West London Waste Plan

Evidence Base: Data Compendium

Report for Issue

Version 1.1

Issued: 29th July 2014

BPP Consulting Document Control

Project: West London Waste Plan

Report: Data Compendium

Version Description: Issue

Version No.: 1.1

Date: 29.07.14

Version No.	Version Description	Author	Date	Reviewed	Date
0.1	Draft for Internal review	Alan Potter	27.02.14	Ian Blake	27.02.14
0.2	Draft for Internal review	Alan Potter	29.07.14	David Payne	29.07.14
1.0	Client review	Alan Potter	29.07.14	David Payne	29.07.14
1.1	Final Issue	Alan Potter	29.07.14	David Payne	29.07.14

Table of Contents

Glossary

ABT	Advanced Biological Treatment
ATT	Advanced Thermal Treatment
C&I	Commercial and Industrial Waste
Defra	Department for the Environment Food and Rural Affairs
EA	Environment Agency
EfW	Mass Burn Incineration with energy recovery
GLA	Greater London Authority
HWRC	Household Waste Recycling Centre
MBT	Mechanical Biological Treatment
MHT	Mechanical Heat Treatment
MSW	Municipal Solid Waste
NPPF	National Planning Policy Framework
MRF	Material Recycling Facility
PPS10	Planning Policy Statement 10: *Planning for Sustainable Waste Management*
RDF	Refuse Derived Fuel (Combustion)
SA	Sustainability Appraisal
tpa	Tonnes per annum
WCA	Waste Collection Authority
WDA	Waste Disposal Authority
WLWA	West London Waste Authority (the WDA for west London)
WLWP	West London Waste Plan

1.0 Introduction

This compendium forms part of the evidence base supporting the joint West London Waste Plan (WLWP) prepared by six partner west London boroughs (Brent, Ealing, Harrow, Hillingdon, Hounslow, and Richmond upon Thames).

It is complementary to other reports produced for the WLWP and should be read in conjunction with the July 2014 Submission Plan as well as other documents that make up the evidence base. The information contained within this report builds on, clarifies and updates, work published in the previous Technical Reports published at the Issues and Options stage and the Proposed Sites and Policies stage.

In preparing the evidence base particular attention to has been paid to *Planning Policy Statement 10 (PPS 10): Planning for Sustainable Waste Management*, and the London Plan (2011).

2.0 Current Waste Management

The review of data indicates that over 5 million tonnes of waste is produced within west London each year. This is based on the following breakdown:

• Municipal Solid Waste	0.657
• Commercial and Industrial Waste	1.299
• Construction, Demolition & Excavation Waste	3.20
• Hazardous Waste	0.088
• Wastewater and Sewage Sludge	0.1
• Radioactive Waste	n/a
	5.344 million tonnes

3.0 Cross boundary Movement of Waste

Around 1.35 million tonnes of West London's waste were exported out of London in 2012. . Table 1 shows the level of exports or flows out of the West London area in 2012. Some Table entries have been amended to reflect the fact that inputs to the Bletchley site should be allocated to Milton Keynes and not Buckinghamshire as initially indicated. The opportunity has been taken to further update the values from different sources.

Table 1: Principal Flows of West London Waste out of West London, 2012 & data sources

(% shown is expressed as total of waste stream exported)

	Tonnes	Principal Destination	Principal Management Methods
Municipal Solid Waste (from WLWA)	415,000	Bucks (35%) Oxon (33%) Slough (24%)	Landfill Landfill EfW (Colnbrook & Slough CHP)
Hazardous waste (WDI plus HWI)	74,000	Northants (9%) Herts (7%) Kent (6%) Surrey (6%) Hants (4%) Peterboro (4%)	Treatment Treatment Recovery/Treatment/Landfill Treatment Transfer Treatment /Landfill
Commercial and Industrial Waste (from WDI +)	483,000	Bucks (37%) M Keynes (36%) Slough (17%) Herts (5%)	Landfill Landfill EfW Landfill
Construction, Demolition and Excavation Waste (from WDI)	376,000	Bucks (28%) M Keynes (26%) Berks (20%) Herts (12%)	Landfill Landfill Landfill Landfill
TOTAL	**1.35 million**		

NB:

CD&E value excludes unknown quantities managed through activity that do not submit data returns

Landfill accounted for 80% of the movements of all waste out of the Plan area as shown in Figure 1 below.

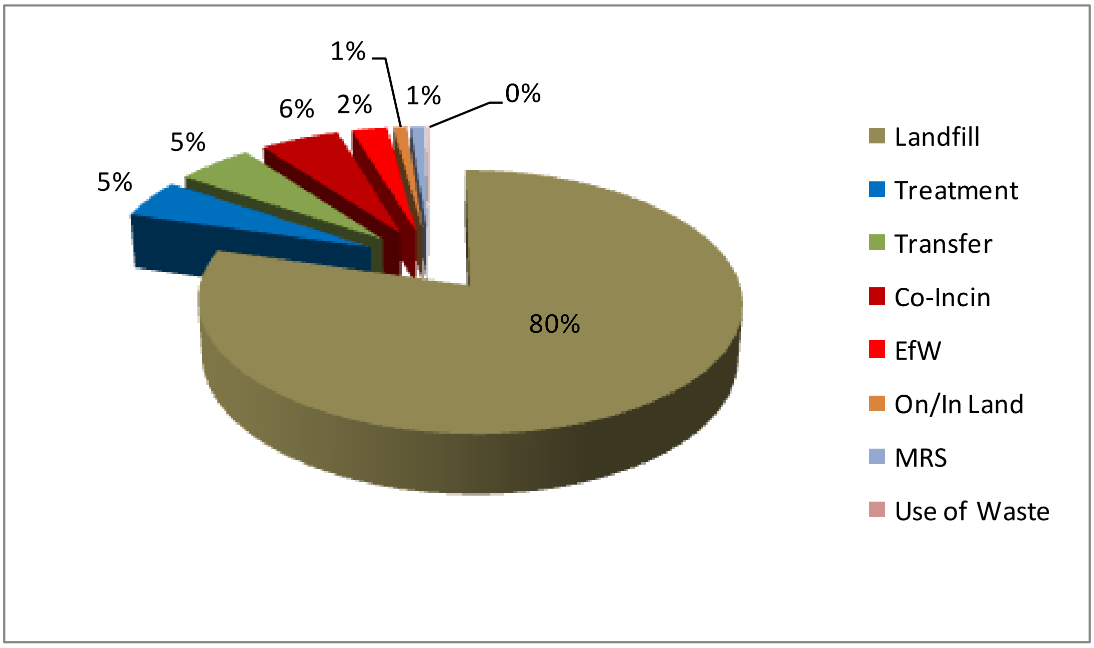


Figure 1: Exports of waste out of West London by management type

Source: WDI 2012

Figure 2 below illustrates that the majority of waste exported in 2012 was sent to Buckinghamshire (60%) and Slough (20%) followed by Oxfordshire (7%) with the remaining 11% divided between four other authorities. This has changed significantly from previous years when Bedfordshire received substantial quantities of waste for landfilling (just under 200,000 tonnes in 2011) but this has now ceased with closure of Stewartby landfill.

The following graph supersedes Figure 3-4 included in the Proposed Submission version of the Plan as since producing this various data discrepancies have come to light including the inclusion of movements to a site in Milton Keynes within high level calculations for imports to Buckinghamshire. Direct inquiry of planners at Milton Keynes council have confirmed that while part of the site in question - Bletchley landfill - does in fact lie within Buckinghamshire, Milton Keynes Council determines waste related planning applications for the site and therefore imports to the site fall within the jurisdiction of Milton Keynes and have therefore now been attributed in the revised Figure accordingly.

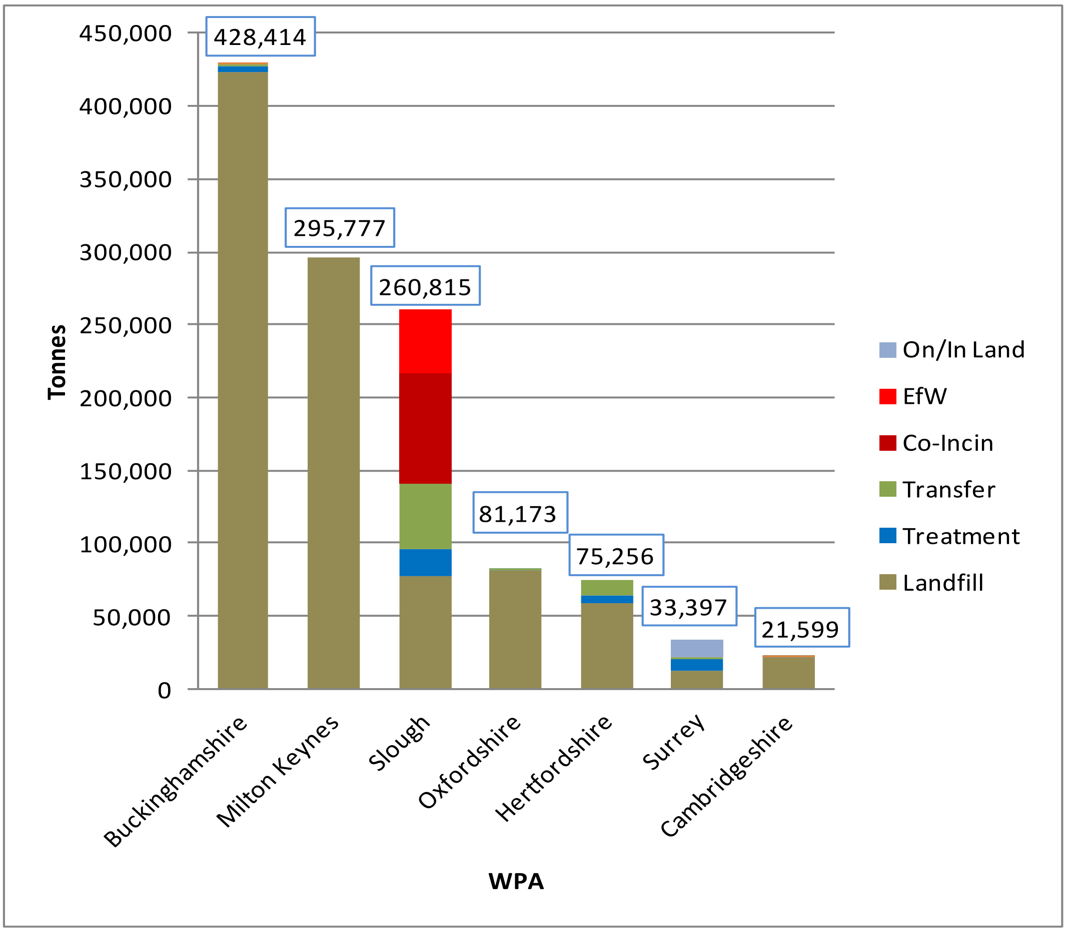


Figure 2: Where West London sent waste in 2012 by fate & WPA

Data Source: WDI 2012 plus Environment Agency datasets

4.0 The Role of Landfill in the Management of Waste

Landfill disposal accounted for approximately 1,143,000 tonnes of waste arising in West London in 2012, with 90% of that exported to landfill facilities outside of the Plan area. The remaining 107,400 tonnes was managed at Harmondsworth Landfill located in southwest Hillingdon.

There are several different types of landfill, all of which play a different role in helping to manage waste from West London. Generally these are categorised by the types of waste they can accept for disposal.

Non-hazardous landfill usually receives residual MSW and C&I waste plus inert CD&E waste that is used for engineering and operational purposes, whereas Inert Landfill only accounts for inert waste from the CD&E stream. Hazardous waste landfills are highly specialised and only accept certain hazardous waste, while stable, non-reactive hazardous waste (SNRHW) (e.g. asbestos) sent to non-hazardous landfill can be deposited in an area specifically designed to accept SNRHW and isolated from biodegradable waste.

4.1 Waste Types Going to Landfill

To understand the degree of reliance of the Plan Area on the continuation of landfill and (the ability to meet the London Plan target of 100% diversion of recyclable waste form landfill by 2031) potential for landfill diversion it is necessary to establish the breakdown of waste sent to landfill in 2012 from the Plan Area. As the waste coding of Municipal Solid Waste e(chapter 20) used in the WDI covers Local Authority Collected waste and Commercial and Industrial Waste it is not simply a case of extracting the data from the WDI.

Therefore the following deductive exercise has been undertaken:

1. The total quantity of waste sent to different types of landfill were extracted - Table 2
2. The quantity of CDEW sent to landfill was extracted (table 3)
3. The quantity of CDEW was deducted from the landfill Total (table 4)
4. The quantity of MSW sent to landfill (provided by WLWA) was deducted from the landfill Total (table 5).
5. This then left the quantity sent to landfill that may be classed as commercial and /or industrial waste.

Step 1: Calculate the Total Amount of Waste sent to Landfill

Table 2 shows the types and amounts of waste sent to landfill from West London in 2012.

Table 2 Waste sent to landfill from West London in 2012, by receiving site type (tonnes)

Landfill Type	Tonnes
Hazardous including via Separate Cell	5,459
Non Hazardous	1,079,915
Inert	57,655
Total	**1,143,029**

Source: WDI & HWI, 2012

Step 2: Calculate the Amount of CDE Waste sent to Landfill

Analysis of the WDI 2012 dataset for the CDE Waste stream (using the Chapter 17 EWC code as a proxy) indicates the following waste types going to landfill:

Table 3 CDEW sent to landfill from West London in 2012, by receiving site type and waste type *(Rounded)*

LF Type	Haz	Non Haz	Inert	Total by Category
Dedicated Hazardous	250			250
SNRHW Cell in Non Haz	1,000			1,000
Mixed Waste Non Haz		33,000	260,000	293,000
Inert			58,000	58,000
Total by Input Type	**1,250**	**33,000**	**318,000**	**352,250**

Haz = hazardous, Non Haz = non-hazardous; inert = inert

Step 3: Calculate the Amount of non CDE Waste sent to Landfill (deduct CDEW)

Taking the values obtained in Table 3-5 and applying them to the values in Table 3-4 i.e. the total waste going to landfill from the Plan Area gives the following

Table 4 Total sent to landfill from West London in 2012, by receiving site type and waste type minus CDEW *(Rounded)*

Landfill Type	Waste Type	Total Tonnes	CDEW	Remainder
Hazardous	Hazardous	5,500	1,250	4,250
SNRHWC in Non Hazardous				
Mixed Waste Non-Hazardous	Mixed Waste	1,080,000	33,000	787,000
	Inert		260,000	
Inert		58,000	58,000	0
Totals		**1,143,500**	**352,250**	**791,250**

This suggests that of the 1.1 million tonnes of waste sent from the Plan Area to landfill in 2012 approaching 800,000 tonnes came from Local Authority (LACW) and C&I sources (values in final column). Taking each of these types of waste in turn:

Step 4: Calculate the Amount of non CDE Waste and non LACW sent to Landfill

The LACW going to landfill in 2012 is due to be diverted from landfill on commissioning of the EfW in South Gloucestershire in 2016. Therefore the majority of LACW input (291,214 tonnes) has been deducted as in Table 5 below.

Table 5 Total sent to landfill from West London in 2012, by receiving site type and waste type minus CDEW & LACW *(Rounded)*

<table>
<tr><th>Landfill Type</th><th>Waste Type</th><th>Total Tonnes</th><th>CDEW</th><th>MSW</th><th>Remainder</th></tr>
<tr><td>Hazardous</td><td rowspan="2">Hazardous</td><td rowspan="2">5,500</td><td rowspan="2">1,250</td><td rowspan="2">183</td><td rowspan="2">4,067</td></tr>
<tr><td>SNRHWC in Non Hazardous</td></tr>
<tr><td rowspan="2">Mixed Waste Non-Hazardous</td><td>Mixed Waste</td><td rowspan="2">1,080,000</td><td>33,000</td><td>290,455</td><td rowspan="2">495,969</td></tr>
<tr><td rowspan="2">Inert</td><td>260,000</td><td>576</td></tr>
<tr><td>Inert</td><td>58,000</td><td>58,000</td><td></td><td>0</td></tr>
<tr><td>Totals</td><td></td><td>1,143,500</td><td>352,250</td><td>291,214</td><td>500,036</td></tr>
</table>

Of the c800ktpa sent to landfill once 291ktpa is deducted post 2016this would leave half a million tonnes of waste from commercial and industrial sources going to landfill all other things remaining equal.

Examination of WDI 2012 output data indicates that this is essentially all waste from waste management sites where processing of materials is taking place (EWC code: 19 12 12). Much of this waste is suitable for conversion to Refuse Derived Fuel that may be used in suitable combustion plants in the UK - such as Scottish and Southern Energy's (SSE) combined heat and power plant (CHP) at Slough[1] - or exported to energy from waste facilities on mainland Europe. Being cost competitive with local landfill and energy from waste, export to European facilities is increasingly being utilised as a solution for management of post processing residual waste with the Environment Agency reporting that in 2013 over 1.5 million tonnes being exported to 8 European countries [2]. It has been reported by WLWA that outputs from the MRF that receives waste delivered by WLWA is already being managed through this route in preference to transport to Slough Heat & Power plant as occurred in 2012. The reliability of this route has been confirmed by Waste Disposal Authority decisions to enter into contracts for management of residue from its MBT plants through this route.[3]

While movement to mainland Europe may be regarded as a medium term solution, in the longer term the expectation is that EfW capacity in the UK will become cost competitive which may see more waste from non municipal sources feeding UK EfWs so that the energy value of this fuel may be exploited. It should be noted in this context that the operating capacity of the Severnside EfW under construction in South Gloucestershire is up to 400,000 tonnes per annum and while WLWA has a supply contract of up to 300,000 tonnes per annum there is expected to be surplus capacity. This might be managed through the SITA UK waste transfer stations based in west London that will service that plant by train.

[1] Scottish and Southern Energy's (SSE) combined heat and power plant (CHP) at Slough currently burns in excess of 150,000 tonnes of waste related fuels including wood producing around 80 Megawatts of electricity per year. In 2013 SSE announced that it is beginning work to upgrade the plant, with the eventual aim is to use 300,000 tonnes of "waste-derived fuel". http://www.letsrecycle.com/news/latest-news/wood/wood-recyclers-uncertain-over-future-of-slough-chp.

[2] RDF exports top 1.5 million tonnes in 2013 28 January 2014 http://www.letsrecycle.com/news/latest-news/energy/rdf-exports-top-1.5m-tonnes-in-2013

[3] Essex to procure short-term RDF contracts 24 February 2014

http://www.letsrecycle.com/news/latest-news/councils/essex-to-procure-short-term-rdf-contracts

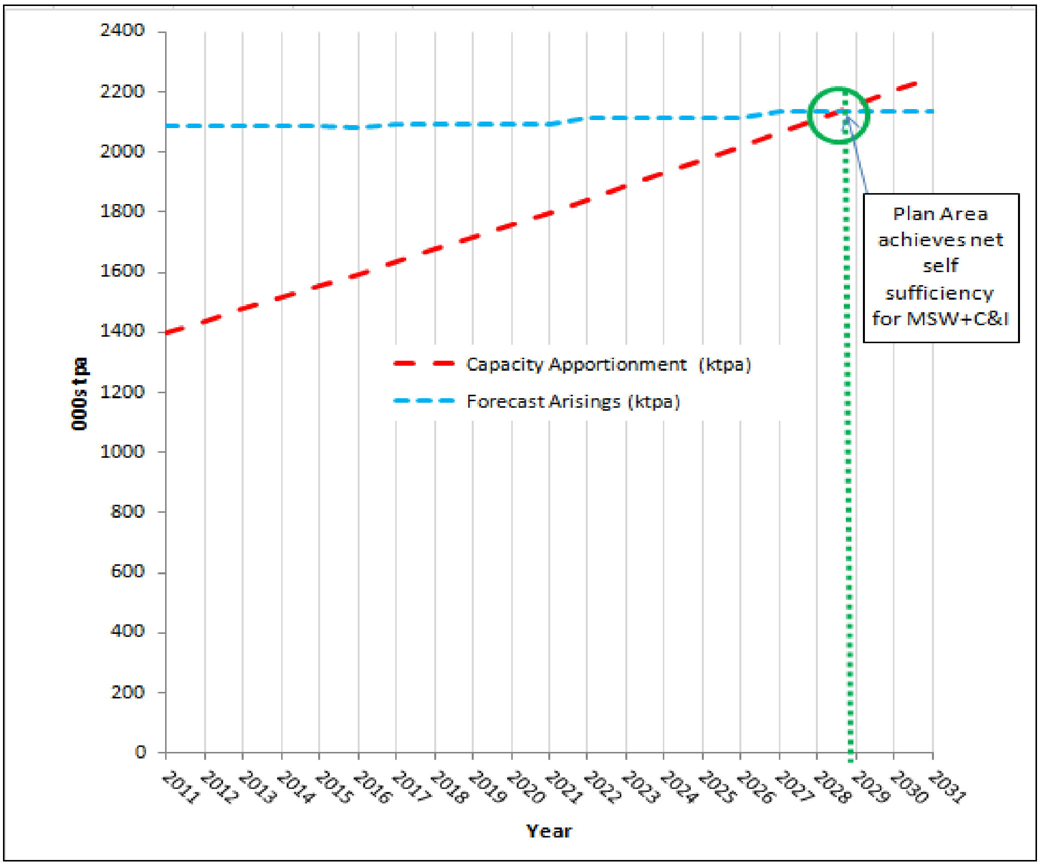
It should be emphasised that the above discussion about arrangements and prospects reflect actual contracts put in place and market conditions/trends and are not intended to be a strategy to form part of the Plan-making process. While the existence of such arrangements and trends catering for significant quantities of West London's waste exist cannot be ignored this Plan still allocates sufficient sites to meet the Borough's London Plan apportionment as stipulated by the London Plan and in accordance with PPS10.

5.0 Future Waste Management

5.1 London Plan Apportionment

MSW and C&I waste arisings projections are included in the London Plan (2011). These figures were considered the most up-to-date for West London and were also used by the Mayor to determine the apportionment figures.

Figure 3: Forecast arisings and capacity apportionment for West London boroughs from the London Plan (2011)



The above graph plots the London Plan forecast arisings data (the blue line) against the apportionment data. It identifies the intersect point where the apportionment exceeds the arisings prediction at 2028. It should be noted that the 'intersect' occurs earlier than 2031 because the apportionment is larger than that actually needed for the west London Boroughs to provide for their own forecast arising. This is because additional arisings were apportioned to some of the west London Boroughs on the expectation that they would provide for some waste from heavily land constrained inner London Boroughs such as the City of London.

Some have read the chart as defining the target trajectory for the Plan strategy. For example Barking and Dagenham Council expressed disappointed that an apparent capacity shortfall will be maintained in the short to medium term and went on to state that "Although the WLWP meets the London Plan target (2011) there are obvious deficiencies between the plan and national planning policy set out in PPS10. As is noted by the plan, PPS10 sets out an expectation that all development Plan Documents (DPDs) should make provision for all waste arising within the Plan area. The WLWP does not become self sufficient until late on in the plan period. As such, it is out of alignment with national planning policy in this regard. It is acknowledged that the London Plan provides a more comprehensive set of strategic planning requirements however, it is unfortunate that the proposed plan is not actively planning to be self sufficient earlier on in the plan period in alignment with PPS10."

This illustrates a misunderstanding of what Figure 3 shows. It represents the progressive growth of capacity to meet the London Plan apportionment. The Plan does not in itself prevent the bringing forward of capacity earlier than indicated by this line should the market wish to. That is to say as of the date of final adoption the sites allocated will be immediately available for prospective developers to submit proposals with a view to establishing additional capacity required to meet the current London Plan apportionment targets. In reality when facilities are developed it will be in increments of a minimum 50,000 tpa capacity therefore the graph can be expected to take a 'stepped' shape.

6.0 Further Alterations to the London Plan (FALP)

This section has been added in response to a number of representors who noted that the existence of the FALP has not been reflected in the Submission Plan and asked that justification be made of how the plan would align to the new targets set out in the draft FALP.

The Mayor published a schedule of proposed Further Alterations to the London Plan (FALP) for consultation in January 2014. This included proposals to amend the forecast quantities of commercial and industrial waste arising within London, based on baseline data adjusted down to reflect the findings of the national C&I waste survey of 2010. As a consequence the revised projected overall capacity shortfall identified has fallen and hence the revised Borough apportionment targets proposed are reduced. The proposed changes have undergone public consultation and are now due to be subject to public examination in September 2014. The need for changes to this Plan in light of the FALP will be considered at its first review.

While the proposed FALP does bring forward the target year for London as a whole to achieve net self sufficiency by 5 years, of more significance is the major reduction in predicted arisings requiring management capacity provision. The current capacity baseline for management of MSW/C&I operating within the Plan area already meets the target i.e. no further facilities would need to be developed to meet the revised apportionment targets. This is illustrated in Figure 4 below

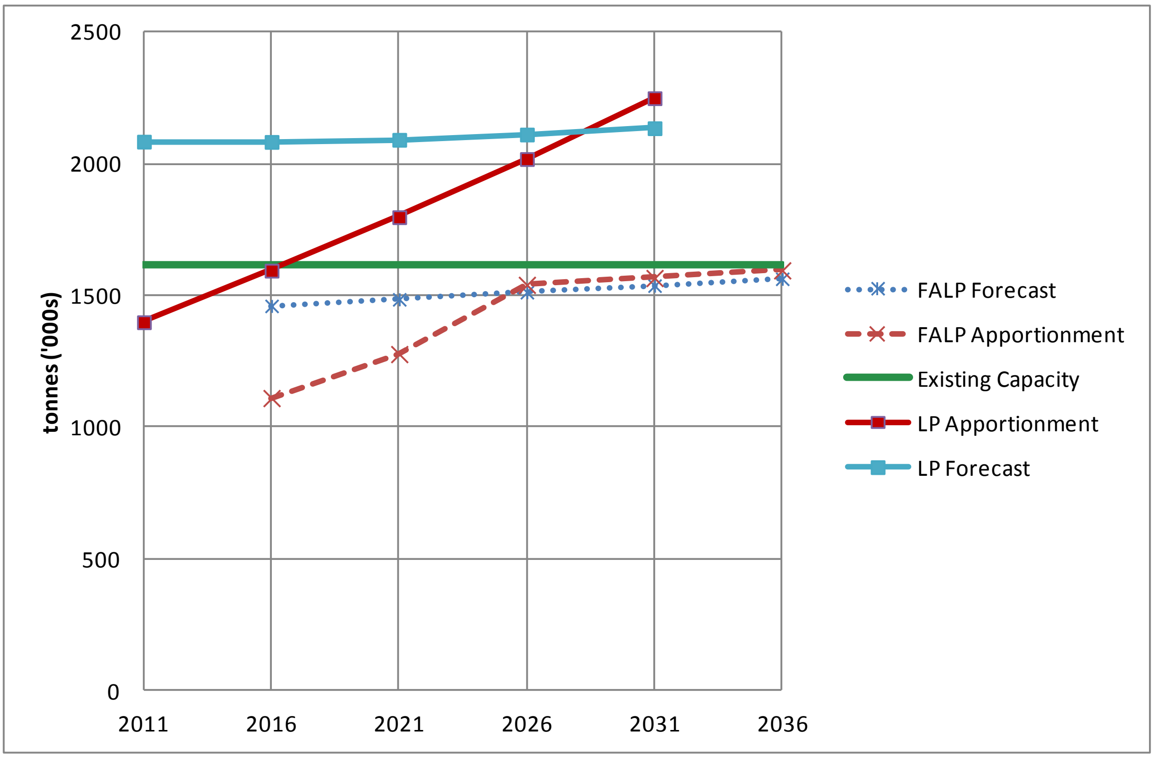


Figure 4: Comparison of London Plan and FALP forecast arisings and capacity apportionment vs. West London Capacity Baseline

7.0 Justification of Landtake Factor applied

A number of representors queried for the use of the 65,000tonne/hectare capacity factor applied to determine the adequacy of the combined hectarage available at the sites proposed for allocation to meet the London Plan apportionment gap at 2031.

This section provides the justification.

There are three key sources of information relevant to this matter as follows:

1. *London Waste Apportionment Study for GLA by Jacobs Babtie 2006*[4]

   In paragraph A-1.11 this advocated a 80,000 tonnes per annum per hectare (tpa/ha) value based on:

   " *Following an evaluation of data in 'Planning for Waste Management Facilities; an ODPM 2004 research report, facility landtake data supplied by the GLA and internal data held by Jacobs, a factor of 80,000 tonnes/hectare was used to convert hectare's available into potential capacity. (Table A-1.9)."*

2. *The South London Waste Plan*[5]

   This used an average throughput per hectare rate of 60,000 tonnes per hectare[6].

   The supporting justification is reproduced in Appendix 1.

[4] *Appendix 1 London Waste Apportionment Study 2006 for GLA by Jacobs Babtie*

http://legacy.london.gov.uk/gla/publications/planning.jsp

[5] South London Waste Plan DPD Evidence Base Study 4: Technical Report October 2010
https://www.sutton.gov.uk/CHttpHandler.ashx?id=13106&p=0

[6] It is notable that the Inspector's comments at Plan's examination:
"In the submitted version this is expressed as land required and that figure is derived by applying an average throughput per hectare for the particular development required. I understand this figure to include not just the footprint for any building but also the area required for any circulation and storage areas, landscaping and other associated site infrastructure. "

3. *The London Plan 2008*

Table 6: Throughput of different types of facilities Extract of Table 4A.7 London Plan 2008 (p. 234)

Facility type	Through put per facility (tonnes per year)	Landtake per facility (ha)
Materials reclamation facility (recycling)	42,000	0.9
Composting	19,000	1.25
Mechanical biological treatment	125,000	1.75
Anaerobic digestion	15,000	1
Gasification/pyrolysis	114,000	2.25

Applying these throughout figures to the footprint data gives a range of between 15,000 tpa/hectare (for AD & Composting) to 71,429 tpa/hectare (for MBT). See Table 7 below (sorted in rank order):

Table 7: Indicated tonnes per annum/hectare from Table 4A.7 London Plan 2008 (Table 1)

Facility type	tpa	ha	t/ha
AD	15,000	1.00	15,000
Composting	19,000	1.25	15,200
MRF	42,000	0.90	46,667
ATT	114,000	2.25	50,667
MBT	125,000	1.75	71,429

Mean values across facility types are between 39,792 tpa/ha (add the individual facility classes and divide by *n*) or 44,056tpa/ha (add up across classes and then divide by total).

Taking the predicted capacity gap value in West London at the end of the plan period (2031) of 614,000 tonnes and dividing this by the total area of the allocated sites (15.31 hectares) indicates that in fact an average throughput rate of 40,097 tpa/ha would deliver the capacity required to meet the predicted gap.

This confirms that an average throughput rate of significantly less than the assumed 65,000 tpa/ha value would in fact be sufficient to deliver the required capacity. However 65,000 tpa/ha has been retained as a useful 'rule of thumb'.

Sensitivity Testing

The validity of an approach which takes an average throughput per area across facility types is also worth examining for a number of reasons:

1. Different types of facilities have varying site area requirements. To use a mean across facilities suggests a merging of all facility types that does not exist in practice.
2. There is a minimum site area needed for all types of facility to be practically operational and the area of a particular site may not actually allow certain facilities to be accommodated, i.e. if the minimum viable area of a site for an Advance Thermal Treatment plant is 1ha it does not follow that a plant half the size could be delivered if the only site available was half a hectare in size.

Defining the minimum footprint

When considering areas with constrained site availability, such as west London, it is appropriate to consider what the reasonably smallest or most compact facility available of a particular type might be. This reflects the approach taken in the SLWP Technical Report which states: *"Where ranges are given, the smallest footprint is used, on the basis that land in South London is scarce and developers should be encouraged to maximise the throughput on any given site."*

Minimum facility footprints, from a sample of facilities actually built in the UK, are shown in Table 8 below:

Table 8: Minimum site footprint requirements for waste management facility types

Facility type	Tonnage	Building Footprint	Site Footprint	Notes
RDF	40,000	0.34	0.41	Lancing 40ktpa exc preprocessing
ABT	90,000	0.08	0.65	Building footprint = vessel exc maturation pad
MHT	150,000	0.28	0.78	Autoclave
EfW	60,000	0.40	0.96	Exeter EfW 60ktpa
MRF	50,000	0.28	1.00	ODPM
ATT	96,000	0.34	1.68	Gasification
MBT	100,000	0.44	1.80	DEFRA 2013

Comparing these against the range of sizes of sites proposed for allocation in the plan (see Table 9 below) indicates the extent to which the range of facility types may be accommodated.

Table 9: Site areas of sites proposed for allocation in the West London Waste Plan

Site Name	Included Area (ha)
Rigby Lane Waste Transfer Station	0.91
Quattro, Victoria Road, Park Royal	0.97
Twyford Waste Transfer Station	1.24
Greenford Depot (inc HWRC)	1.783
Forward Drive Depot	1.83
Twickenham Depot	2.67
Veolia/Brent Transfer Station & Depot	2.71
Western International Market	3.2

The above table shows that the range of sizes of the proposed sites is between 0.91 and 3.2 hectares. Comparing these site sizes with minimum facility footprints gives the results shown in Table 10 below:

Table 10: Matching of allocated site areas (Table 9) with minimum footprint values (Table 8)

	Site	Rigby Lane WTS	Quattro,	Twyford WTS	Greenford Depot	Forward Drive Depot	Twickenham Depot	Veolia WTS	Western International Market
Facility Type	**Site Footprint**	0.91	0.97	1.24	1.783	1.83	2.67	2.71	3.2
RDF	0.41	✓	✓	✓	✓	✓	✓	✓	✓
ABT	0.65	✓	✓	✓	✓	✓	✓	✓	✓
MHT	0.78	✓	✓	✓	✓	✓	✓	✓	✓
EfW	0.96		✓	✓	✓	✓	✓	✓	✓
MRF	1.00			✓	✓	✓	✓	✓	✓
ATT	1.68				✓	✓	✓	✓	✓
MBT	1.80					✓	✓	✓	✓

This demonstrates that for all the proposed sites there is a range of facility types possible. With only the four smallest being constrained by choice (on the assumption that other facility types cannot be orientated to fit within a smaller site than so far achieved in the UK).

Table 11 below also shows that even at the smaller end of the range, facilities are achieving a tpa/hectare throughput well in excess of the minimum required (40,097 tpa/ha) to meet the WLWP 2031 shortfall.

Table 11: Indicated tonnes per annum/hectare from minimum footprint values (Table 8)

	Tonnage	Site Footprint	T/he
MRF	50,000	1.00	50,000
MBT	100,000	1.80	55,556
ATT	96,000	1.68	57,143
EfW	60,000	0.96	62,617
RDF	40,000	0.41	97,466
ABT	90,000	0.65	138,462
MHT	150,000	0.78	193,199

It should also be noted that the above facility types do not include depot uses. Under the London Plan paragraph 5.75, the bulking up of materials for onwards recycling counts towards the apportionment targets and therefore depots with storage bays would also qualify. The only capacity limit that would apply to such a use would be the height to which materials may be stored safely.

From this we can conclude that the use of 65,000 t/ha is justified on the basis of a number of facility types. In any event, a lower value would still show that allocated sites are sufficient to deliver the necessary capacity.

Appendix 1: South London Waste Plan DPD Evidence Base Study 4: Technical Report October 2010

3.21 The remaining capacity which is needed to meet the apportionment would be encouraged to be treated in a range of management facilities (as listed in Table 3.4), in accordance with the waste hierarch.

Typical footprints for modern waste management facilities

3.22 The studies listed below provide illustrative site size requirements (including supporting site infrastructure) for the range of modern waste management facilities. Findings from these studies are combined in Table 3.7.

- The 2004 Office of the Deputy Prime Minister-commissioned report, '*Planning for waste management facilities: a research study.*' prepared by Enviros Consulting.
- The 2004 GLA-commissioned report, '*Meeting the challenge: a guide to waste planning in London*' prepared by Land Use Consultants and SLR Consulting Ltd.
- The 2005 GLA-commission report, *'Recycling and recovery facilities: Sites investigation in London,'* prepared by Land Use Consultants and SLR Consulting Ltd. The figures in this report are based on those in the 2004 ODPM report, together with consideration of figures presented in the ALG Guide to Waste Planning in London as well as evidence from operational and recent planning applications for waste facilities in London. It is upon these figures that the 2008 London Plan assumptions are based.
- The 2007 DEFRA-commissioned '*Waste Technology Management Briefs*', prepared by Enviros Consulting. Five reports were published, covering advanced biological treatment, mechanical biological treatment, mechanical heat treatment, incineration and advanced thermal treatment. These studies provided some indicative land takes needed for this range of technologies.
- The 2008 GLA and Design for London-commissioned report, *'Rubbish In-Resources Out. Design ideas for waste facilities in London,'* prepared by Dow Jones Architects and Arup. This report presents concepts for integrating waste management into London's urban settings. Since the South London Waste Plan is seeking to allocate strategic sites, the examples used from this report are those which are located within industrial settings; rather than those examples which show how waste treatment can be integrated into dense urban and residential settings.

3.23 In addition, more recent applications for waste facilities in London have been examined to add a more recent London-specific dimension to the consideration of 'throughput per hectare.' These are identified at sources i, j and k within Table 3.7. The more recent applications and pre-application discussions taking place in the South London partner boroughs indicate that higher throughputs per hectare can be achieved. One current application in Merton, for example aims to manage over 100,000 tonnes of waste in a Mechanical Biological Treatment facility on 0.3 hectares. This comparative isn't included in Table 3.7 since it is considered that the throughput is exceptionally high and will skew the average figures too greatly.

41

Table 3.7: Average throughput and size of waste management facilities based on previously published studies[30]

Type of waste management facility	Potential Tonnage (tonnes per annum)	Land take (hectares)	Potential Tonnage / hectare (column b / column c)*	Source
Materials Recovery Facility (MRF)	50,000	1.2	41,667	b
Materials Recovery Facility (MRF)	50,000	1 to 2	50,000	c
Materials Recovery Facility (MRF)	85,000	1	85,000	a
Materials Recovery Facility (MRF)	84,000	0.65	129,231	j
In-Vessel composting plant (IVC)	20,000	1	20,000	b
In-Vessel composting plant (including kitchen waste)	25,000	1 to 2	25,000	c
In-Vessel composting plant	60,000	2	30,000	a
Anaerobic Digestion Plant (AD)	40,000	1	40,000	b
Anaerobic Digestion Plant	75,000	2.34	32,051	k
Anaerobic Digestion Plant	50,000	1.5	33,333	a
Mechanical Biological/Heat Treatment /Pre-Treatment (MBT)/(MHT)/(MPT)	50,000	1 to 2	50,000	c
Mechanical Biological Treatment (MBT)	75,000	1.5	50,000	g
Mechanical Biological Treatment (MBT)	60,000	1	60,000	a
Mechanical Biological Treatment (MBT)	60,000	2.5	24,000	b
Mechanical Biological Treatment (MBT)	120,000	4	30,000	b
Mechanical Biological Treatment (MBT)	180,000	3.5	51,429	g
Mechanical Heat treatment (MHT)	100,000	1	100,000	e
Mechanical Heat treatment (MHT)	100,000	2	50,000	e
Mechanical Biological Treatment (MBT)	250,000	2.5	100,000	a
Mechanical Pre Treatment (MPT)	170,000	1.79	94,972	i
Mechanical Pre Treatment (MPT)	180,000	1.79	100,559	i
Mechanical Biological Treatment (MBT)	190,000	1.79	106,145	i
Gasification and Pyrolisis	10,000	1	10,000	b
Gasification and Pyrolisis	50,000	1	50,000	a
Gasification and Pyrolisis	50,000	1 to 2	50,000	c

[30] Waste transfer stations were removed from the calculations, since the South London Waste Plan is seeking to allocate land to waste management facilities, not to additional transfer stations. In addition, examples requiring less than 0.9 hectares were removed, since the South London Waste Plan is seeking to allocate sites greater than 0.9 hectares.

42

Type of waste management facility	Potential Tonnage (tonnes per annum)	Land take (hectares)	Potential Tonnage / hectare (column b / column c)*	Source
Pyrolysis	60,000	0.98	61,224	f
Gasification and Pyrolisis	240,000	3.5	68,571	a
Modern Energy from Waste Plant (EfW)	50,000	2	25,000	a, b
Thermal treatment	50,000	1 to 2	50,000	c
Thermal treatment	90,000	1.7	52,941	h
Energy from Waste Plant (EfW)	100,000	2.5	40,000	b
Thermal treatment	250,000	2 to 5	125,000	c
Thermal treatment	250,000	4	62,500	h
Energy from Waste Plant (EfW)	400,000	2.5	160,000	a
Energy from Waste Plant (EfW)	204,000	1.86	109,677	I

Average throughput for recycling facilities (MRF, IVC, AD, MBT/MHT/MPT): **59,245 tonnes per hectare**
Average throughput across all waste facilities (i.e. including gasification, pyrolysis and modern efw): **61,951 tonnes per hectare**

a) Source: Recycling and recovery facilities: Sites investigation in London, prepared by Land Use Consultants and SLR Consulting for the GLA, July 2005
b) Source: Meeting the Challenge: A guide to waste planning in London, prepared by Land Use Consultants and SLR Consulting for the ALG, November 2004
c) Source: Planning for Waste Management Facilities: A research study, prepared by Enviros Consulting for the ODPM, August 2004
d) Source: 'Rubbish In-Rubbish Out' prepared by Dow Jones Architects and Arup for the GLA and Design for London, 2008
e) Source: Mechanical Heat Treatment of solid municipal waste, prepared by Enviros Consulting for DEFRA, 2007
f) Source: Advanced Thermal Treatment of Municipal Solid Waste, prepared by Enviros Consulting for DEFRA, 2007
g) Mechanical Biological Treatment of Waste of Municipal Solid Waste, prepared by Enviros Consultating for DEFRA, 2007
h) Incineration of municipal solid waste, prepared by Enviros Consulting for DEFRA, 2007
i) Confidential: details of facilities discussed in pre-application meetings with bidders as part of the South London Waste Partnership's residual waste treatment procurement, 2010
j) Application for A MRF at Western Riverside Waste Transfer Station, Wandsworth. Identified in Wandsworth's Core Strategy, 2010
k) Application for an AD facility at Beddington Farmlands, Sutton, 2010

* Where ranges are given, the smallest footprint is used, on the basis that land in South London is scarce and developers should be encouraged to maximise the throughput on any given site.

43

3.24 Table 3.7 reveals that the average throughput for recycling facilities to be around 59,000 tonnes per hectare, whilst the average throughput across all modern waste facilities (i.e. including pyrolysis, gasification and modern energy from waste facilities) is slightly higher, at around 62,000 tonnes per hectare.

3.25 It is important to note that the findings shown in Table 3.7 are *indicative* only. Much will depend on the site specific constraints and opportunities; particularly the shape of the site, permissible height of buildings etc. There is always potential for facilities of a greater or smaller size than those indicated, for example sites like the one exempt from the calculations of Table 3.7 (see paragraphs above Table 3.7). In addition, there are opportunities to 'co-locate' two or more waste management facilities, which can help to reduce overall land take by virtue of the shared use of access roads and storage areas.

3.26 However, it is necessary to make some assumptions about land take, to enable a quantum of land needed for the South London Waste Plan to be identified. Table 3.7 shows that the land area needed to accommodate new waste management facilities varies between technology types and the volume of waste to be managed. However, in general, sites of between 1-2 hectares are likely to be needed for facilities managing around 50,000-85,000 tonnes per annum. Larger sites of between 2.5-5 hectares will be needed for facilities that could manage between 100-400,000 tonnes per annum.

3.27 Whilst Table 3.7 identifies an average throughput across all modern waste management facilities of around 62,000 tonnes per hectares, the 2006 GLA-commissioned, *'London Waste Apportionment Study'* prepared by Jacobs Babtie identifies an 'average throughput' of 80,000 tonnes of waste per hectare. The Jacobs study forms part of the 2008 London Plan's evidence base and is based on an evaluation of data in the 2004 ODPM research report together with additional data provided by the GLA.

3.28 Whilst the Jacobs study forms part of the evidence base for the 2008 London Plan, the evidence shown in Table 3.7 shows a lower throughput figure of approximately 60,000 tonnes per hectare. It is considered that using a lower average throughput per hectare figure builds greater contingency and therefore flexibility into the South London Waste Plan. For this reason, the lower figure will be used in the South London Waste Plan.

3.29 By applying the *average throughput per hectare for recycling facilities* (59,245) to the minimum additional capacity needed to meet recycling/composting targets (identified in Table 3.6), it is possible to identify a minimum land take needed for additional recycling/composting facilities. The remaining apportionment need is then assumed to be accommodated by the wider range of facilities available (which have an average throughput of just over 61,000 tonnes per year). All calculations are shown in Table 3.9 which appears at the end of this report.