	Dry Recycling	100,460	111,450	114,260
	Organics	29,560	32,790	33,620
	Total Waste	188,090	206,060	211,250
Scenario 4 GLA employment growth w/ waste reduction	Residual	57,480	52,110	50,800
	Dry Recycling	99,460	93,940	91,590
	Organics	29,270	27,640	26,950
	Total Waste	186,210	173,700	169,350

Scenario	Stream	2021	2031	2036
Range	Residual	57,480 - 57,930	52,110 - 62,210	50,800 - 64,240
	Dry Recycling	99,460 - 100,230	93,940 - 112,150	91,590 - 115,810
	Organics	29,270 - 29,490	27,640 - 33,000	26,950 - 34,080
	Total Waste	186,210 - 187,660	173,700 - 207,360	169,350 - 214,120

Source: Anthesis

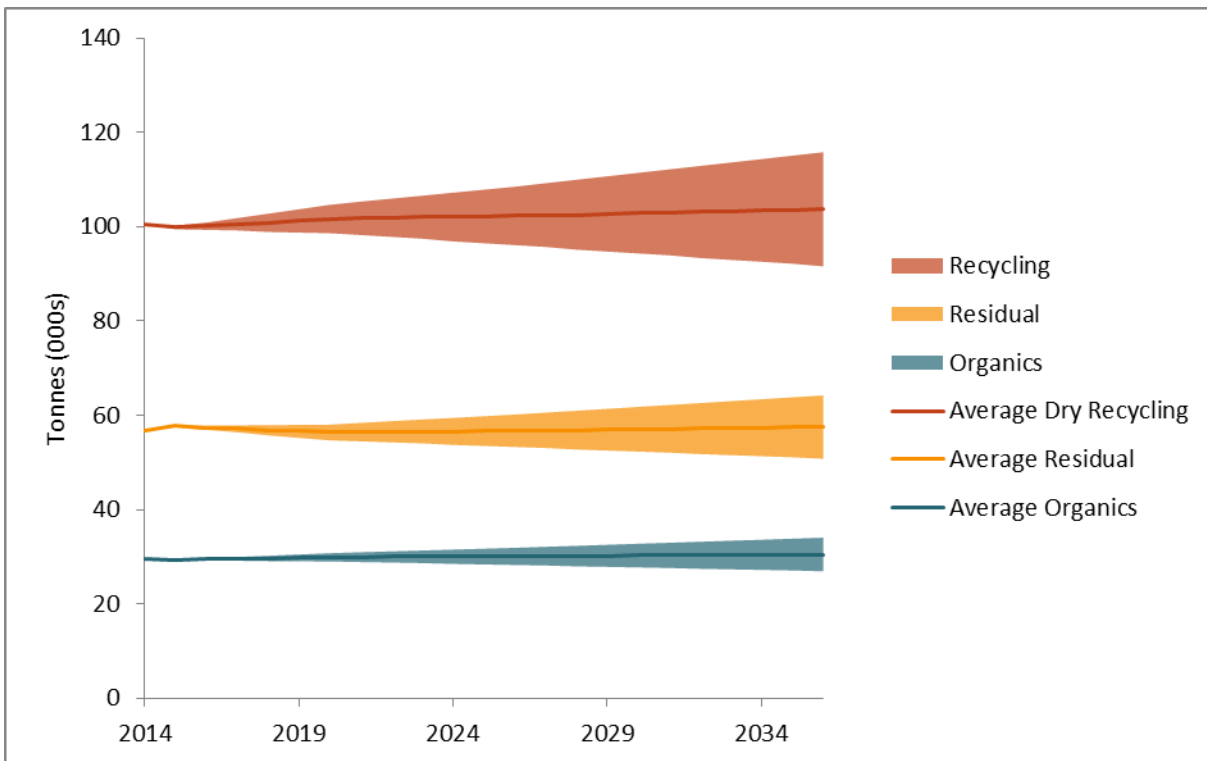


Figure 6: Range and average of arisings estimates by stream for all projected scenarios (2014 - 2036)

3.5 Construction, demolition and excavation waste

What is this waste?

3.5-1 CD&E waste comprises of waste arising from the construction and demolition industries, including excavation during construction activities, and is made up of mainly inert materials such as soils, stone, concrete, brick and tile. However, there are also non-inert elements in this waste stream such as wood, metals, plastics, cardboard, and residual household-like wastes. Due to their weight, the inert elements make up the majority of the total tonnage.

3.5-2 Within the City, there are a number of large infrastructure projects underway which have contributed to the CD&E waste arising, both now and in the near future.

Crossrail / Elizabeth Line

3.5-3 Crossrail Limited is building a new railway for London and the South East, running from Reading and Heathrow in the west, through 42km of new tunnels under London to Shenfield and Abbey Wood in the east. The new railway, which will be known as the Elizabeth line when services begin in 2018, will be fully integrated with London's existing transport network and will be operated by Transport for London.

3.5-4 Changes to Liverpool Street and Moorgate stations have contributed significant CD&E waste arisings within the City. Substantial changes to Farringdon station have also taken place, which should be noted as very close to the City, however this is within the London Borough of Islington.

Thames Tideway Tunnel

3.5-5 The Thames Tideway Tunnel will be a 25km interception, storage and transfer tunnel, running up to 65m below the Thames. This has been designed to prevent the tens of millions of tonnes of untreated sewage which currently overflow into the Thames each year, which contravenes the European Urban Wastewater Treatment Directive.

3.5-6 Starting in west London, the main tunnel generally follows the route of the River Thames to Limehouse, where it then continues north-east to Abbey Mills Pumping Station near Stratford. There it will be connected to the Lee Tunnel, which will transfer the sewage to Beckton Sewage Treatment Works. Construction has recently started in 2016.

3.5-7 The only site within the City is the Blackfriars Bridge Foreshore. Currently at this location, in a typical year, there are 21 discharges of untreated sewage with a volume of about 520,000 tonnes into the tidal River Thames. This is not a main tunnelling site however significant waste arisings are expected from the works at this site.

3.5-8 The project has been split into two phases, spread over a number of years:

1. Early works / pier relocation – these are the enabling works for the main works and involve moving the existing Blackfriars pier to the east of the bridges and the removal of infrastructure around the old HMS President mooring site. Some advance works are underway, with this phase starting fully in November 2016.
2. Construction of the main Combined Sewer Overflow interception which will consist of a shaft and include a large area of temporary cofferdam and associated fill. This phase is likely to start around November 2017.

Bank Station Capacity Upgrade (BSCU)

3.5-9 Transport for London (TfL) is to carry out upgrade works to Bank Station, between 2016 and 2019. The BSCU involves a major upgrade of the Bank Monument Station Complex to improve passenger access, circulation and interchange, and improved emergency fire and evacuation protection measures¹⁵.

¹⁵ <https://tfl.gov.uk/corporate/publications-and-reports/bank-station-capacity-upgrade>

3.5-10 The BSCU includes works to provide a new passenger entrance opening on to Cannon Street at the junction with Nicholas Lane with lifts and escalator connections; a new Northern Line passenger concourse using the existing southbound platform tunnel; a new Northern Line southbound running and platform tunnel; and new internal passenger connections between the Northern Line, the Docklands Light Railway (DLR) and the Central Line. Works to divert and protect utilities and to protect listed and other buildings from ground settlement as a result of construction will also be undertaken.

3.5-11 Two main worksites are to be used to construct the scheme: Cannon Street and Arthur Street. All properties on the Cannon Street site will be demolished and a new station entrance; lifts and escalators will be rebuilt and later redeveloped with new offices and retail units. The Arthur Street site is where the majority of the tunnelling works will be carried out.

Current Arisings

3.5-12 Establishing the current waste arisings of CD&E waste is challenging due to the lack of data sources for this type of waste material. There is also normally a time lag for data to become available, and therefore 2014 were seen to be the most appropriate year to focus on for a baseline.

3.5-13 Consequently, many of the infrastructure projects identified above were not under construction in 2014 and therefore may not feature in the baseline waste arisings figures. However, for estimating future arisings, some of these projects are likely to feature significantly as a proportion of the overall CD&E waste being generated.

3.5-14 The Waste Data Interrogator 2014 identifies 451,860 tonnes (see Table 13) of EWC Chapter 17 (Construction & Demolition Wastes) originating in the City of London. WDI collates data collected by the Environment Agency from waste returns from individual waste sites. There are some draw backs to this data, including potential double counting of waste streams, and the fact that it does not cover waste treated under exemptions, or at energy from waste facilities.

3.5-15 However, as there are no CD&E transfer, treatment, or disposal sites in the City of London; double counting of waste is unlikely to occur, since WDI only records the most recent location that waste has been delivered from, not necessarily its ultimate origin. CD&E waste is often reused or treated on-site, or at exempt sites, which is not captured by WDI, as it is not subject to waste returns. Over the course of the study, Anthesis conducted interviews with several of the largest construction companies currently operating in the City of London; in all cases, the construction companies indicated that there was little or no on-site reuse due to a lack of space, and that the construction waste generated in the City of London sent to exempt sites outside the City was minimal. Therefore it is believed that data obtained from WDI in this case is largely representative of CD&E waste generated within the City.

3.5-16 In order to verify this, data were received from some of the larger construction contractors operating within the City. This data was scaled up using the development schedule information provided by the City of London. This estimate produced a figure of 350,800 tonnes. In addition to this, 107,760 tonnes were produced by the Crossrail project. The total is therefore 458,560 tonnes, which largely aligns with the WDI figure. Therefore, the WDI figure of 451,860 tonnes is thought to be a robust estimate for 2014.

3.5-17 The estimated composition of CD&E waste in the City is shown in Table 13.

Table 13: CD&E arisings by type (2014)

Waste Type	2014 Tonnes	Fraction
Inert	352,800	78.1%
Non-hazardous	97,190	21.5%
Hazardous	1,870	0.4%
Total	451,860	100.0%

Source: Environment Agency WDI 2014

Destinations of City of London’s CD&E waste

3.5-18 Based on data from WDI 2014, over 99% of CD&E waste originating in the City is sent to a location in London or the South East, with the remainder being sent to sites in the Midlands, as shown in Table 14.

Table 14: Destination WPAs of CD&E waste (tonnes)

Local Authority	Waste Planning Authority	Inert	Non-hazardous	Hazardous	Total
Newham	East London Waste Authority	228,750	5,690	10	234,450
Barking and Dagenham	East London Waste Authority	4,450	66,620	160	71,230
Thurrock	Thurrock	38,660	0	10	38,660
Greenwich	Greenwich	20,460	5,060	0	25,520
Hillingdon	West London Waste Authority	21,930	0	0	21,930
Havering	East London Waste Authority	16,370	2,370	40	18,780
Merton	South London Waste Authority	9,400	5,100	0	14,500
Surrey	Surrey	9,810	0	460	10,280
Waltham Forest	North London Waste Authority	1,280	3,900	0	5,180
West Sussex	West Sussex	0	5,100	0	5,100
Barnet		490	2,840	0	3,320
Northamptonshire	Northamptonshire	0	0	960	960
Other WPAs	North London Waste Authority	1,200	500	230	1,930
Total		352,800	97,190	1,870	451,860

Source: Environment Agency Waste Data Interrogator, 2014. *Due to rounding, not all columns/rows total precisely

3.5-19 WDI shows that 96% of CD&E waste is sent to transfer stations, sorting facilities or for re-fill applications, with only 4% being sent to landfill. While it is not possible to ascertain the destination of the waste after it passes through transfer stations and sorting facilities, data received from major construction firms in the City show upwards of 95% of CD&E waste being diverted from landfill for reuse or recycling. Approximately 842 tonnes of the hazardous CD&E identified is comprised of asbestos containing material.

Future Arisings

3.5-20 Quantities of CD&E waste are highly reliant on the level of development being undertaken in the area being considered. For an area like the City of London, this can vary year on year, partially due to large infrastructure projects having a disproportionate effect on the overall arisings, as well as general refurbishment and development works.

3.5-21 For this reason, this is a particularly hard waste stream to predict, especially for years more than 5-10 years in the future, for which there is limited oversight into the level of likely development. The further into the future projections are made, the less robust they are likely to be. Whilst this is true of all waste streams to a certain degree, it is especially true for CD&E waste due to the non-linear nature of waste generation over time.

3.5-22 CD&E waste was projected by assuming 344,100 tonnes as a baseline for CD&E arisings in the City, excluding any large infrastructure developments. Growth was applied to this baseline figure based on development trajectories provided by the City of London. The year-on-year likely development trajectory for housing, hotels, and offices were compared year-on-year, in order to determine whether construction activity is likely to be greater or lesser than the 2014 baseline year, and applied proportionate to the change in floor space area (m²) of developments of each category identified in the City of London Development Schedule.

3.5-23 It has been assumed that the majority of associated CD&E waste tonnage will be generated during the first year of construction/demolition, with the arisings decreasing year-on-year for the duration of the development; the estimates also assume that lower volumes of waste will be generated from refurbishment projects compared to new build. In addition to these changes in baseline tonnage, estimated yearly arisings associated with major infrastructure projects (Crossrail, Bank Station, Thames Tideway) were included, based on data provided by the contractors. Projections are shown in Figure 7 and Table 16. It has been assumed that the approximate proportion of Inert, Non-hazardous, and Hazardous materials will remain consistent.

3.5-24 In discussion with the City, it was considered that as we progress further into the future, an increasing proportion of development is likely to be refurbishment than new build. This is due to the focus in recent years on sustainability in building, which means more flexible spaces which are more easily converted, compared to older buildings. As refurbishments produce lower associated waste volumes (less than half of the volume generated by new builds per unit area) this would decrease the waste arisings generated. The baseline scenario and a second scenario associated with increased refurbishment in the City are described in Table 15, and illustrated in Figure 7. These scenarios do not take into account any unforeseen major construction projects which have yet to be developed.

Table 15: Modelled CD&E waste scenarios

Scenario	Description	Source
Scenario 1 Baseline	Overall waste changes in-line with City of London development trajectories	City of London development Trajectories (2015)
Scenario 2 Increased refurbishment	Overall waste changes in-line with City of London development trajectories, with refurbishment increasing to 50% of developments between 2021-2036	City of London development Trajectories (2015)

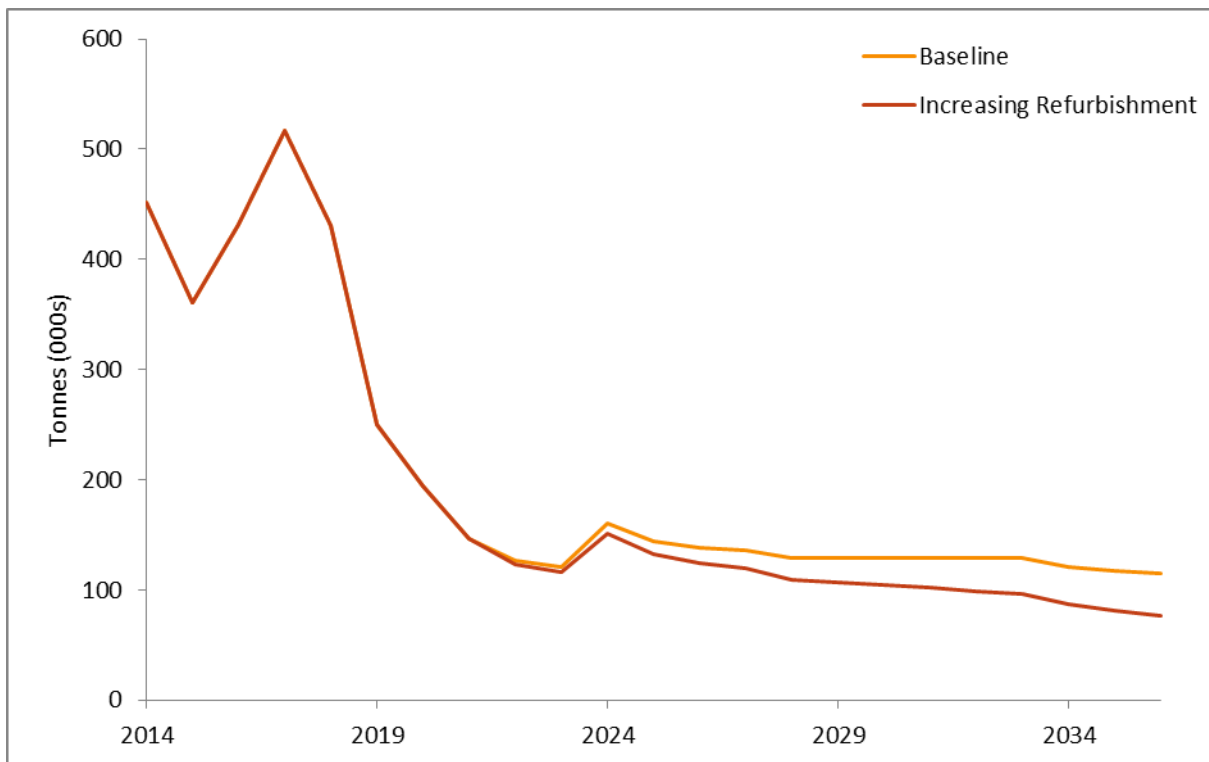


Figure 7: Projected total CD&E arisings for key scenarios

3.5-25 Projected arisings for individual CD&E waste streams in key years under each scenario are presented in Table 16.

Table 16: Estimated CD&E waste tonnages for all scenarios in key years

Scenario	Stream	2021	2031	2036
Scenario 1 Baseline growth	Inert	114,824	100,420	89,660
	Non-hazardous	31,633	27,660	24,700
	Hazardous	609	530	480
	Total	147,065	128,610	114,840
Scenario 2 Increasing refurbishment	Inert	114,824	79,430	60,220
	Non-hazardous	31,633	21,880	16,590
	Hazardous	609	420	320
	Total	147,065	101,730	77,130
Range	Inert	114,824	79,430 - 100,420	60,220 - 89,660
	Non-hazardous	31,633	21,880 - 27,660	16,590 - 24,700
	Hazardous	609	420 - 530	320 - 480
	Total	147,065	101,730 - 128,610	77,130 - 114,840

Source: Anthesis

3.5-26 As illustrated in Figure 7, there is a significant drop in CD&E arisings from 2014 to 2015; this is due to a large decrease quantity of arisings associated with the Crossrail project after initial excavation. The increase in arisings between 2016 and 2018 is due to an anticipated spike from the Bank station and Thames tideway projects, which will then be underway. More details with regards to these specific projects and future waste generation are presented in the following sections.

3.5-27 After 2018, waste arisings decrease due to the anticipated completion of currently scheduled developments. There is no visibility on any large infrastructure projects or major development schemes that may result in similar spikes further in the future, as such, further future spikes in CD&E waste arisings are difficult to predict and therefore have not been included in these projections.

3.5-28 These figures should be reviewed regularly in line with the GLA’s waste arisings reports, and the City should engage with TfL and the GLA regularly through the London Waste Planning Forum, to ensure they have visibility on any future infrastructure projects which would likely result in increased CD&E waste quantities.

Crossrail / Elizabeth Line

3.5-29 At Liverpool Street station, the main civil engineering works are due to complete in the fourth quarter of 2017. However all the tunnelling and shafts have been completed and waste generation at this locality, as well as at Farringdon, has been tailing off (see Section 0). Fit-out of stations and testing will continue afterwards. It is expected that Crossrail services will commence on the central section by late 2018, therefore waste projections for this project in the City do not go beyond 2018.

Thames Tideway Tunnel

3.5-30 Thames Tideway has provided estimated figures (approximately 80,000 tonnes over the life of the project) for the waste generated at Blackfriars Bridge Foreshore. Information was provided with regards to the programme and this has been used to estimate annual waste arisings from the project. It is thought that the most waste intensive phase of this project is likely to be in the construction of the shaft in 2018.

3.5-31 The project has planned for excavation waste (90.8% of the total) to go for ‘beneficial uses’ (e.g. landfill capping) and 8.9% going for recycling. The majority of the 0.3% of the waste going for disposal is hazardous waste.

3.5-32 The project intends to transport as much waste material from the site as possible via barge, rather than utilising the roads.

Bank Station Capacity Upgrade (BSCU)

3.5-33 An Environmental Impact Assessment (EIA) was carried out for the BSCU project. As part of this, an assessment of the waste generated was carried out and the estimates presented in Table 17 were calculated.

Table 17: Total Annual (bulked) waste arisings for the BSCU split by demolition, excavation and construction activities

Waste Source	2016	2017	2018	2019	2020
Demolition waste	18,584	-	-	-	-
Bulked excavated materials	12,616	70,294	44,680	8,676	4,988
Concrete waste from tunnel construction	3,741	13,619	9,786	1,923	1,080
Operational infrastructure construction waste	861	1,921	2,959	1,148	1,222

Source: Waste Management and Resource Use, BSCU EIA, 2014, Chapter 15

3.5-34 The project has a target to recover for beneficial reuse or reprocess/recycle 95% of the overall waste generated. As there are limited opportunities to use the excavated material on site, it is proposed to transport it from site by lorry to be used for beneficial purposes such as clean fill, contaminated land remediation or capping material for existing landfill sites.

3.5-35 Demolition waste will similarly be reused where practicable. For example, most waste concrete on the project, including that arising as a by-product of the Sprayed Concrete Lining tunnelling process, is anticipated to be crushed at specialist facilities and used for future construction projects¹⁶.

3.6 Low level radioactive waste

3.6-1 Radioactive waste is any material that is either radioactive itself or is contaminated by radioactivity and for which no further use is envisaged. Most radioactive waste is produced from nuclear power stations and the manufacture of fuel for these power stations. This is referred to as “nuclear waste.” Radioactive waste is not included in the definition of hazardous waste.

3.6-2 Radioactive waste also arises from nuclear research and development sites. Some also arises from Ministry of Defence sites and medical, industrial and educational establishments. This is sometimes referred to as “non-nuclear waste”.

3.6-3 This waste stream is divided into four categories as follows:

1. High Level Wastes (HLW): These are highly radioactive materials that generate substantial amounts of heat. HLW is the product from reprocessing spent nuclear fuel at Sellafield in Cumbria. It arises as highly radioactive nitric acid, which is converted into glass within stainless steel containers in a process called vitrification which is carried out at Sellafield. If declared a waste, spent fuel can also be categorised as HLW.
2. Intermediate Level Wastes (ILW): These are wastes with radioactivity levels that are higher than for Low Level Waste, but which do not require heating to be taken into account in the design of management facilities. ILW is sufficiently radioactive to require shielding and containment. It arises mainly from the reprocessing of spent fuel and from operations and maintenance at nuclear sites, including fuel casing and reactor components, moderator graphite from reactor cores, and sludges from the treatment of radioactive effluents.
3. Low Level Waste (LLW): These are radioactive wastes other than that suitable for disposal with ordinary refuse. Radiation levels do not exceed 4 gigabecquerels per tonne of alpha activity, or 12 gigabecquerels per tonne of beta or gamma activity. (A Becquerel is the unit of radioactivity, representing one disintegration per second.) Unlike HLW and ILW, LLW does not normally require shielding during handling or transport. LLW consists largely of paper, plastics and scrap metal items that have been used in hospitals, research establishments and the nuclear industry. As nuclear plants are decommissioned, there will also be large volumes of this type of waste arisings in the form of soils, concrete and steel. LLW represents about 90% by volume of UK radioactive wastes but contains less than 0.0003% of the radioactivity.
4. Very Low Level Waste (VLLW): This is a sub-category of LLW, consisting of the same sorts of materials, and divided into Low Volume (“dustbin loads”) and High Volume (“bulk disposal”). Low volume VLLW can be disposed of to unspecified destinations with municipal, commercial or industrial waste. High volume VLLW can be disposed of to specified landfill sites and controlled as specified by the environmental regulators.

¹⁶ Bank Station Capacity Upgrade – fact sheet 16 Management of excavated material and waste

3.6-4 Categories 3 and 4 are those of interest in this Plan. Some activities which involve radioactive substances require a permit from the EA. No data on arisings and their destinations is held by the EA, as there is a different regime for its regulation.

3.6-5 In order to estimate quantities of this waste that requires management, a list of those permitted to handle radioactive substances was requested from the EA. Only one organisation, Bart's Hospital, was identified and was contacted to provide quantities. Very small amounts have been generated here. However there has been an increasing trend, due to an extension of their cancer treatment services. From none of this type of waste in 2013, 26.5kg were generated in 2014, increasing to 152.8kg in 2015.

3.6-6 This waste is stored on-site (in lead-lined receptacles), until they are full, when specific requests for collection are made. Collections are made by a specialist healthcare waste contractor and the material is taken directly to their licenced incineration plant in Ashford, Kent.

3.6-7 There is likely to be further increases in growth in low level radioactive waste from Bart's Hospital over the period, however the actual quantities are still going to be very small, and it is not possible to estimate this increase to any degree of accuracy. However there are appropriate measures in place to treat this material currently arising and these are likely to continue.

3.7 Agricultural Waste

3.7-1 Since 2006, most agricultural waste has been subject to the same controls that have applied to other sectors for many years (with the exception of natural wastes including slurries and manures used as fertiliser on agricultural premises).

3.7-2 In the 2006 waste management regulations agricultural waste was defined as waste from premises used for agriculture within the meaning of the Agriculture Act 1947, the Agriculture (Scotland) Act 1948 or the Agriculture Act (Northern Ireland) 1949, and the Chartered Institute of Wastes Management (CIWM) refer to it as waste that has been produced on a farm in the course of 'farming'.

3.7-3 Data from WDI shows that 5 tonnes of 'plant tissue waste', coded as from agricultural sources (i.e. EWC 02 01) were generated within the City in 2014.

3.7-4 Given the very small tonnage of this waste, the predominantly urban character of the City, and that no activities or land within the City of London is are classed as agricultural, it is not considered to need specific consideration.

3.7-5 Other waste types categorised under Chapter 02, which may include some animal tissue which requires specific treatment under the Animal By-Product Regulations, has been given special mention in the C&I section.

3.8 Hazardous Waste

3.8-1 Hazardous wastes are categorised as those that are harmful to human health, or the environment, either immediately or over an extended period of time. They range from asbestos, chemicals, and oil through to electrical goods and certain types of healthcare waste. Quantifying the amount of Hazardous waste is somewhat complicated, as not all hazardous waste is recorded in the same way. Hazardous waste requires a range of specialist facilities for treatment and disposal, but it is not anticipated that substantial additional need for new capacity within the City of London will develop, and as such, opportunities for additional hazardous waste management capacity have not been identified in as part of this study.

3.8-2 The Hazardous Waste Data Interrogator (HWDI) identified 1,124 tonnes of hazardous waste originating in the City of London in 2014; this tonnage is based on consignment notes completed by waste hauliers. In the previous 2013 study, 945 tonnes were identified through HWDI. These records are likely to provide a high level of accuracy, however, not all hazardous waste is subject to consignment notes, and significant tonnages may be delivered directly to waste sites by producers, and would therefore not be captured by consignment notes.

3.8-3 The Waste Data Interrogator identifies 3,038 tonnes of hazardous waste originating within the City in 2014; this tonnage includes the 1,124 tonnes identified by HWDI. A breakdown of hazardous waste generated in the City can be found in Table 18, below.

Table 18: Hazardous waste originating in the City of London

Waste Type/EWC Chapter	Tonnes
13 - Oil Wastes And Wastes Of Liquid Fuels	1,518
18 - Human And Animal Health Care Waste	1,088
16 - Wastes Not Otherwise Specified In The List	282
15 - Packaging, Absorbents , Wiping Cloths Etc N.O.S.	69
05 - Petroleum, Gas And Coal Processing Wastes	36
08 - Paint, Adhesive, Sealant And Ink Manufacturing Waste	24
20 - Municipal Wastes	19
19 - Waste And Water Treatment Wastes	1
11 - Chemical Surface Treatment And Metal Coating Wastes	1
14 - Organic Solvent, Refrigerant And Propellant Waste	1
Total	3,038

Source: Environment Agency WDI, 2014

3.8-4 Most hazardous waste is being processed in other London boroughs, and the South East of England, with some small tonnages being processed as far away as Warrington.

3.8-5 In 2014, 1,078 tonnes of Human and animal health care wastes – likely from St Bart's Hospital - was processed at Grndon’s Star Works Treatment Plant in Wokingham. Approximately 842 tonnes of asbestos was identified from the City of London; however, this has been covered by the hazardous portion CD&E waste stream, and not included in these figures. A complete breakdown of hazardous waste destinations is presented in Table 19 below.

Table 19: Destinations of hazardous waste from the City of London

Facility WPA	Tonnes
Havering WPA	1,418
Wokingham WPA	1,079
Oxfordshire WPA	233
Hertfordshire WPA	172
North East Lincolnshire WPA	25
Northamptonshire WPA	21
Other WPAs	71
Total	3,038

Source: Environment Agency WDI, 2014

3.8-6 In addition to the above figures, there are 27,360 tonnes of end of life vehicles, which the Waste Data Interrogator identifies as arising within the City of London. The majority (i.e. 95%) of these are treated at a facility in Haringey, with the remaining being treated at facilities in Enfield and West Sussex. These figures have not been included in the projections below. They are however, included in the C&I waste projections.

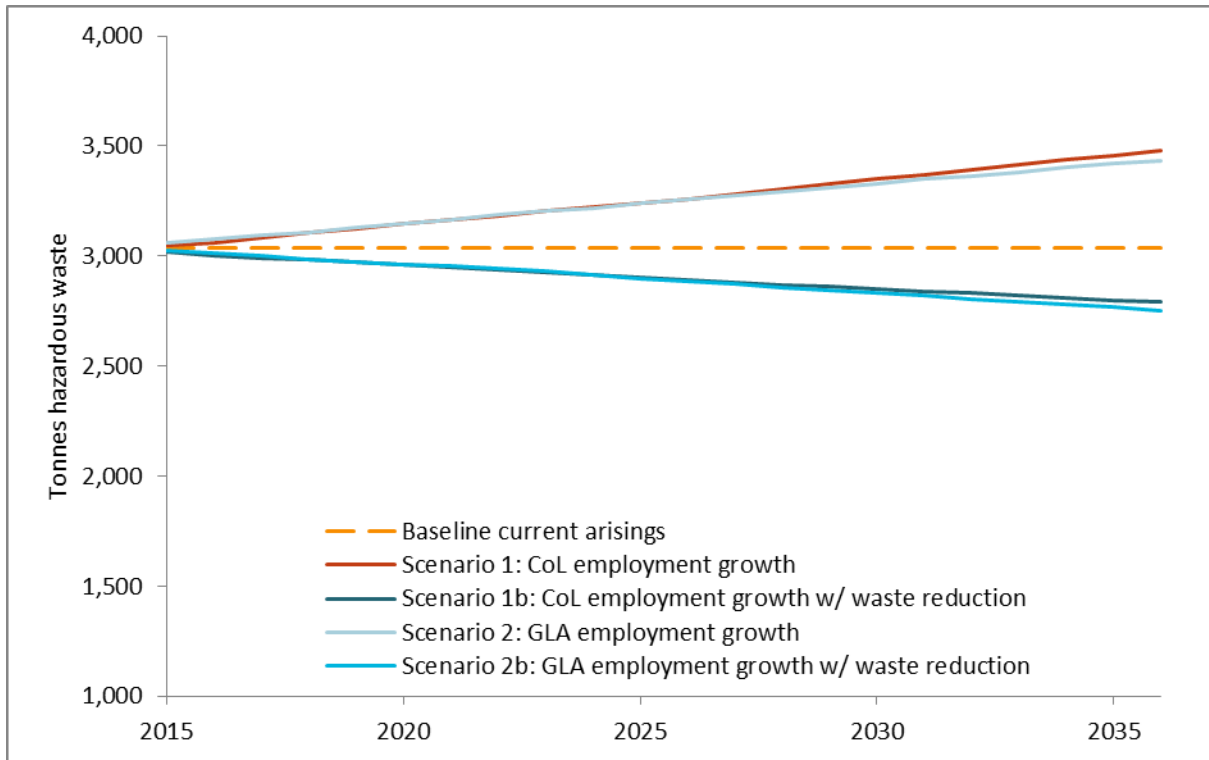


Figure 8: Hazardous waste arisings in the City of London

3.8-7 Projecting the Hazardous waste arisings forward into the future, the same four scenarios were used as for the C&I waste arisings, described in Table 11. The results of these projections are shown in Figure 8 and Table 20.

Table 20: Projected hazardous waste in the City in key years

Scenario	2021	2031	2036
Scenario 1: City of London employment growth	3,166	3,371	3,481
Scenario 2: City of London employment growth with 1% p.a. waste reduction	2,951	2,841	2,790
Scenario 3: GLA employment growth	3,168	3,350	3,434
Scenario 4: GLA employment growth with 1% p.a. waste reduction	2,953	2,824	2,753
Range	2,951 – 3,168	2,824 – 3,371	2,753 – 3,481

Source: Anthesis

3.9 Wastewater

3.9-1 Thames Water Limited is responsible for wastewater and sewage sludge treatment in London, and manages sewerage infrastructure as well as sewage treatment works. Thames Water operates across London and the Thames Valley supplying water services to 9 million customers and wastewater services to 14 million. On average, each day the company supplies 2.6 billion litres of drinking water, and removes and

treats more than 4 billion litres of sewage. For its wastewater services, assets include 350 sewage treatment works, 108,000 km of sewer and 2,530 pumping stations¹⁷.

3.9-2 Thames Water was contacted to ascertain whether estimates with regards to the quantity of wastewater attributed to the City of London could be provided, however no data was received. It has been estimated that 3.8 million m³ of wastewater is generated in the City each year.

3.9-3 This has been calculated using population and employment projections. The assumptions used were that each employee produced 37 litres of wastewater per day and household use is 150 litres per person per day (which assumes wastewater generation is similar to water use). This equates to 3.44 million m³ per year (based on 224 working days) for employees and 0.38 million m³ for households.

3.9-4 The City's wastewater is treated at the sewage treatment works (STW) in Beckton, in the London Borough of Newham, which is the largest in Europe, and treats the waste of a population of 3.5 million people. Thames Water is undertaking an upgrade and expansion of this facility to both treat sewage to a higher standard, and increase the capacity to a population equivalent of 3.9 million.¹⁸

3.9-5 Although not specifically calculable, the City's proportion of the wastewater treated at Beckton is very small. The increase in treatment capacity at Beckton STW is around 11%, which more than accounts for increases in anticipated population of the City.

3.10 Summary of current and future waste arisings

3.10-1 All current waste arisings and projections have been summarised below in Table 21. Some key points are:

- CD&E waste made up 70% of the overall waste generated within the City in 2014. However this is expected to significantly decrease over the period due to infrastructure projects and current large developments completing and an increasing proportion of redevelopment being refurbishment in the future, resulting in less waste generated. However, these figures should be reviewed regularly by the WPA in line with the GLA's waste arisings reports, and the City should engage with TfL and the GLA regularly through the London Waste Planning Forum, to ensure they have visibility on any future infrastructure projects which would likely result in increased CD&E waste quantities;
- LACW was less than 1% of the overall waste stream in 2014. In all of the scenarios developed, it is not anticipated to become more than 2% of the overall waste stream;
- C&I waste made up 29% of the waste stream in 2014. However by 2036, projections show that this could become the dominant waste stream, of 63-67% of the total waste, predominantly due to a significant decrease in CD&E waste seen on the 2014 baseline; and
- Hazardous waste is less than 1% of the waste stream in 2014 and has been estimated to grow in line with the C&I waste, therefore also increasing in scale by 2036, however remaining at only 1% of the waste stream.

¹⁷ Thames Water: All Wastewater Treatment & Sewerage Projects

¹⁸ Thames Water case studies: Beckton Upgrade

Table 21: Current waste arisings and projections generated in the City of London (tonnes)

Waste type	2014 (baseline)	2021	2031	2036
Local authority collected	3,949	3,717 - 4,457	3,382 - 4,947	3,382 - 5,094
Commercial & Industrial	186,891	186,210 - 187,660	173,700 - 207,360	169,350 - 214,120
Construction, Demolition & Excavation	451,860	147,065	101,730 - 128,610	77,130 - 114,840
Low level radioactive	Negligible (26.5kg)	N/A	N/A	N/A
Agricultural	5	N/A	N/A	N/A
Hazardous	3,038	2,951 – 3,168	2,824 – 3,371	2,753 – 3,481
Wastewater	3.8 million m ³	N/A	N/A	N/A
Total	645,743	339,943-342,350	281,636-344,288	252,615-337,535

Source: Anthesis

Table 22 shows the total waste streams (i.e. residual, dry recycling and organics) from both LACW and C&I sources, to give an indication of the likely scale of treatment capacity required for these types of wastes arising in the City.

Table 22: LACW and C&I waste totals by waste type (tonnes)

Waste type	2014 (baseline)	2021	2031	2036
Residual waste	60,276	56,644 – 61,098	54,089 – 65,382	52,838 – 67,506
Dry Recycling	100,807	99,356 – 107,257	94,955 – 114,634	92,605 – 118,367
Organics	29,486	29,128 – 31,366	27,838 – 33,485	27,148 – 34,579

Source: Anthesis

3.10-2 As discussed in the next section, there is no waste treatment capacity within the City itself and therefore it relies on waste management capacity of other WPAs. There are some key summary points with regards to where waste generated within the City travels to:

- The majority of LACW is treated within Greater London, with the exceptions being organic waste treated predominantly in Kent and some dry recycling materials being transported more widely around the country (after sorting, which is within London) for reprocessing;
- 90% of the residual waste is treated within Greater London, with the vast majority going to Cory Environmental’s Riverside Resource Recovery facility. Destinations for only a relatively small proportion of organics and dry recycling can be identified. The organic LACW is being treated in Kent and the dry recycling is being separated in facilities in Southwark and Tower Hamlets; and
- 87% of CD&E was sent to a facility within Greater London. Some of these may be transfer stations, and while it is not possible to ascertain the destination of the waste after it passes through transfer stations and sorting facilities, data received from major construction firms in the City show upwards of 95% of CD&E waste being diverted from landfill for reuse or recycling.

3.10-3 Figure 9 shows where waste originating in the City travels to (note this is only for waste where destinations have been able to be identified), for those authorities receiving more than 1,000 tpa. It shows that all of the WPAs receiving greater than 1,000 tonnes a year are within London or the south east of England, with east London Boroughs, particularly Newham, receiving a significant proportion of the waste (this is mainly CD&E waste).

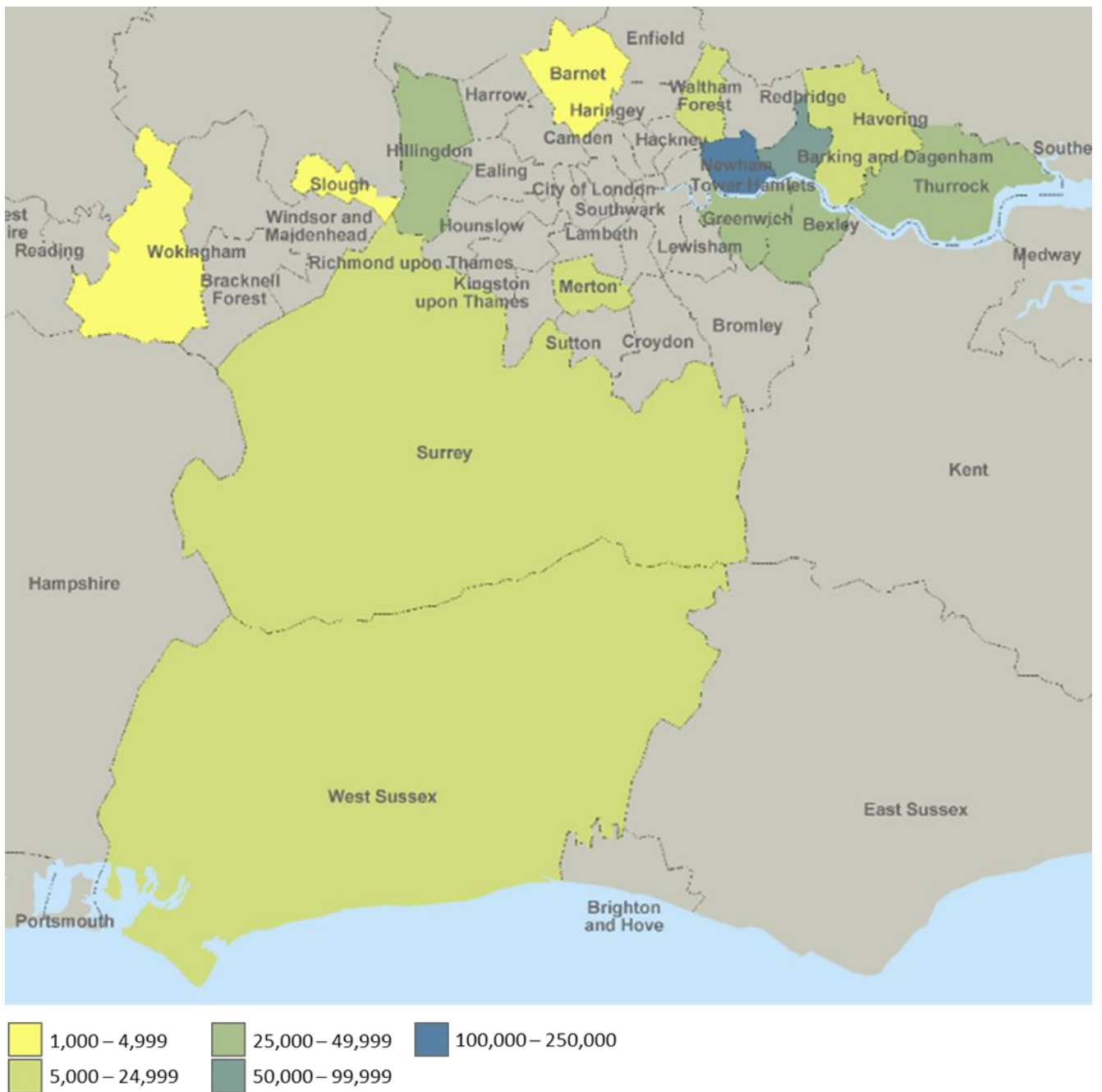


Figure 9: Destinations of waste originating in the City of London (tonnes) in 2014 Source: Anthesis

4 Waste management capacity

4.1 Introduction to waste management capacity

4.1-1 Walbrook Wharf is the City’s only waste site and is used primarily as a waste transfer facility transporting waste by river to other river served waste management facilities. As such, the City itself has no actual large scale waste treatment capacity and therefore relies on cooperation from other WPAs. A few buildings either have, or plan to have, small scale on-site facilities to treat food waste generated at those sites, but exact capacity is not known and it is not expected that additional food waste could be treated on these sites.

4.1-2 Given the lack of available land within the City, there is limited opportunity to expand the waste management capacity within the City. However, this section reviews potential small scale treatment technology that could be employed either at Walbrook Wharf or other small sites, or on-site treatment options for large buildings or other developments.

4.1-3 This section has mostly considered potential treatment provision for LACW and C&I waste, and has not considered options for CD&E waste. Although it is currently the largest portion of the waste arising in the City, it is being managed in accordance with the waste hierarchy, with landfill diversion rates of 95%. Therefore, this and given the lack of available space for waste management sites, it was considered more appropriate to focus on small scale technologies to treat LACW and C&I waste.

4.2 Current Waste Management Provision

4.2-1 The report “Waste Management Capacity in the City of London”¹⁹ examined the provision of waste treatment capacity within the City of London, and the options for developing new capacity to deal with City of London generated waste. The study concluded that to deal with ca. 100,000 tonnes of waste per year, using technologies such as sorting, composting or energy recovery, a land use of 2ha would be required. In an area with limited development land and very high land prices, the availability of such a site is highly unlikely. The report cited Walbrook Wharf as the only existing waste management facility in the City, and a number of possible small scale technologies, which could potentially occupy space at the Wharf, were postulated including MRF (20,000t) or MBT/MHT (40,000t), although the civil and mechanical engineering challenges of such facilities would be considerable, and because of their small scale, their financial viability was likely to be limited. Also re-siting of the police vehicle parking and maintenance operations currently occupying this space would also represent a challenge in an area with very limited development land or available facilities.

4.2-2 For this study Anthesis re-examined options at Walbrook Wharf and investigated whether changes in waste management technology since 2009 will enable viable waste management facilities to be developed in the City.

4.2-3 Walbrook Wharf is a 110,000tpa permitted waste transfer station, limited to 85,000tpa for safety reasons. It occupies a footprint of 0.66ha. The building is on three floors, with the top floor used for vehicle maintenance and parking, with the first and ground floors used for the waste transfer operation. The first floor houses four discharge bays, including compactors, for the discharge of residual waste from collection vehicles, which gain access via a weighbridge and ramp from the ground floor. The first floor also provides vehicle storage, wash down facilities and a small amount of WEEE and recyclate storage (in 1,100 litre bins), whilst the ground floor has some waste bin storage. Compacted waste is discharged directly into containers on the ground floor, which when full are stored on the ground floor prior to carriage by crane to a waiting barge. One barge per day (26 containers, each with 10-12 tonnes compacted waste) takes the containerised waste to Cory Environmental’s Riverside energy from waste facility in the London of Bexley, some 15 miles downstream. Operating hours, access by road and barging operations are time limited to reduce nuisance to local residents.

4.2-4 Walbrook Wharf is subject to a number of Planning Policy designations which may affect the potential future uses which would be acceptable on this site. In summary these include:

¹⁹ AeA Technology for the City of London Corporation (published December 2009)

- Safeguarded river wharf – Walbrook Wharf should only be used for waterborne freight handling use;
- Safeguarded waste site – Walbrook Wharf is protected as a waste site which must be re-provided elsewhere if lost to a non-waste use;
- City Flood Risk Area (River Flood risk zone 3a and surface water flood risk area) restricts the land uses permitted in this area; and
- Thames Riverside policy – promoting office led commercial development.

4.2-5 Arisings estimates for non-hazardous waste from LACW and C&I sources generated in the City of London, across the forecast period, amount to as much as 34,500tpa organic waste (likely to be mostly or all food waste), 117,500tpa dry recyclates and 67,000tpa residual waste. Relating these volumes to the size of facility required to treat this waste shows considerable land take, as summarised in Table 23 following:

Table 23: Land requirements and building size for typical waste management facility types

Waste facility Type	Throughput (tpa)	Waste Type	Site Area	Building dimensions
Composting (windrow)	25,000	green waste only	2-3ha	n/a
Composting IVC	25,000	green waste and food	1-2ha	20mx30mx4-5m height
AD	5,000	food waste	0.15ha	30mx15mx10m height
AD	40,000	food waste	0.6ha	40mx25mx7m height
MRF	50,000	mixed recyclates	1-2ha	70mx40mx12m height
MBT	50,000	residual waste	<1-2ha	100mx30mx10-20m height
Pyrolysis/gasification	50,000	residual waste	1-2ha	60mx60mx15-25m height
Thermal (small)	50,000	residual waste	<1-2ha	30mx40mx15-25m height
Thermal (large)	250,000	residual waste	2-5ha	120mx60mx25-30m height

Source: "Planning for Waste Management Facilities", Office of Deputy Prime Minister, 2004

4.2-6 As concluded in the “Waste Management Capacity in the City of London” report it is likely that the space and infrastructure available at Walbrook Wharf is insufficient to accommodate a suitably sized residual waste treatment, and engineering modification required for such a facility would be substantial. Smaller scale anaerobic digestion or MRF may be feasible, although processing more waste streams at the Wharf is likely to impact on vehicle access and cause potential queueing and with 141,500tpa AD capacity²⁰ and 2.01 million tpa²¹ of MRF capacity already operational within London, such smaller scale facilities are unlikely to be financially viable from an operational cost and gate fee view point.

²⁰ Biogas Map at Biogas-info, updated May 2016

²¹ [UK Gov website: Waste management for England 2014](#), data for 2014

4.3 Potential Options for New Developments

4.3-1 The general move to adopt the requirements of a circular economy²², reflected in EU Circular Economy legislation adopted in December 2015, and supported by Defra and the UK government, includes moves to further increase recycling rates for both local authorities and businesses (through packaging recycling targets), and promote re-use and industrial symbiosis to minimise discarded materials going into the waste stream. The London Waste & Recycling Board publication “Towards a Circular Economy” also stresses the importance of the circular economy in London to reduce waste and drive better resource productivity. The report concludes that “by adopting a circular economy approach, London can unite business interests with the city’s wider development needs. This will help London remain globally competitive”.

4.3-2 The requirements of the circular economy will need to be addressed by businesses within the City, and presents opportunities particularly for new business developments within the City.

4.3-3 Rather than trying to deal with all the waste generated within the City of London locally, there are options for each large office building or complex to make provisions to deal with their own waste, resulting in reduced loading on current waste treatment facilities and reducing road miles in getting collected material to processing facilities.

4.3-4 As an example, British Land, with developments in the City, are creating waste management options for a number of their developments, including the use of food waste digesters, small scale anaerobic digestion and recycle segregation facilities on site, to deal with the waste produced by their individual developments.

4.3-5 Larger scale options could be used to deal with waste on an area basis, or for a collection of buildings. Table 24, based upon market research undertaken by Anthesis, gives examples of smaller scale waste management equipment commercially available, with throughput, capital cost and physical footprint.

²² “A circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life” (WRAP)

Table 24: Footprint and capital cost of examples of small scale waste management processing options

Waste Type	Technology Type	Capacity (tpa)	Costs	Physical Footprint
Food Waste	Bio-digester	65 per unit	Capital cost £12,500, running costs typical unit £2,500pa	1m x 1m x 1.3m(h)
	In Vessel Composting	7 – 2,200	£11,500 (450Kg/week) capital cost plus £1,100pa utilities and maintenance to £56,000 capital cost (4,000Kg/week) £40 per week utilities £3,375pa utilities and maintenance	Typical unit 4m x 1m x 1.9m(h)
	Dewatering (waste reduction)	2,000 (running 8 hours/day)	£14,000 capital cost for simple bench mounted unit	0.7m x 1.5m x 0.9m(h)
	Drying (waste reduction)	7 – 7,000	£15,750 – £67,945 capital cost depending upon throughput	Typical unit 2.4m x 1.5m x 1.8m(h)
	Biomass energy plant	70 – 7,000	Example: 1 tonne of food per day, 1200kw of heat, it will use 750kw of energy, capital cost £265,000	
	Small-scale AD	200 – 1,000	Capital cost £150k-£500k depending upon throughput	11m x16m to 11m x28m
Mixed Recyclate	Sorting/Baling Recyclates	Wide range	Small system would be around capital cost £125-£150k plus installation of £5-8k. Operating costs can vary greatly, depending on how much labour you need to operate it and equipment to load/bale/remove etc. the products.	
General Waste	Pyrolysis	2,000 – 10,000	Typical capital cost of £1m for a 2,000 tpa solution. Consumables estimated as £35k per annum, maintenance £50-£60k per annum.	12m x 8m x 4m(h)

Source: Anthesis

4.3-6 Although a high proportion of CD&E waste generated in the City is already recycled having been processed outside of the Borough, there may be scope for more on-site recycling within future projects to reduce transport. However, it is recognised that there are space, dust (air quality) and noise issues in on-site processing which would need to be addressed.

4.4 Conclusions

4.4-1 There is little free space within Walbrook Wharf to deal with City of London generated waste within the WPA area, and it is likely that engineering and operational costs for relatively small scale facilities are likely to be prohibitive compared to processing at other suitable infrastructure within London.

4.4-2 However, there is scope for dedicated or shared waste treatment facilities, particularly for food waste, within existing and new commercial developments, of which there are already examples within the City. Such facilities could broaden the service offer to building tenants, whilst reducing load on the established waste management infrastructure and reduce road miles of current waste to facilities outside of the City.

4.4-3 It is therefore recommended that as part of the planning process, developers of new buildings and complexes are encouraged to include waste management provision in their planning applications.

5 Conclusions & Recommendations

5.1 Overall Conclusions

5.1-1 Based upon the scenarios developed in this study, and the most up to date data, the City of London WPA area generated approximately 646,000 tonnes of wastes in 2014 of which 70% came from construction and demolition activities, 29% from commercial businesses and 1% from household collections. If the assumptions regarding large construction and infrastructure projects and the growth of building refurbishments are correct, total arisings could reduce to 252-337,000 tonnes by 2036, due primarily to a reduction in CD&E wastes.

5.1-2 City of London relies upon other WPAs within London and beyond, to deal with its waste. Major receptors (those receiving more than 1,000tpa) of City of London wastes (as shown in Table 25) were invited to comment on the draft report.

Table 25: Major Recipients of City of London waste (by WPA)

Construction & Demolition Wastes		Local Authority and Commercial & Industrial wastes	
Local Authority	Waste Planning Authority	Local Authority	Waste Planning Authority
Newham	East London Waste Authority	Bexley	Bexley
Barking and Dagenham	East London Waste Authority	Hillingdon	West London Waste Authority
Thurrock	Thurrock	Newham	East London Waste Authority
Greenwich	Greenwich	Waltham Forest	North London Waste Authority
Hillingdon	West London Waste Authority	Slough	Slough
Havering	East London Waste Authority	Havering	East London Waste Authority
Merton	South London Waste Authority	Thurrock	Thurrock
Surrey	Surrey County Council		
Waltham Forest	North London Waste Authority		
West Sussex	West Sussex		
Barnet	North London Waste Authority		

In addition, Wokingham WPA receives over 1,000 tpa collectively across all the waste streams.

Source: Anthesis

5.1-3 Some sites have been identified as potentially not being available to receive waste from the City throughout the whole life of the plan i.e. to 2036. These are shown in Appendix 3. In 2014, approximately 35,000 tonnes of CD&E waste were sent to these sites. However, given the projected decrease in CD&E wastes, this is not anticipated to be problematic.

5.1-4 Walbrook Wharf is the only operating waste management site in the City of London, with no other development sites available to accommodate waste management facilities of the scale required to deal with the volume of waste generated within the City. Walbrook Wharf itself does have the road capacity and potentially floor space to handle a small increase in waste, but this is most likely applicable for the bulking up of food waste and recyclates rather than the additional processing or treatment of waste.

5.1-5 The consultation highlighted a trend in authorities aiming to be net self-sufficient in terms of waste management capacity, and therefore the City may not be able to rely on other authorities having excess capacity to treat waste generated in the City. This is in line with the London Plan March 2016, which includes Policy 5.16 Waste net self-sufficiency i.e. to manage the equivalent of 100% of London's waste within London by 2026.

5.1-6 There are a number of small scale technology options which could potentially reduce the waste arisings impact of new office, hotel or retail developments in the City including food waste digestion or small scale anaerobic digestion.

5.1-7 Compliance with the EU Waste Framework Directive can be summarised as follows:

- The Waste Framework Directive states that Member States may take the measures necessary to prevent shipments of waste which are not in accordance with their waste management plans. Waste arising from the City of London is taken to a recovery facility in Bexley. This facility is very large (approximately 660,000tpa) and therefore the shipment received from the City is unlikely to be a significant for Bexley WPA. While the City is clearly not self-sufficient in the management of waste arising in its Plan Area, waste arising in the City is managed within the UK.
- Article 28 of the Waste Framework Directive provides that certain issues must be covered in Waste Management Plans, as set out in Section 2.2.
- The existing policies in the current City of London Local Plan (January 2015) contain several references to waste minimisation. However, a separate Waste Minimisation Plan could be developed in conjunction with businesses in the City to take this further.
- All existing waste policies within the current Local Plan are considered to still be relevant after this review of waste arisings and capacity. For example, it contains references to the requirement for separate storage of waste types, including biodegradable waste, and states that on-site waste management, including energy recovery, should be incorporated wherever possible. It is our recommendation that this should be extended to on-site food waste management, which may in itself not generate energy, but would reduce the need for vehicle movements to separately collect this material.
- This Evidence Base Report fulfils the requirements of Article 28 as setting out the current waste management situation including the type, quantity and source of waste arising, existing waste management approaches and an assessment of the need for new collection schemes and additional waste infrastructure.
- Public participation in the form of consultation on the Local Plan is a further requirement of the Waste Framework Directive and this will need to be delivered as part of the Local Plan Regulations (2012).

5.2 Recommendations

5.2-1 As the City depends upon facilities in other WPA areas to deal with its waste, it needs to continue to consult with the authorities identified in Table 25 to identify any challenges or barriers to continuing with this waste movement and processing in the future. However it should be noted that the destinations of

waste changes regularly as it a competitive market, and therefore this list of authorities for engagement should be reviewed regularly after completion of the City's Annual Monitoring Report²³.

5.2-2 The City could consider strengthening existing Local Plan policies with the addition of ensuring on-site food waste treatment is incorporated into new developments, and that on-site management of CD&E waste is carried out, wherever possible.

5.2-3 The City should develop a separate Waste Minimisation Plan, potentially in conjunction with businesses in the City to take this further.

5.2-4 The lack of robust commercial and industrial waste arisings data for businesses in the City makes development of reliable forecasts difficult. With the lack of any national or regional aspiration to collect such data, it is suggested that a survey of businesses is carried out at sufficient scale to be representative, on a regular basis.

5.2-5 The City should engage with TfL and with the GLA regularly through the London Waste Planning Forum, to ensure visibility of any future infrastructure projects which would likely result in increased CD&E waste quantities, and update the CD&E waste projections both from this engagement and using the GLA's waste arisings reports.

²³ City of London Local Plan Monitoring Report: Waste

Appendix 1 Assumptions used in waste projections

Table 26: LACW growth rates used for projections

Year	Population growth p.a. (SHLAA - DCLG based long term migration)	Per capita waste reduction p.a. (The Mayor of London’s 2011 Strategy, “London’s Wasted Resource”)	Overall recycling rate (Targets Achieved)
2015	-	-	35.9%
2016	2.50%	-0.86%	40.6%
2017	2.44%	-0.86%	42.9%
2018	2.38%	-0.87%	45.3%
2019	2.33%	-0.88%	47.6%
2020	2.27%	-0.89%	50.0%
2021	1.11%	-0.89%	51.7%
2022	2.20%	-0.90%	52.5%
2023	1.08%	-0.91%	53.3%
2024	1.06%	-0.92%	54.2%
2025	2.11%	-0.93%	55.0%
2026	1.03%	-0.94%	55.8%
2027	0.00%	-0.94%	56.7%
2028	1.02%	-0.95%	57.5%
2029	0.00%	-0.96%	58.3%
2030	1.01%	-0.97%	59.2%
2031	1.00%	-0.98%	60.0%
2032	0.00%	0.00%	60.0%
2033	0.99%	0.00%	60.0%
2034	0.98%	0.00%	60.0%
2035	0.00%	0.00%	60.0%
2036	0.97%	0.00%	60.0%

Table 27: C&I and Hazardous Waste growth rates used for projections

Year	GLA employment growth estimates p.a.(GLA Working Paper 67)	City of London employment growth estimates p.a. (Extrapolation of GLA Working Paper 52)	Overall recycling rate (targets achieved)
2014	-	-	69.0%
2015	0.64%	0.41%	69.1%
2016	0.64%	0.41%	69.3%
2017	0.63%	0.67%	69.5%
2018	0.42%	0.67%	69.7%
2019	0.63%	0.66%	69.8%
2020	0.62%	0.66%	70.0%
2021	0.62%	0.65%	70.0%
2022	0.61%	0.60%	70.0%
2023	0.61%	0.60%	70.0%
2024	0.40%	0.59%	70.0%
2025	0.60%	0.59%	70.0%
2026	0.60%	0.59%	70.0%
2027	0.60%	0.67%	70.0%
2028	0.40%	0.67%	70.0%
2029	0.59%	0.67%	70.0%
2030	0.59%	0.66%	70.0%
2031	0.58%	0.66%	70.0%
2032	0.39%	0.65%	70.0%
2033	0.58%	0.65%	70.0%
2034	0.58%	0.64%	70.0%
2035	0.57%	0.64%	70.0%
2036	0.38%	0.64%	70.0%

Table 28: CD&E growth rates used for projections

Year	Baseline CD&E waste growth	Baseline CD&E waste growth w/ increasing refurbishment
2015	0.0%	0.0%
2016	13.0%	13.0%
2017	8.8%	8.8%
2018	-35.7%	-35.7%
2019	-19.9%	-19.9%
2020	-23.7%	-23.7%
2021	-23.7%	-23.7%
2022	-0.6%	-2.6%
2023	-3.9%	-6.0%
2024	31.9%	30.1%
2025	-9.8%	-12.1%
2026	-4.1%	-6.4%
2027	-2.0%	-4.3%
2028	-5.3%	-7.9%
2029	0.0%	-2.4%
2030	0.0%	-2.5%
2031	0.0%	-2.6%
2032	0.0%	-2.6%
2033	0.0%	-2.7%
2034	-6.0%	-9.4%
2035	-3.2%	-6.6%
2036	-2.0%	-5.4%

*Based on City of London development trajectories for Offices, Housing, and Hotels

Appendix 2 Business survey

Anthesis Group has been commissioned by the City of London Corporation to carry out a high level study of the waste arisings and treatment capacity in the City of London through to 2036. As a Waste Planning Authority, the City of London Corporation is expected by national policy to ensure that there is sufficient waste management processing capacity to deal with the waste their local authority area is likely to generate. To produce a detailed picture of collected waste within the City of London, Anthesis is approaching businesses active in the City of London, such as yourselves, and requesting they complete a short survey. All data provided will be kept strictly confidential, anonymised and aggregated before being presented to the City of London Corporation.

Please send all completed surveys to andrew.hennig@anthesisgroup.com by **Tuesday 17th May 2016**. Note that responses should relate only to business activity within the City of London boundary (<http://www.mapping.cityoflondon.gov.uk/>), and not branches/offices located elsewhere.

1. What type of business are you?
 - a. Office
 - b. Retail
 - c. Hotel
 - d. Other (please specify)

2. What is the approximate size of your office/retail unit/hotel, based in the City of the London? Either:
 - a. Number of employees;
 - b. Floorspace (m²) / No. of hotel rooms (where relevant); or
 - c. Don't know

3. How much total waste is produced at the offices/branches based in the City of London? (tonnes per year)

4. What waste streams are collected and how many tonnes of each are collected per year e.g.
 - a. General waste
 - b. Mixed recycling
 - c. Paper and/or other recyclates separately
 - d. Confidential waste
 - e. Food waste
 - f. Other (please specify)

5. Who is your waste contractor(s)? Please specify if different for different waste materials.

If you wish to expand upon any of your answers above, please do so here:

It is not essential you provide your company and contact details; however this may be useful if we have any clarification questions. If you are happy for us to contact you, please enter details below:

Name:

Job title:

Company:

Email:

Telephone no:

Thank you for completing this survey. If you have any further questions, please contact Andrew Hennig at andrew.hennig@anthesisgroup.com or 07904 164 496.

The City of London Corporation confirms the appointment of Anthesis to carry out this Waste Arisings and Capacity Study. If you require any further information on this please contact Peter Shadbolt peter.shadbolt@cityoflondon.gov.uk 020 7332 1038 or Janet Laban janet.laban@cityoflondon.gov.uk 020 7332 1148.

Appendix 3 Duty to Cooperate Consultation

The City of London sent the draft version of this document to those authorities identified in Table 25 (including Wokingham), the EA and the GLA. Responses were received from the following local authorities:

- Bexley
- Greenwich;
- Havering;
- Newham;
- North London Waste Authority (on behalf of Barnet, Waltham Forest and Haringey);
- Slough;
- Surrey;
- Thurrock; and
- West Sussex.

Responses from the EA and GLA were also received. A final version of this report has been produced to take into account these responses where necessary.

As a result of this consultation, Table 29 shows the sites which were identified by authorities that may not be available throughout the whole life of the plan (i.e. to 2036).

Table 29: Sites identified as potentially not available for whole period until 2036

Site	WPA	Types & quantity of waste received from City (tonnes, 2014)	Comments
Patteson Court Landfill, Redhill (Biffa)	Surrey County Council	CD&E: 9,800 tonnes C&I: 450 tonnes	Landfill is due to be fully restored by 2030 so it is anticipated that site will not receive waste beyond 2027.
Rainham Landfill, Havering	East London Waste Authority	CD&E: 7,000 tonnes	Existing planning permission requires operations & closure to be completed by 31st December 2018. However existing application has been submitted to extend until 31st December 2024, with site restoration by 31st December 2026. Decision to be issued shortly.
Bywaters, Waltham Forest (transfer station)	North London Waste Authority	CD&E: 5,200 tonnes	Site is currently subject of a planning application for mixed use development which will be determined summer 2016. The proposal includes re-provision of the existing capacity at the operator’s sister site in Newham. This re-provision will need to be agreed as part of the decision on this proposal. Should planning permission be granted, this site will be removed from the

Site	WPA	Types & quantity of waste received from City (tonnes, 2014)	Comments
			schedule of existing sites. Timeframe for the ceasing of operations is currently unknown.
Ebbcliffe Ltd facility at Mardyke Farm, Havering	East London Waste Authority	CD&E: 5,200 tonnes	This is a landscaping and re-contouring project. The most recent planning permission for this site permits the approved engineering and landscaping works (importation of inert soils) until 11/04/2017. As the importation allowed on this site is for a specific project, with a specific end date, it will not be available for use past April 2017.
Veolia Inert Soils, Rainham Landfill, Havering	East London Waste Authority	CD&E: 4,500 tonnes	Existing permission required all imports to cease by the end of 2012. New application seeks to allow imports until 2018. Delay in decision as did not want to consider before determination of application about the landfill, but it is likely that staff will recommend approval, subject to conditions.
Donoghue, Claremont Rd, Barnet (transfer station)	North London Waste Authority	CD&E: 3,200 tonnes	The site will be redeveloped under the approved planning permission for the regeneration of Brent Cross Cricklewood. It is not identified for redevelopment until after 2028 and the site is expected to remain operational until this time.
Home Farm Quarry extension landfill (Shepperton Aggregates)	Surrey County Council	CD&E: 400 tonnes	Landfill expected to be fully restored by 2019 so would expect they would stop receiving waste before this date.
Williams Environmental Management Ltd, Newham (transfer station)	East London Waste Authority	CD&E: 6 tonnes C&I: 4 tonnes	This site sits within the development site for Silvertown Quays and so will cease to operate at some point (yet unknown). While the scheme has 'Resolution to Grant' it does not have full consent as yet and the Council is not in a position to advise re the likely closure date of waste facility.
Star Works Landfill Site	Wokingham	C&I: 8 tonnes	Original planning permission was given subject to conditions, including that waste could not be disposed of beyond 17 years. This means disposal has to cease by January 2016, with restoration completed by January 2018.