London Plan Waste
Forecasts and Apportionments

Task 2 – Construction, Demolition & Excavation Waste and Hazardous Waste Forecasts

GREATER LONDON AUTHORITY

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CONTENTS

1.0 OVERVIEW

The Greater London Authority's responsibilities in respect of waste management include oversight of Waste Planning Authority provision of land for waste infrastructure. To this end, the London Plan establishes waste tonnage Apportionments for each borough, accounting for

- projected total waste arisings (including local authority collected waste, and commercial and industrial waste); and
- the apportionment methodology (determined by a range of criterion – for example availability of suitable land, and proximity to sustainable transport modes).

To support the current review of the London Plan the GLA has appointed consultancies SLR and LUC to provide support in respect of these elements. The GLA's requirements have been addressed through the following discrete tasks:

- Task 1 – GLA Arisings Model Critical Friend Review
- Task 2 – CDEW and Hazardous Waste Forecasts
- Task 3 – Strategic Waste Data
- Task 4 – Updating the Apportionment Methodology

This paper sets out SLR's findings in respect of Task 2, including projections for London's arisings of construction, demolition and excavation waste (CDEW), and hazardous waste. For both waste streams, SLR has reviewed available data sources to estimate current arisings of these waste streams. From this baseline, forecasts for the London Plan are then developed accounting for the latest GLA economic and demographic forecasts.

2.0 CONSTRUCTION, DEMOLITION AND EXCAVATION WASTE

2.1 Baseline Arisings

Policy makers and regulators have typically treated CDEW as a low priority waste stream when compared to local authority collected waste (LACW) and commercial and industrial waste (C&IW).

For this reason, arisings of construction, demolition and excavation waste (CDEW) are not well characterised by published data, CDEW surveys being infrequent, and subject to significant uncertainty.

In preparing CDEW arisings projections, SLR has reviewed potential data sources which may be used to characterise baseline arisings of this waste stream in London. Please refer to Table 2-1 for a summary of documents considered.

Table 2-1: Review of CDEW Data Sources

Document name	Date published	Comm-issioned by	Survey year	Authors	Geogra-phical resolution
Survey of Arisings and Use of Alternatives to Primary Aggregates in England, 2005[1]	February 2007	DCLG	2005	Capita Symonds	English regions
UK statistics on waste[2],[3]	December 2016	Defra	2010 to 2014	Defra	UK and England
Waste Data Interrogator 2015	October 2016	Environment Agency	2015	Environment Agency	Regions, down to districts[4]
Survey of Construction & Demolition Waste Generated in Wales 2012[5]	2014	Natural Resources Wales (NRW)	2012	Urban Mines / RSK	Welsh regions

DCLG's 2005 'Survey of Arisings and Use of Alternatives to Primary Aggregates in England' provides survey based estimates of CDEW arisings, with relatively robust data published at regional level. Used to inform estimates of London's CDEW arisings as part of the FALP evidence base, the DCLG remains the most recent full survey of CDEW arisings providing data specific to London.

[1] http://webarchive.nationalarchives.gov.uk/20120919132719/http:/www.communities.gov.uk/documents/planningandbuilding/pdf/surveyconstruction2005.pdf

[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/400534/CDE-generation-estimates.xls

[3] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/577752/UK_Statistics_on_Waste_statistical_notice_Dec_2016_FINAL.pdf

[4] Increasing uncertainty at finer geographical resolution.

[5] https://naturalresources.wales/our-evidence-and-reports/waste-reports/construction-demolition-waste-survey/?lang=en

To meet EU reporting requirements under the Waste Framework Directive and Waste Statistics Regulations, Defra provides annual estimates of total CDEW arisings in the UK. Methodological details published by Defra reference sources including Environment Agency (EA) site returns, EA records of exemptions, WRAP survey data, and recycled aggregate data provided by the Mineral Products Association. In presenting CDEW data, Defra notes that "*tonnage figures are subject to a relatively high level of uncertainty*"[3].

Under environmental permitting regulations, operators of permitted waste facilities are required to record details of waste tonnage inputs, and outputs. Information recorded includes waste type (by European Waste Catalogue [EWC] code and Substance Oriented Classification [SOC]), as well as the origin / destination of waste inputs / outputs. This data is released publically by the Environment Agency in the form of the Waste Data Interrogator (WDI) database tool. In principle, through extraction and analysis of WDI data, it is possible to estimate CDEW arising in London. It should however be noted that the WDI does not record tonnages accepted at facilities which are exempt from EA permitting requirements.

The Natural Resources Wales (NRW) 2012 survey differs from previous estimates of CDEW in that findings are based on a waste producer survey (as opposed to analysis of disposal data). In this sense the NRW CDEW survey follows the typical approach to estimation of commercial and industrial waste, applied by Defra, the EA and others. Published NRW CDEW survey data can be used to estimate construction waste arisings per employee in this sector. In principle, this per employee generation can be used to infer potential CDEW arisings in London.

Focussing on the Waste Data Interrogator and the NRW CDEW survey, sections below derive baseline estimates of CDEW arising in London.

2.1.1 Waste Data Interrogator

Through extraction and analysis of WDI data, it is possible to estimate arisings of a given waste type within a specific area. WDI findings are however contingent on the accuracy of data recorded by waste operators. In particular, SLR's experience in utilising WDI findings is that the operator coding or the origin / destination of waste inputs/outputs is inaccurate in some cases. Estimates of the geographic origin of waste streams therefore become increasingly unreliable at finer geographic scales. With this caveat, the Interrogator provides a valuable up to date source flows of CDEW.

The most recent version of the WDI provides information on tonnages reported by waste facility operators in calendar year 2015. Through an analysis of WDI data, SLR has compiled an indicative assessment of CDEW tonnages recorded as originating in London. In presenting these findings, it is important to note that WDI records are limited to tonnages managed via licensed waste management facilities. CDEW tonnages managed via sites and operations which are exempt from permitting requirements are not captured by this approach.

For a summary of SLR's analysis of WDI data on CDEW, please refer to Table 2-2 overleaf. As shown, Interrogator records suggest that in 2015, facilities in London disposed of 3.6 Mt of CDEW originating from London. A further 6.4 Mt of CDEW was then recorded as received from London at sites outside the Capital. Accounting for these contributions, it is estimated that circa 9.7 Mt of CDEW was generated in London and managed at facilities operating under an environmental permit. For tabulated datasets underpinning these estimates, please refer to Appendix A.

Further to this estimate of CDEW originating in London, Waste Data Interrogator records indicate that in 2015 permitted waste management sites in London received imports of circa

1.4 Mt of CDEW originating from outside the Capital. Of this, 1.1 Mt was recorded as originating in the South East, and 0.3 Mt originating in the East of England, with minimal contributions from other regions.

A complexity in deriving estimates of CDEW disposed of in London is that for the case of some treatment facilities a proportion of inputs may be processed into products which are no longer classified as wastes, with a remaining residual fraction transferred onwards to other facilities. In particular this is the case for facilities operating under EA environmental permits for Physical Treatment, and Material Recycling Facilities. For the case of Physical Treatment, as an average across all facilities in England, 32% of inputs are transferred onwards as wastes to other facilities the remaining 68% being considered as "disposed". For Material Recycling Facilities accepting CDEW, an average of 71% of inputs are transferred to other waste facilities, with 29% of inputs being considered as disposed. In the workings presented in Appendix A1, these fractions are considered in quantifying the CDEW tonnage arising and disposed of in London.

In presenting these findings, it should be noted that analysis of WDI tonnage data also highlights a discrepancy in tonnages reported for London:

- As noted above, waste facilities outside London reported receiving 6.4 Mt of CDEW from the capital in 2015.
- Conversely analysis of WDI data on the destinations of outputs from London's transfer facilities indicates a substantially lower export of 3.5 Mt.

A possible explanation for this discrepancy is that significant tonnages of CDEW are exported from London without processing at waste facilities operating under an environmental permit, such that the full scale of exports is not captured via the Interrogator. These waste flows occurring outside the EA's permitting regime may include:

- material loaded to bulk haulage vehicles at the point of arising, and exported directly out of London (for example this is likely to be the case for excavation waste); and
- material processed at exempt sites, before export from London to a permitted waste facility (for example to landfill outside the Capital).

Table 2-2: WDI based estimate of CDEW Generated in London and Managed Via Licensed Waste Facilities

	Estimated London CDEW arising, 2015 (Mt)	**Basis of estimate**
Disposed at sites in London	3.3	Total of all recorded inputs of CDEW recorded as originating in London, and disposed at sites in London. Disposal operations considered include landfill, as well as estimated net removal by treatment.
Disposed at sites outside London	6.4	Total of all recorded CDEW inputs to facilities outside London, reported as originating in London.
Total CDEW originating in London and recorded at permitted facilities	**9.7**	

2.1.2 Natural Resources Wales 2012 Survey

As noted above, the NRW's approach to surveying CDEW arisings parallels that typically used to quantify commercial and industrial waste. Sample data on CDEW generation was collected from individual businesses via face-to-face interview at business sites, using a structured questionnaire. In total, a sample of 457 construction and demolition businesses were interviewed, including a range of business sizes and types. From this sample, waste generation rates per business were used to extrapolate an estimate of Wales' total CDEW generation. Notably, even employing this relatively large sample size, the NRW survey finding for the total tonnage of CDEW generated in Wales achieve a stated precision of +/- 33% at 90% confidence. This finding underlines the inherent difficulty in accurately quantifying CDEW arisings in London.

Recognising these limitations, NRW survey data may be used to infer CDEW currently arising in London. One approach to deriving an estimate is to assume that the rate of construction waste generation per capita in London is comparable to that in Wales. Dividing Wales' CDEW generation (3,359 kt of CDEW in 2012[6]) by the country's total population in 2012 (3.01 million[7]) indicates an average annual CDEW generation rate of 1.1 t/person. Taking the product of this average rate, and London's total population in 2015 (8.63 million) suggests that London generates circa 9.5 Mt of CDEW in 2015.

Alternatively, London's CDEW arising may be estimated assuming proportionality to employment in the construction sector. Accounting for numbers employed in Wales' construction sector (estimated at 104 thousand persons[8]) an average annual generation of CDEW of 32 t/employee is estimated. Multiplying this generation rate by London's total construction sector employment in 2015 (298 thousand persons) provides a comparable estimate of circa 9.6 Mt CDEW in 2015.

A more refined approach to estimation of CDEW arisings would be to develop an estimate resolved by construction sub-sector. Taking this approach, separate generation rates would be derived from the NRW survey for different construction activities (for construction of buildings, roads and highways, demolition and site preparation etc). At present GLA Economics does not currently publish employment projections at a sub-sectoral level, and as such it is not possible to apply this approach. Since this method would arguably give a more London-appropriate estimate of CDEW generation, it is recommended that it is applied should the required dataset be released.

As noted above, Wales' survey data is subject to a wide confidence interval, and further uncertainty is introduced through extrapolation of Wales' survey data to England. Nevertheless, it is notable that the London CDEW arising estimated by this approach is comparable to that derived using the Waste Data Interrogator.

2.1.3 CDEW Managed via Exempt Facilities

As noted above, Environment Agency records published via the Waste Data Interrogator not account for waste tonnages accepted at facilities which are exempt from environmental permitting requirements. This omission introduces a substantial uncertainty in estimating London's total CDEW arising.

[6] https://naturalresources.wales/our-evidence-and-reports/waste-reports/construction-demolition-waste-survey/?lang=en

[7] http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/rel/pop-estimate/population-estimates-for-england-and-wales/mid-2012/mid-2012-population-estimates-for-england-and-wales.html

[8] http://gov.wales/statistics-and-research/priority-sector-statistics/?lang=en

Available published data does not allow estimation of CDEW tonnages currently managed at exempt sites in London with any degree of confidence. Nevertheless, the order of magnitude of this tonnage may be inferred from DCLG's 2005 CDEW survey[1]. For the case of London, the DCLG survey indicates 2 Mt of CDEW used at exempt sites. This estimate includes permitting exemptions under Paragraph 9A(1) (for spreading of soil, rock, ash, some sludges, dredgings or C&D waste) and 19A(2) (which allows for use of waste materials for infrastructure projects, excluding land reclamation)[9].

Whilst emphasising the highly approximate nature of the DCLG survey derived exempt waste tonnage, it can be combined with the Waste Data Interrogator derived estimate of 9.7 Mt handled via permitted faciliteis, to give a total of circa 12 Mt.

In contrast to this finding the above NRW-survey derived finding is an arising of 9.5 Mt, understood to be inclusive of tonnages managed via exempt facilities. NRW however present this as a central estimate, stated at +/-33% at 90% confidence. Taking this confidence interval (an ignoring any uncertainties associated with the extrapolation of the Wales data to London) the NRW-derived survey derived estimate of London's total CDEW arising ranges from 6.4 Mt, up to 12.8 Mt.

An alternative approach to characterising the CDEW tonnage managed via exempt sites is to compile a list of all exempt waste management activities currently registered in London, and evaluate their possible combined throughput. To this end, SLR submitted a request to the Environment Agency for data on exempt waste management operations. In response, the EA has provided a list of all registered exemptions across the four EA office areas covering South East England (Thames; Hertfordshire and North London; Kent, South London and East Sussex; Solent and South Downs). LUC's GIS team has then assisted in identifying those sites which are located within Greater London.

Key exemptions understood to be relevant to CDEW are:

- U1 – Use of waste in construction;
- T5 – Screening and blending waste; and
- T7 – Treatment of waste bricks, tiles and concrete by crushing, grinding or reducing in size.

Notably, details of T7 exemptions are absent from the dataset provided by the EA – it is understood that T7 exemptions are registered via local authorities, such that data is not captured centrally by the EA.

For a summary of numbers of U1 and T5 exemptions registered in London, please refer to Table 2-3. As illustrated, a total of 438 facilities are known to operate in London under these exemptions (please note that since grid references are not included for a circa 4% of waste facilities, this is likely to be a marginal underestimate). Of these, excluding facilities which appear to accept agricultural wastes, 393 sites remain.

[9] Please note that under Environmental Permitting (England and Wales) Regulations 2010, Paragraph 9 and 19 exemptions were replaced, by new exemptions U1, U3 and U11, some activities permitted under Paragraph 9 being becoming subject to environmental permitting requirements.

Table 2-3: Numbers of Exempt Sites in London Potentially Handing CDEW[10]

	Exemption code:	U1	T5		
	Exemption description:	Use of waste in construction	T5 screening and blending waste	Total number of U1 and T5 exemptions	Considered relevant to CDEW
Paragraph sub-type	Not on a farm	35	9	44	Yes
	Non-Agricultural Waste Only	257	66	323	Yes
	Both agricultural and non-agricultural waste	24	2	26	Yes
	On a farm	30	5	35	No
	Agricultural Waste Only	8	2	10	No
	Total number of exemptions in London	**354**	**84**	**438**	
	Total considered relevant	**316**	**77**	**393**	

Since exempt sites do not report tonnages managed to the EA, any attempt at quantifying CDEW managed at these sites is speculative. With this caveat, the order of magnitude of tonnages managed by these sites may however be indicatively inferred, contingent on assumptions on site throughputs. Under U1 exemptions, allowable tonnages under exemptions are as follows:

- 5 kt of aggregates;
- 1 kt of soils & untreated woody material; and
- 50 kt of bituminous & reclaimed sub-base materials.

No recorded data exists on the relative use of these three materials under U1 exemptions. Simplistically, assuming an equal split between these activities, the average of the above is 19 kt. Since these exemptions are valid for a three year period, this could be taken to equate to an average annual throughput of 6 ktpa for U1 exemptions.

For the case of T5 exemptions, allowable tonnages include

- 50 kt of bituminous wastes; and
- 5 kt of other wastes (concrete, bricks, tiles, as well as some non-CDEW waste streams).

As for the case of U1, no data exists on the relative use of these materials under T5 exemptions. Again, on the simplistic assumption of equal contributions from these uses, an average of 28 kt of waste used. Since these tonnages apply over a three year duration, this would correspond to an average 9 ktpa annual throughput.

[10] Contains Environment Agency information © Environment Agency and/or database right. For the conditional license under which this data is provided, please refer to the following link: https://www.gov.uk/government/publications/environment-agency-conditional-licence/environment-agency-conditional-licence.

It is understood that since the process of registering exemptions is free (with the exception of the T11 WEEE exemption), and relatively straightforward, a significant proportion of exemptions granted are not ultimately used by operators. No data exists on this unused proportion, but here it is illustratively assumed at 30%.

Combining the above exemption numbers, illustrative throughputs, and accounting for a 30% unused proportion, throughput of U1 and T5 exemptions in London amounts to 1.9 Mtpa. It should be emphasised that this estimate is highly speculative, being dependent on a number of assumptions. As an illustration of the uncertainty in the estimate

- if lower three year site throughputs of 5 kt are adopted for U1 and T5 exemptions, this estimate reduces to 0.5 Mtpa; and
- conversely, if all sites operated at their maximum permitted input, the estimate would increase to 4.6 Mtpa.

As noted above, the estimated total excludes T7 exemptions which are registered with local authorities, and for which no published data exists.

2.2 Major Infrastructure Projects

To further characterise London's CDEW arisings, SLR has reviewed available data on CDEW arisings from the Capital's major infrastructure projects.

To establish a list of projects to be considered, SLR has reviewed the National Infrastructure and Construction Pipeline published by HM Treasury and Infrastructure and Projects Authority in December 2016[11]. To establish a shortlist of "major" projects for consideration, those projects having a total capital spend in excess of £250M are selected. These include:

- HS2 - National high speed rail network;
- Crossrail;
- Thameslink;
- Thames Tideway Tunnel Main (Thames Water);
- Northern Line Extension;
- Bank station; and
- Victoria station.

For each of these projects, SLR has reviewed published estimates of waste generated, including data presented in consultation documents, case studies and press releases. For a summary of SLR's findings on CDEW arising from these projects, please refer to Table 2-4.

Table 2-4: CDEW Details for Major Infrastructure Projects

Pipeline project name	Findings on CDEW generation
HS2 – (Phase 1)	For the full HS2 Phase 1 scheme (rather than London alone) it is reported that development of the scheme will yield a total c.130Mt of excavated material, of which over 86% will be reused[12]. The remaining material will be surplus to requirements or

[11] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/574492/national_infrastructure_and_construction_pipeline_autumn_2016.xlsx

[12] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/509164/E3_-_Excavated_Material_and_Waste_Management_Strategy_v1.5.pdf

Pipeline project name	Findings on CDEW generation
	unsuitable for reuse due to contamination and is likely to be disposed to landfill. Furthermore, c.3.1Mt of construction waste and 1.7Mt of demolition material will be generated, of which at least 90% will be diverted from landfill. In a technical appendix to the HS2 environmental statement[13] HS2 developers have published estimates of CDEW tonnages generated for each segment of the route. SLR's review of route segment contributions indicates total generation of 21.7 Mt CDEW in London, including 1.3 Mt construction waste, 0.6 Mt demolition waste, and 19.7 Mt excavation waste.
Crossrail	One source[14] predicts that c. 8 million m^3 of surplus CDEW material from Crossrail, categorised as follows: 1.2 million m^3 of construction waste; 0.3 million m^3 of demolition waste; 6.0 million m^3 of clean excavated material; and 0.5 million m^3 of contaminated excavated material. The second source[15] states that as of the end of FY 2015/16, a total of 7.9Mt of material had been excavated since construction began (0.4 Mt of material was excavated in 2015/16 alone with 98% diverted from landfill). A further 67 kt of construction and demolition waste were produced in 2015/16, with 97% diverted from landfill. As of the end of 2015/16, it was reported that 97% of construction and demolition waste has been reused or recycled, and ~99% of clean excavated material has been used. A major recipient of material excavated by the Crossrail project has been the RSPB nature reserve at Wallasea Island, Essex. It is understood the depositing of material at Wallasea Island occurs under an EA recovery permit. Waste Data Interrogator records indicate that the Wallasea project received circa 900 kt of CDEW from London in 2014.
Thameslink	Available data is incomplete, being limited to case studies for individual stations. One source estimates 91 k·m^3 of C&D waste over 5 years (2012 – 2018) from the redevelopment of London Bridge Station[16]. However a separate source indicates 200,000 tonnes of waste was generated from the redevelopment of London Bridge Station, with over 99% diverted from landfill[17]. For London Blackfriars Station, it is reported that c.9,000 tonnes of spoil will be removed by river barge[18]. For Farringdon Station redevelopment, C&D recovery rates of >95% are indicated, though the waste tonnage is unknown[19].
Thames Tideway Tunnel Main	It is reported that construction of the Thames Tideway Main Tunnel will take a period of c.6 years from 2016. During this period 4,700 kt of material is to be removed from all sites across the project[20]. 50 kt of general construction waste will be generated

[13] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265885/AllCFAs_Waste_and_Material_Resources_Assessment_WM-001-000.pdf

[14] http://74f85f59f39b887b696f-ab656259048fb93837ecc0ecbcf0c557.r23.cf3.rackcdn.com/assets/library/document/0/original/0001-r-exmatwastestrat1.pdf

[15] http://www.crossrail.co.uk/sustainability/environmental-sustainability/materials-and-waste

[16] http://www.wrap.org.uk/sites/files/wrap/DoW_London_Bridge_Station_0.pdf;

[17] http://www.costain.com/our-culture/costain-cares-stories/london-bridge-legacy/

[18] http://www.railwaystrategies.co.uk/article-page.php?contentid=13789&issueid=415

[19] http://www.ceequal.com/case-studies/thameslink-programme-farringdon-station-redevelopment/

[20] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/WW010001/WW010001-003462-9.10.03_Excavated_Materials_Options_Assessment_(EMOA)_Main_Report.pdf

Pipeline project name	Findings on CDEW generation
(Thames Water)	(consisting of wastage of 16kt of imported fill, 25 kt of concrete and 0.450 ktpa of welfare waste)[21].
Northern Line Extension	The following anticipated waste generation rates and targets have been published for the Northern Line Extension project[22]: 48 kt of construction waste (target to recover 96%);10 kt tonnes of demolition waste (target to recover 96%); and 1.0 Mt of excavated material (target to recover 100%).
Bank station	It is anticipated that upgrading of Bank Station will take circa 5 years to complete with c.200 kt of C,D&E waste being generated and a breakdown as follows[23]: 30.1kt of concrete waste from tunnel construction; 8.1kt of operational infrastructure construction waste; 18.6 kt of demolition waste; and 141.3 kt of bulked excavated material. A target of 95% recovery of CD&E waste has been set.
Victoria station	245 k·m^3 of CDEW is reported to have been generated from the Victoria Station Upgrade[24]. At an assumed density of 0.87 t/m^3 [25], this converts to an estimated 213 kt.

Published data for the identified major infrastructure projects summarised in Table 2-4 provides an incomplete picture of CDEW tonnage generation. While the limitations of this available data must be emphasised, findings can be used to derive an order of magnitude estimate of CDEW generated in London by the projects. For a summary of derived estimates of CDEW tonnages for the seven projects, please refer to Table 2-5.

Forecasted annual time series' for major project CDEW generation developed on the basis of estimated works start and end dates and annual tonnage estimates presented in Table 2-5 are illustrated in Figure 2-1. Given the limitations to available data, these findings must be presented with the following caveats:

- For all projects, start and end dates of works giving rise to CDEW are not well defined by published sources. Indicatively, it is assumed that works resulting in CDEW effectively cease one year before the planned project end date.

- Likewise changes in overall rates of CDEW generation over the course of projects are unknown. For all projects, CDEW generation is assumed to occur at a constant rate over the duration of works. In practice, CDEW may be biased towards the first few years of project construction, though this cannot be estimated with any accuracy.

- For the case of Thameslink, the estimate of construction waste generation from works at stations in London is incomplete – in particular, no data is available for Farringdon.

- Where converted from reported as volumes, tonnages are converted assuming waste density estimates published by WRAP[25]: for construction and demolition waste, a density of 0.87 t/m^3 is adopted, 1.25 t/m^3 then being applied to excavation waste.

[21] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/WW010001/WW010001-000882-6.2.03_Environmental_Statement_Volume_3_Project_wide_effects_assessment.pdf

[22] http://content.tfl.gov.uk/resource-efficiency-plan-rev-3-23-01-15.pdf

[23] http://content.tfl.gov.uk/bscu-twao-envstatement-ch15wastemanagementandresourceuse.pdf

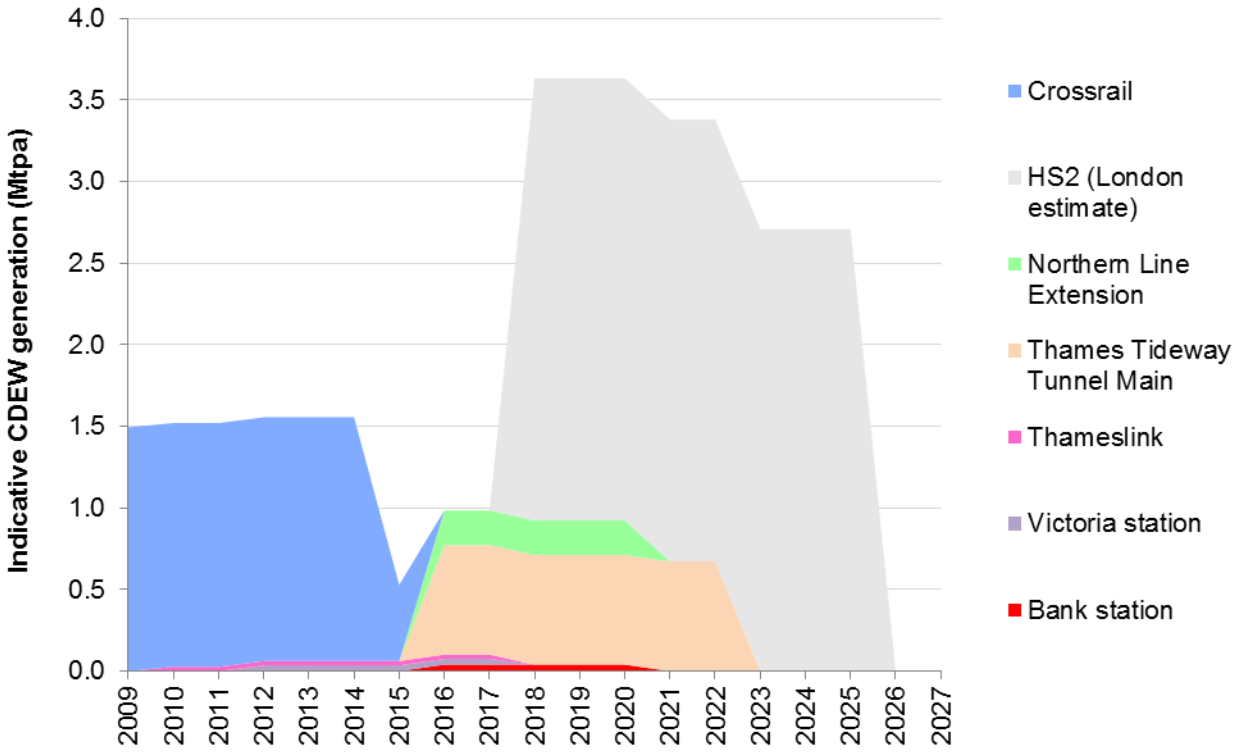
[24] https://www.thepodfather.com/news/green-apple-award-victoria-station-upgrade

[25] http://www.wrap.org.uk/sites/files/wrap/WRAP%20Waste%20Reporting%20Guidance%20Update%20-%20FINAL1.pdf

Table 2-5: Estimated CDEW Tonnage Generation by Major Infrastructure Schemes

	Estimated project waste generation (Mt; where known)					Assumed works start and end for CDEW generation		
Short name	**C**	**D**	**E**	**Total**	**Waste requiring landfill, if known (Mt)**	**Start**	**end**	**Illustrative total annual waste generation within London (Mt)**
HS2 (London estimate)	1.3	0.6	19.7	21.7		2018	2025	2.7
Crossrail	1.0	0.3	8.1	9.4	0.2	2009	2018	1.5
Thameslink				0.2		2010	2017	0.03
Thames Tideway Tunnel Main	0.1		4.7	4.7		2016	2022	0.7
Northern Line Extension	0.0	0.0	1.0	1.1	0.002	2016	2020	0.2
Bank station	0.0	0.0	0.1	0.2	0.01	2016	2020	0.04
Victoria station				0.2		2012	2017	0.04

Figure 2-1: Illustrative Time Series for CDEW Generated in London by Major Infrastructure Projects



A further caveat which must be made is that all excavated material reported by projects has been assumed to be classified as waste. However, Article 2(1)(c) of the revised Waste Framework Directive (WFD) explicitly excludes excavated material from the definition of waste, if it complies with the following definition[26]:

> *"uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated;"*

For a number of the projects considered, it is unclear whether a proportion of excavated material may comply with this definition, and therefore not fall under the WFD definition of waste.

Despite the limitations of available data, it can be concluded that the seven major infrastructure projects considered will be responsible for a substantial proportion of CDEW generated in London over the next two decades. Nevertheless, the burden of these projects on the Capital's waste infrastructure may be limited for the following reasons:

- For all projects, developers report that circa 90% or more of waste arisings will be diverted from landfill.
- In many cases, and particularly for the case of excavation waste, CDEW generated by these large projects will be bulk-hauled from the point of arising to an end disposal

[26] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0098&from=EN

point – avoiding the requirement for intermediate handling at existing waste management facilities. Where treatment capacity is required, it is likely that this would be temporary mobile plant, located on the land being developed.

2.3 Projections

Above sections 2.1.1 and 2.1.2 develop two independent estimates of London's arisings of CDEW. Through analysis of Waste Data Interrogator records, section 2.1.1 derives an indicative CDEW arising estimate of 9.7 Mtpa. Utilising survey data published by Natural Resources Wales, section 2.1.2 then arrives at an estimate of 9.5 Mtpa.

As detailed in these sections, due to limitations of the available sources both of these estimates should be viewed as highly approximate. Here the WDI based estimate of 9.7 Mtpa is taken as a basis for projections – however it is important to recognise the limitations of this estimate:

- This estimate is contingent on the accuracy of waste facility operator records of the origin of tonnages accepted.

- The quantified CDEW tonnage is limited to waste processed via facilities operating under an environmental permit – sites which are exempt from permitting requirements are not included.

As for the case of LACW and C&IW, future growth in CDEW arisings may be estimated using an appropriate proxy dataset. Adopting the methodology applied to C&IW, future CDEW generation may be coupled with GLA Economics employment projections for the construction sector. SLR's projection for London's total CDEW arising developed on this basis is presented overleaf in Figure 2-2.

In common with other waste streams, future levels of CDEW production per person may change in response to a range of factors. For example waste minimisation efforts may reduce arisings, while growth in the construction sector may increase arisings. Recognising this uncertainty, three illustrative scenarios are included in Figure 2-2:

- an intermediate case, under which CDEW generation rates per employee remain constant;

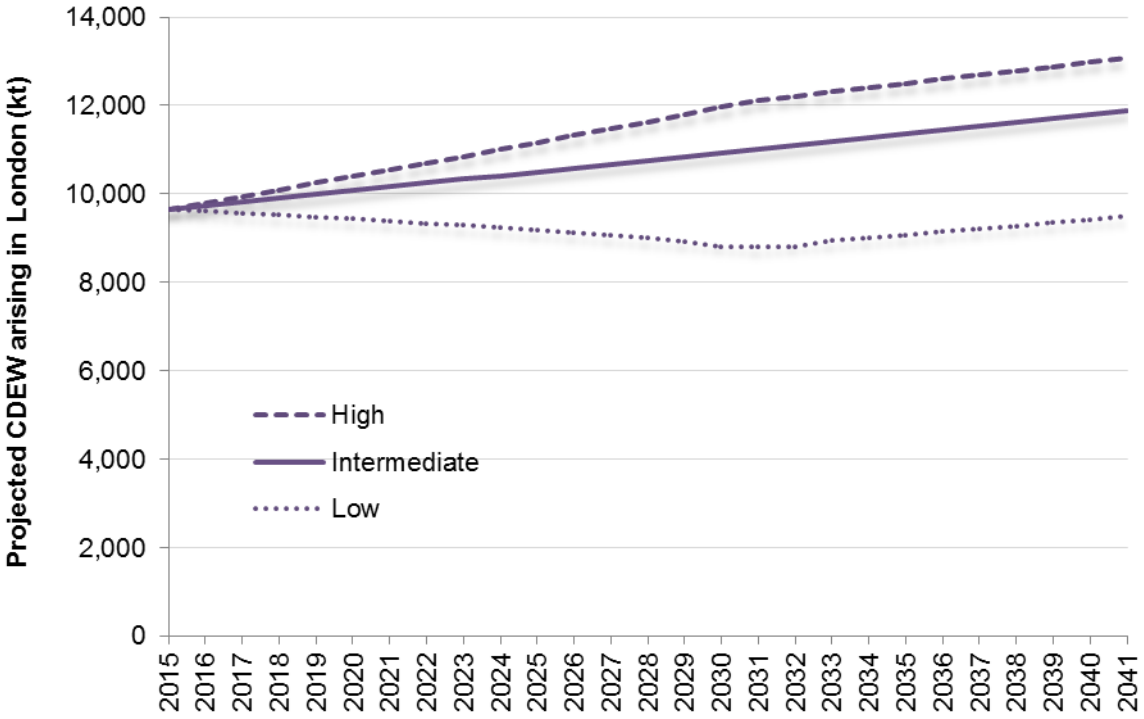
- a lower (circular economy case), where waste minimisation efforts achieve a 20% reduction in CDEW arising per employee by 2031; and

- an upper case, under which construction sector growth results in a 10% increase in waste arising per employee.

In presenting these scenarios it should be emphasised that lower and upper cases do not account for uncertainty in baseline CDEW data. This baseline uncertainty is known to be high, but cannot be meaningfully quantified on the basis of available data.

As noted above in section 2.3, projections for CDEW arisings for major infrastructure projects are order of magnitude estimates only. Given the uncertainties around waste projections for these projects as well as the potential for double counting of tonnages which may be captured by the WDI, no attempt has been made to explicitly incorporate CDEW generated by future infrastructure projects in Figure 2-2. For tabulated data values associated with the forecast illustrated in Figure 2-2, please refer to Appendix C.

Figure 2-2: Projected CDEW Arising in London



2.4 Inert Waste Landfill Capacity

CDEW survey findings indicate that the overwhelming majority of this material is beneficially recycled/reused. In provisioning for future waste management requirements, the disposal of CDEW to landfill is however a continuing concern – particularly given the finite landfill void available at existing facilities. Subsections below consider the adequacy of remaining inert landfill void in London, and regions receiving London's inert waste.

2.4.1 London

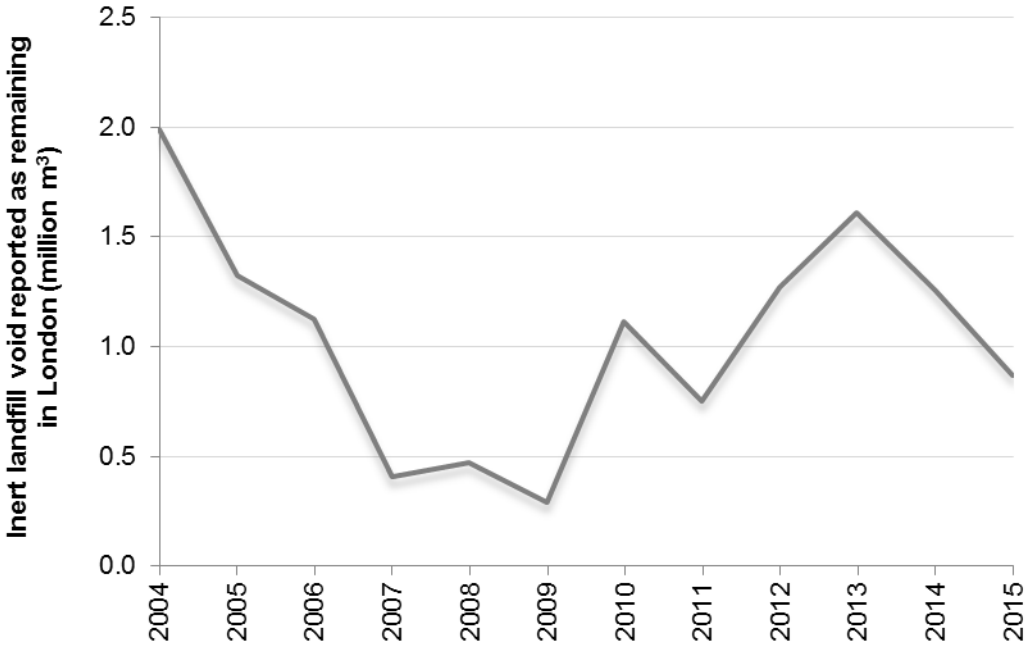
Environment Agency records[27] indicate that remaining void at inert landfills in London totalled 867 thousand m^3 in 2015. Assuming an inert waste density of 1.5 t/m^3, this would allow for disposal of 1.3 Mt of inert waste. In 2015, inputs to London's inert landfills totalled 547 thousand tonnes. Simplistically, at current input rates, it would therefore appear that inert void reported in London for 2015 would be depleted within 3 years – i.e. by 2018.

However, data on inert landfill void reported historically for London suggests that the situation is more complex. Below, Figure 2-3 presents a time series of landfill void remaining in London, as reported annually by the Environment Agency. Rather than a continuing decline in London's remaining inert landfill void, this data indicates a net increase over the period 2009 to 2019. This rise in inert void is likely a combination of extension of existing permitted inert landfill sites, as well as possible creation of new capacity through minerals extraction. It is suggested that the GLA engages with the Environment Agency to investigate

[27] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/563887/Waste_management_2015_in_england_data_tables.xlsx

whether new permit applications indicate adequate provisioning of new inert landfill void in London in future years.

Figure 2-3: Reported Inert Landfill Void Remaining in London



Further to the above, consideration of material received at London's inert waste landfills, it should also be noted that comparable inert waste volumes are also disposed at London's non-hazardous (active waste) landfills. Waste Data Interrogator records suggest disposal of 561 kt CDEW at non-hazardous landfills in London in 2015.

2.4.2 South East and East of England

Analysis using the Waste Data Interrogator confirms that where CDEW originating in London is destined for landfill, the majority of this material is exported outside the capital for disposal. In particular, substantial volumes of London's inert waste are accepted at landfills in the South East and East of England former Government Office Regions.

It is estimated that in 2015, landfills in the South East received 1.5 Mt of inert waste from London, while landfills in the East of England received 2.2 Mt. To ensure adequate provisioning for CDEW generated in London, it is important to consider whether these regions will be in a position to continue to dispose London's inert waste volumes on this scale.

Focussing on landfills licensed to receive inert waste only, combined remaining inert void at landfills in the South East totalled 26.5 million m^3 in 2015. At an assumed 1.5 t/m^3 waste density, this equates to capacity for 39.8 Mt. Reported inert waste disposals at these facilities in the same year totalled 2.7 Mt in 2015. On the simplistic assumption that disposal rates remain constant a current levels, inert landfills in the South East have capacity adequate for a further 14 years operation.

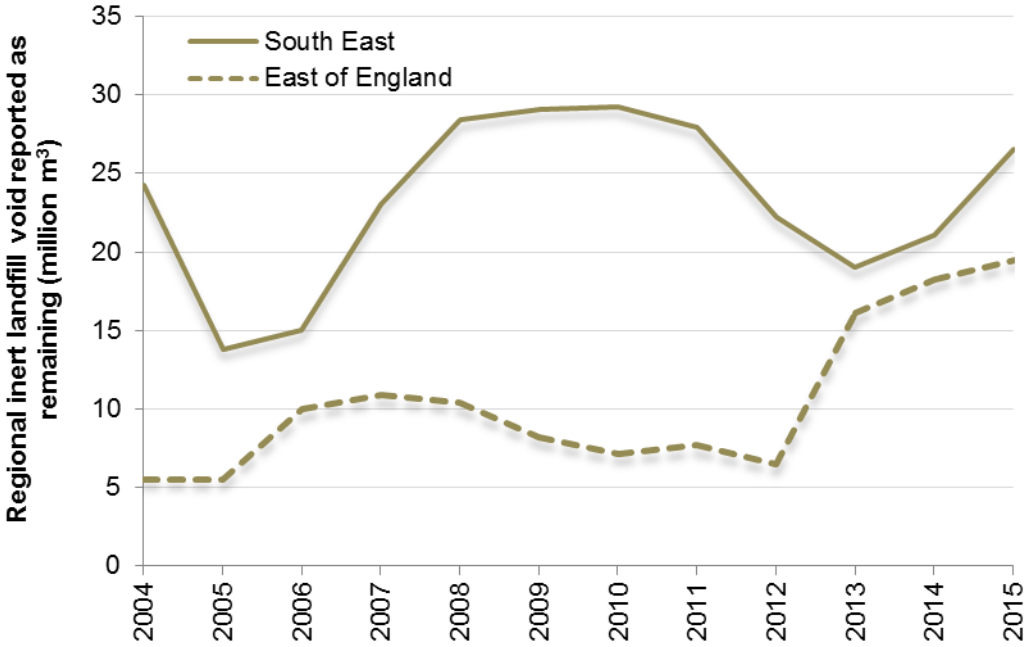
For the case of the East of England, remaining void at inert waste landfills in the East of England in 2015 totalled 19.5 million m^3, or 29 Mt assuming 1.5 t/m^3 density. Assuming that

annual inputs to these facilities remain at the 3.4 Mt reported in 2015, this void would simplistically be expected to be exhausted within 9 years.

Paralleling the case of London, it is notable that remaining inert landfill void within the South East and East of England has fluctuated significantly over the last decade (as opposed to declining). As illustrated below in Figure 2-4, remaining void reported in 2015 exceeded that in 2004 for both regions. Historically therefore, deposits on inert waste in each region have been offset by creation of new void.

Despite this finding, it cannot be assumed that historical rates of new void creation will continue in future years. It is therefore suggested that the GLA engages with waste planning authorities within these regions, and with the Environment Agency, to develop projections for future void availability.

Figure 2-4: Reported Inert Landfill Void Remaining in London



As per the above findings for London, it is notable that landfills in the South East and East of England under non-hazardous (active) waste permits also receive inert waste volumes on a large scale. Disposal of CDEW generated in London is therefore also contingent on continuing availability of void at these facilities.

To inform its understanding of current disposal routes for CDEW generated in London, the GLA has requested details of landfills currently accepting waste generated in London. Through extraction and processing of tonnage data from the Waste Data Interrogator, SLR has developed a list of all landfill sites reporting receipt of waste from London in 2015. This list is included as Appendix D to this report, landfill sites being listed in descending order of reported tonnage input of waste originating from London. For each site, reported inputs of household/industrial/commercial, CDEW, and hazardous waste from London are detailed. Also included is the total input to each site, and the proportion of inputs sourced from London. Please note that this dataset is derived from the Waste Data Interrogator, findings are contingent on accurate record keeping by waste facility operators. In particular, SLR's experience in using the Waste Data Interrogator indicates that the reported geographical origin of waste received may be misleading in some cases.

3.0 HAZARDOUS WASTE

3.1 Baseline Arisings

Few published studies of hazardous waste arisings exist, and no recent estimates of hazardous waste generated in London are known. However, data on this waste stream is captured by the Environment Agency's Waste Data Interrogator; as well as the separately released Hazardous Waste Interrogator.

Both of these sources allow identification of movements of hazardous waste, and can be used to derive comparable estimates of the hazardous waste arising in London. In contrast to CDEW, the overwhelming majority of hazardous waste will be accepted at permitted facilities, and is therefore recorded via these tools.

While the Hazardous Waste Interrogator provides high level data on waste movements between local authority areas, the Waste Data Interrogator (WDI) provides greater detail, including flows of hazardous waste via individual facilities. However, a limitation of the Waste Data Interrogator is that this does not capture data on hazardous waste accepted for incineration (data recorded via the WDI is limited to facilities operating under an environmental permit, while incinerators are regulated separately under the Industrial Emissions Directive).

For a high level summary of London's hazardous waste generation derived from the WDI, please refer to Table 3-1. As indicated, it is estimated that in 2015, London generated a total of 324 kt of hazardous waste. This total comprises 60.2 kt disposed at facilities in London, with a further 263.4 kt recorded as received at disposal sites outside London. For further detail of waste flows considered in deriving totals shown in Table 3-1, please refer to Appendix B.

Table 3-1: WDI based estimate of Hazardous Waste Generated in London

	Estimated London hazardous waste arising, 2015 (kt)	Basis of estimate
Disposed at sites in London	60	Total of all inputs of hazardous waste recorded as originating in London, and disposed at sites in London.
Disposed at sites outside London	263	Total of all recorded hazardous waste inputs to facilities outside London, reported as originating in London.
Total hazardous waste originating in London and recorded at permitted facilities	**324**	

Further to the assessing hazardous waste flows using the EA's Hazardous Waste Interrogator, as a consistency check, SLR has also undertaken a similar assessment using the Waste Data Interrogator. Extraction and analysis of WDI data indicates an arising of 329 kt, compared with 324 kt for the case of the Waste Data Interrogator. The two Environment Agency waste data tools therefore give comparable estimates – though the reason for the discrepancy between the two values is unclear.

3.2 Projections

Following the approach adopted for other waste streams, hazardous waste arisings may be projected assuming scaling with an appropriate proxy. Here the GLA's intermediate population forecast (long term trend, 2015 round[28]) is adopted as a basis for projecting hazardous waste growth.

Dividing the estimated baseline total London hazardous waste arising by London's 2015 population (8.45 million) indicates an average per capita generation rate of 38 kg/person/year. Assuming that this rate stays constant, hazardous waste arisings are then projected as the product of this per capita generation rate, and the GLA's forecasted population. Please refer to Figure 3-1 for an illustration of the resultant hazardous waste forecast for London. For data values underpinning the forecasts shown in Figure 3-1, please refer to Appendix C.

Paralleling the case of CDEW, levels of hazardous waste generation per capita may potentially fall or rise over time. To illustrate resultant variation in hazardous waste arisings, Figure 3-1 includes

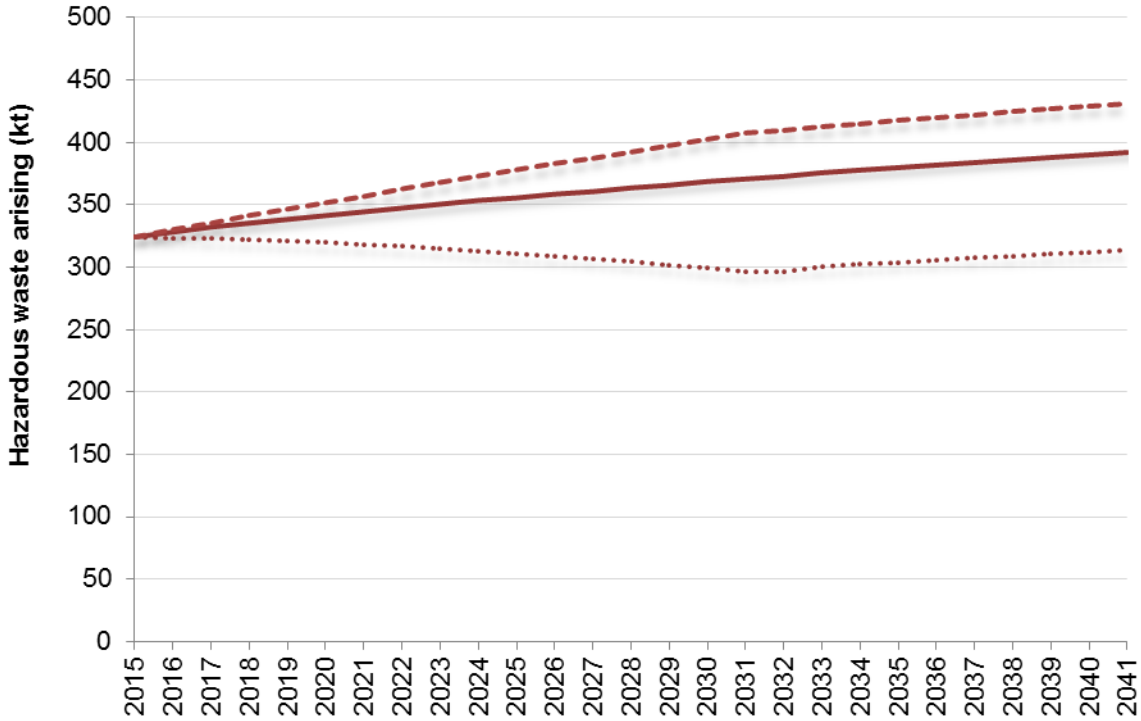
- an intermediate scenario, with no change in hazardous waste generation per person;
- a lower, circular economy scenario, applying a 20% reduction the hazardous waste generation rate; and
- an upper case, under which the arising per person increases by 10%.

Please note that this approach focusses on potential variation in hazardous waste arisings per person, rather than attempting to quantify the full forecast uncertainty.

In presenting data on hazardous waste, it should be emphasised that this material arises as part of other waste streams including household waste, commercial and industrial waste, and CDEW. For this reason, hazardous waste arisings illustrated in Figure 3-1 are not additional to other waste projections prepared for the London Plan.

[28] https://files.datapress.com/london/dataset/2015-round-population-projections/2016-10-21T14:23:54/long_term_trend_2015_round.xlsx

Figure 3-1: Projected London Total Hazardous Waste Arising



3.3 Hazardous Waste Landfill Capacity

Management routes for London's hazardous waste, estimated via the Hazardous Waste Interrogator (detailed in Appendix B) indicate that only a minority of this material (circa 10%) is disposed direct to landfill. Nevertheless, availability of hazardous waste landfill capacity remains essential for some wastes which cannot be safely recovered or treated. This section considers the adequacy of remaining landfill capacity in London, and regions receiving London's hazardous waste.

3.3.1 London

Landfill void data published by the Environment Agency indicates that in 2015, 219 thousand m^3 of void remained at hazardous waste landfills in London. However EA data also suggests that no hazardous waste was disposed to landfills in London in 2014 or 2015.

3.3.2 Regions Receiving London's Hazardous Waste Exports

In contrast to the case of CDEW, for which exports from London are primarily received in the South East and East of England, hazardous waste generated in London is exported throughout the England. This mobility is due to the relatively low arising of hazardous waste, the specialised nature of facilities required.

Exports of hazardous waste originating in London and disposed directly to landfill are relatively small – estimated at 29 kt in 2015. For a summary of tonnages received by former Government Office Region, derived via the Environment Agency's Waste Data Interrogator, please refer to Table 3-2. As shown, major recipients are the North West, East Midlands, East of England, and North East. Notably, in all cases, hazardous waste quantities received

from London make a relatively small contribution to total hazardous waste quantities disposed to landfill in these regions.

Table 3-2: Exports of London's Hazardous Waste to Landfill, and Regional Totals

Receiving region	Total received from London (ktpa)	Total hazardous waste landfill (ktpa)	London proportion of total
North West	9	65	14%
East Midlands	8	179	4%
East of England	7	55	13%
North East	4	152	3%
South West	0.4	157	0%
Yorks & Humber	0.2	252	0.1%
South East	0.1	59	0.1%
West Midlands	0.0	17	-
London	0.0	0.0	-
Total	**29**	**935**	**3%**

Given the national extent of movements of hazardous waste generated in London, it would arguably not be appropriate for to engage with neighbouring regions on the issue of hazardous waste landfill capacity. Nevertheless, the ongoing availability of landfill capacity for hazardous waste arising in London can be projected at a regional level using published data. Following the approach applied to CDEW, the remaining number of years of hazardous waste landfill capacity can be estimated accounting for existing input rates, and current remaining void.

Drawing on data published by the Environment Agency[27], and assuming a density of 1 t/m^3 for hazardous waste disposed to landfill, timescales for exhaustion of existing hazardous waste landfill void are estimated in Table 3-3. Notably the North West, which is the largest recipient of hazardous waste originating in London and disposed to landfill, has an apparent 74 remaining years at current input rates. The East Midlands, which is the second largest recipient, then has void sufficient for 7 years.

As noted above for the case of CDEW, it should be emphasised the approach taken in Table 3-3 in projecting landfill void is simplistic, in that it neglects the potential for creation of new hazardous landfill void. Assuming continuing permitting of new hazardous waste landfill void, landfill lifetimes may extend beyond those indicated.

Table 3-3: Exports of London's Hazardous Waste to Landfill, and Regional Totals

Region	Remaining hazardous waste landfill capacity, 2015 (kt) [29]	Input to hazardous waste landfills, 2015 (ktpa)	Years remaining at current input rate
North West	4,832	65	74
East Midlands	1,109	166	7
East of England	0	0	-
North East	6,887	126	55
South West	1,837	79	23
Yorks & Humber	2,419	270	9
South East	630	63	10
West Midlands	535	0	-
London	219	0	-

[29] Assuming a hazardous waste density of 1 t/m^3. Please note that some non-hazardous landfills are permitted to accept stable non reactive hazardous wastes (SNRHW) in a dedicated cell. Since this SNRHW capacity is not quantified by available datasets, it is excluded from void projections presented in Table 3-3. Hazardous waste arising in London and disposed to landfill in the East of England is deposited in SNRHW cells, and as such it is not possible to provide a void projection for the case of the East of England

4.0 COMMENTS ON APPORTIONMENT

The London Plan identifies waste tonnage apportionments to be managed within each borough. Borough's are required allocate land and identify waste facilities to ensure management of their apportioned tonnages. In determining borough apportionments, previous versions of the London Plan have focused specifically on household waste, and commercial and industrial waste.

This approach is in-keeping with the requirements of Planning Policy Statement 10 (PPS10)[30], which explicitly limits the requirement for apportionment to household waste and commercial and industrial waste, therefore excluding CDEW.

Notably the successor to PPS10, the National Planning Policy for Waste (NPPW)[31] is not explicit in this regard, though the emphasis of the document is on provisioning for household and commercial and industrial waste streams.

It is considered that apportionment of CDEW in the new London Plan would be problematic, for a number of reasons:

- Uncertainties are around the arising of CDEW are substantial. While CDEW arisings may be estimated using Interrogator data, this approach has a number of limitations (as highlighted section 2.1.1). Even taking the example of Wales, where a recent extensive CDEW survey has be taken, the precision achieved for arisings estimates is low, at +/-33 (90% confidence). Given this uncertainty, there is potential for significant error in identifying future capacity and landtake requirements.

- A significant proportion of CDEW generation is driven by major new developments. The arising of CDEW can therefore vary significantly over time, and is unevenly spatially distributed. As such it is difficult to predict optimal locations for new CDEW management capacity.

- Much of the CDEW arising (particularly excavation waste) may be managed close to the point of waste generation, without the need for permanent waste infrastructure – it would therefore not be appropriate to allocate waste management capacity for this material.

Rather than apportioning CDEW, the existing London Plan puts forward policy for CDEW in respect of planning decisions, and the development of Local Development Frameworks. These policies include the development of new CDEW at existing sites, use of mineral extraction sites for CDEW recycling, and requirements for major developments to recycle CDEW on site. Given the above considerations, it is arguably appropriate to continue this approach.

In relation to hazardous waste, it should be emphasised that this waste stream is generated by households, commerce and industry, and construction / demolition activities. Since hazardous waste is implicitly included in projections for these waste streams, it would not be appropriate to develop separate apportionments for hazardous waste.

[30] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/11443/1876202.pdf

[31] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/364759/141015_National_Planning_Policy_for_Waste.pdf

5.0 CLOSURE

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Greater London Authority; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

APPENDIX A – WASTE DATA INTERROGATOR ESTIMATION OF CDEW ARISINGS

Table A1: Inert Waste Originating in London, and Received at Facilities in London

		Inert waste originating in London, and received at facilities in London, 2015 (kt)				
Facility type	**Site category**	**London**	**London (Est'd)**	**Not Codeable**	**Total**	
Car Breaker	MRS	3	0	0	3	0%
Metal Recycling	MRS	150	0	0	150	0%
Vehicle Depollution Facility	MRS	25	0	0	25	0%
CA Site	Transfer	40	0	0	40	0%
Haz Waste Transfer	Transfer	170	0	0	170	0%
Inert Waste Transfer	Transfer	912	0	1	913	0%
Non-Haz Waste Transfer	Transfer	1,843	15	0	1,858	0%
Haz Waste Transfer / Treatment	Treatment	0	0	0	0	0%
Inert Waste Transfer / Treatment	Treatment	252	0	24	276	0%
Non-Haz Waste Transfer / Treatment	Treatment	491	0	0	491	0%
Non-Haz Waste Transfer/Treatment	Treatment	0	0	0	0	0%
Clinical Waste Transfer	Transfer	0	0	0	0	0%
WEEE treatment facility	Treatment	0	0	0	0	0%
Material Recycling Facility	Treatment	674	0	0	674	29% *
Chemical Treatment	Treatment	0	0	0	0	68%*
Physical-Chemical Treatment	Treatment	18	0	0	18	68%*
Physical Treatment	Treatment	1,537	0	0	1,537	68%*
Inert LF	Landfill	478	0	0	478	100%
Non Haz (SNRHW) LF	Landfill	0	0	0	0	100%
Non Hazardous LF	Landfill	442	0	0	442	100%
Hazardous Merchant LF	Landfill	0	0	0	0	100%
Restricted LF	Landfill	0	0	0	0	100%
Deposit of waste to land (recovery)	On/In Land	1,069	0	0	1,069	100%
Composting	Treatment	0	0	0	0	100%
Biological Treatment	Treatment	8	0	0	8	100%
Construction	Use of Waste	0	0	0	0	100%
Reclamation	Use of Waste	1	0	0	1	100%
Timber Manufacturing	Use of Waste	0	0	0	0	100%
				Total	**8,153**	
				Estimated total arising in London, and disposed in London	**3,255**	

* Estimated proportion of waste inputs “disposed” (no emerging as waste outputs), determined on the basis of England-wide averages.

Table A2: Inert Waste Originating in London, and Received at Facilities Outside London

Facility type	Site category	Inert inputs originating in London, received outside London, 2015 (kt)
Car Breaker	MRS	9
Metal Recycling	MRS	58
Vehicle Depollution Facility	MRS	0
CA Site	Transfer	0
Haz Waste Transfer	Transfer	1
Inert Waste Transfer	Transfer	210
Non-Haz Waste Transfer	Transfer	210
Haz Waste Transfer / Treatment	Treatment	0
Inert Waste Transfer / Treatment	Treatment	24
Material Recycling Facility	Treatment	152
Non-Haz Waste Transfer / Treatment	Treatment	11
Non-Haz Waste Transfer/Treatment	Treatment	0
Inert LF	Landfill	1,742
Non Haz (SNRHW) LF	Landfill	623
Non Hazardous LF	Landfill	1,372
Hazardous Merchant LF	Landfill	0
Restricted LF	Landfill	0
Deposit of waste to land (recovery)	On/In Land	1,542
Clinical Waste Transfer	Transfer	0
Chemical Treatment	Treatment	0
Composting	Treatment	0
Physical Treatment	Treatment	391
Physical-Chemical Treatment	Treatment	1
Biological Treatment	Treatment	0
WEEE treatment facility	Treatment	0
Construction	Use of Waste	55
Reclamation	Use of Waste	0
Timber Manufacturing	Use of Waste	0
	Total	**6,400**

APPENDIX B – WASTE DATA INTERROGATOR ESTIMATION OF HAZARDOUS WASTE ARISINGS

Table B1: Hazardous Waste Originating in London, and Received at Facilities in London

	Hazardous waste arising in London, and received at facilities in London, 2015 (kt)
Transfer (D)	4
Transfer (R)	20
Treatment	7
Recovery	49
Incineration without energy recovery	4
Incineration with energy recovery	0
Landfill	0
Long term storage	0
Other Fate	0
Rejected	0
Total	**84**
Total disposal (i.e. ex. transfer)	**60**

Table B2: Hazardous Waste Originating in London, and Received at Facilities Outside London

	Hazardous waste originating in London, and received at facilities outside London, 2015 (kt)
Transfer (D)	15
Transfer (R)	54
Treatment	89
Recovery	53
Incineration without energy recovery	2
Incineration with energy recovery	1
Landfill	40
Long term storage	9
Other Fate	0
Rejected	0
Total	**263**

APPENDIX C – FORECAST DATA TABLES

Table C1: Intermediate Projected arisings of Construction, Demolition and Excavation Waste, and Hazardous Waste

Year	Construction, Demolition and Excavation Waste* (kt)	Hazardous waste (kt)
2015	9,655	324
2016	9,738	327
2017	9,819	330
2018	9,903	334
2019	9,987	337
2020	10,072	340
2021	10,157	343
2022	10,241	346
2023	10,326	349
2024	10,411	352
2025	10,497	355
2026	10,582	357
2027	10,668	360
2028	10,753	363
2029	10,839	365
2030	10,925	367
2031	11,011	370
2032	11,097	372
2033	11,183	375
2034	11,269	377
2035	11,356	379
2036	11,442	381
2037	11,529	384
2038	11,616	386
2039	11,703	388
2040	11,790	390
2041	11,877	392

* Based on CDEW tonnages accepted at permitted waste management facilities.

APPENDIX D – LANDFILLS RECEIVING WASTE FROM LONDON

Table D1: Landfills Reporting Receipt of Waste Originating in London

					Input from London, 2015 (kt)					
Permit	Site name	Operator	Waste planning authority	Region	Hhold/ Ind/ Com	Inert/ C+D	Haz-ardous	Total	Total input, 2015 (kt)	Prop-ortion of input from London
EP3136GK	Rainham Landfill EPR/EP3136GK	Veolia ES Landfill Limited	Havering WPA	London	346	442	0	**788**	**869**	**91%**
EP3936GP	Pitsea Landfill	Veolia ES Landfill Limited	Essex WPA	East of England	470	230	0	**700**	**1,650**	**42%**
BM4635IH	BLETCHLEY LANDFILL SITE	FCC Waste Services (UK) Limited	Milton Keynes WPA	South East	213	395	0	**609**	**1,241**	**49%**
BV3782IM	MUCKING LANDFILL	Cory Environmental Ltd	Thurrock WPA	East of England	0	562	0	**563**	**644**	**87%**
DP3431PC	WESTMILL II WASTE MANAGEMENT FACILITY	Biffa Waste Services Ltd	Hertfordshire WPA	East of England	104	279	0	**384**	**590**	**65%**
SP3439LE (71266)	East Tilbury Quarry	S Walsh And Son Limited	Thurrock WPA	East of England	0	379	0	**379**	**392**	**97%**
BS6726IL (210032)	Stone Pit 2 Inert Landfill	Stonepit Restoration Limited	Kent WPA	South East	21	257	0	**278**	**354**	**79%**
BU9947IA	New Crosby LF EPR/BU9947IA	SUEZ Recycling and Recovery UK Ltd	North Lincolnshire WPA	Yorks & Humber	263	0	0	**263**	**303**	**87%**
XP3636KW	Gerrards Cross Landfill	Veolia ES Landfill Limited	Buckinghamshire WPA	South East	217	34	0	**251**	**513**	**49%**
AB3009HS (400345)	Highwood Quarry Inert Landfill	Sewells Reservoir Construction Limited	Essex WPA	East of England	0	202	0	**202**	**444**	**46%**
DP3794ER (101016)	Spring Farm Landfill	Ingrebourne Valley Ltd	Havering WPA	London	0	199	0	**199**	**200**	**99%**
BT7183IA (80594)	Sipson North East Inert Landfill	Henry Streeter (Sand & Ballast) Ltd	Hillingdon WPA	London	0	198	0	**198**	**252**	**79%**
BV1461IV	Barrington Works Landfill EPR/BV1461IV	Cemex UK Cement Ltd	Cambridgeshire WPA	East of England	0	197	0	**197**	**197**	**100%**
KP3896EK (101840)	Home Farm Extension Landfill Site	Shepperton Aggregates	Surrey WPA	South East	0	195	0	**195**	**241**	**81%**
BU8126IY	Redhill Landfill (NEQ) EPR/BU8126IY	Biffa Waste Services Ltd	Surrey WPA	South East	40	119	0	**159**	**528**	**30%**

BS8605IQ	Calvert Landfill Site	FCC Waste Services (UK) Limited	Buckinghamshire WPA	South East	101	37	0	**138**	**398**	**35%**
ZP3832SQ (210109)	Great Westwood Landfill	Cemex U K Materials Ltd	Hertfordshire WPA	East of England	0	122	0	**122**	**244**	**50%**
AP3093VW (100801)	Horton Brook Quarry	Jayflex (Aggregates) Ltd	Slough WPA	South East	0	110	0	**110**	**203**	**54%**
LB3631AU (210119)	Borough Green Landfill	Robert Body Haulage Limited	Kent WPA	South East	0	95	0	**95**	**349**	**27%**
CP3190VE (210001)	Marks Warren Quarry Landfill	Ingrebourne Valley Ltd	Barking and Dagenham WPA	London	0	81	0	**81**	**95**	**85%**
RP3732SZ	Buckden North Landfill EPR/RP3732SZ	Anti-Waste Limited	Cambridgeshire WPA	East of England	55	23	0	**78**	**197**	**40%**
MP3435KP	Elsenham Landfill EPR/MP3435KP	Viridor Waste Management Limited	Essex WPA	East of England	0	75	0	**75**	**403**	**19%**
FP3399VV (101312)	Stone Lane Quarry	Fox (Owmby) Limited	Central Bedfordshire WPA	East of England	0	68	0	**68**	**301**	**23%**
BU7901IP	COLNBROOK LANDFILL	Biffa Waste Services Ltd	Slough WPA	South East	0	66	0	**66**	**66**	**100%**
SP3131GC	Runfold South Landfill Areas A and C EPR/SP3131GC	SITA UK Limited	Surrey WPA	South East	0	60	0	**60**	**140**	**43%**
BS6726IL	Stone Pit II EA/EPR/BS6726IL/V003	Seer Restoration Ltd	Kent WPA	South East	4	45	0	**50**	**72**	**69%**
PP3935CU	Martells Quarry Landfill EPR/PP3935CU	Recycled In Ardleigh Limited	Essex WPA	East of England	42	4	0	**46**	**77**	**60%**
BK9377IZ	GREATNESS QUARRY INTEGRATED WASTE MANAGEMENT FACILITY	Cory Environmental Ltd	Kent WPA	South East	21	22	0	**43**	**114**	**38%**
BV7001IK	SUTTON COURTENAY EPR/BV7001IK/V009	Waste Recycling Group (Central) Limited	Oxfordshire WPA	South East	2	27	0	**29**	**345**	**8%**
BP3537PP	Eye North Eastern Landfill	Biffa Waste Services Ltd	Peterborough WPA	East of England	1	23	0	**24**	**127**	**19%**
AB3701HP (210089)	Park Lodge Landfill Site	Brett Aggregates Ltd	Buckinghamshire WPA	South East	0	22	0	**22**	**28**	**78%**
BB3000FG (210096)	Addlestone Quarry	Cappagh Public Works Limited	Surrey WPA	South East	0	18	0	**18**	**38**	**47%**
LP3236SU	Barling Marsh Landfill	Cory Environmental Ltd	Essex WPA	East of England	6	9	0	**15**	**153**	**10%**

	EPR/LP3236SU									
AB3105HD (400391)	Denham Park Farm	Ingrebourne Valley Ltd	Buckinghamshire WPA	South East	0	12	0	**12**	**12**	**100%**
BV7346IM	ARDLEY LANDFILL SITE	Viridor Waste Management Ltd	Oxfordshire WPA	South East	10	1	0	**10**	**195**	**5%**
AP3238GH	Winsford Rock Salt Mine Waste Disposal Facility	Veolia ES (UK) Limited	Cheshire West and Chester WPA	North West	0	0	9	**9**	**24**	**38%**
CP3639AV	Finmere Quarry Landfill EPR/KB3531RR	Opes Industries Limited	Oxfordshire WPA	South East	4	5	0	**8**	**92**	**9%**
PP3734SE	Cranford Landfill Site EPR/PP3734SE	SUEZ Recycling and Recovery UK Ltd	Northamptonshire WPA	East Midlands	2	6	0	**8**	**175**	**5%**
KB3434RQ (210021)	Stanwell I I I Landfill	Cappagh Public Works Ltd	Surrey WPA	South East	0	8	0	**8**	**14**	**55%**
TP3430GW	East Northants Resource Management Facility	Augean South Limited	Northamptonshire WPA	East Midlands	0	0	8	**8**	**166**	**5%**
CB3433RZ (103418)	Cainhoe Quarry	Thomas Brothers Excavations (Luton) Ltd	Central Bedfordshire WPA	East of England	0	7	0	**7**	**164**	**5%**
UP3830NT	Oak Farm Quarry Landfill	Himley Environmental Limited	Dudley WPA	West Midlands	6	0	0	**6**	**222**	**3%**
RP3133PP	Thornhaugh Landfill Site	Augean South Limited	Peterborough WPA	East of England	0	0	6	**6**	**43**	**14%**
BV4576IK	Stewartby Landfill EPR/BV4576IK	FCC Waste Services (UK) Limited	Bedford WPA	East of England	0	5	0	**5**	**290**	**2%**
BU2381IE	Ling Hall Landfill EPR/BU2381IE	Veolia ES Landfill Limited	Warwickshire WPA	West Midlands	4	0	0	**4**	**296**	**1%**
BV1917IT	ICI No 3 Teesport EPR/BV1917IT	North Tees Waste Management Limited	Redcar and Cleveland WPA	North East	0	0	4	**4**	**46**	**8%**
BV9896IY	BROOKHURST WOOD LANDFILL SITE	Biffa Waste Services Ltd	West Sussex WPA	South East	0	4	0	**4**	**388**	**1%**
JB3132AR (101644)	Reading Quarry	John Mould, Jay Thomas Mould & Jodie Samantha Mould	West Berkshire WPA	South East	2	1	0	**3**	**265**	**1%**
DP3939SW	Bellhouse Landfill EPR/DP3939SW	Cory Environmental Ltd	Essex WPA	East of England	0	3	0	**3**	**183**	**2%**
BV1046IV	Sidegate Lane Landfill EPR/BV1046IV	SUEZ Recycling and Recovery UK Ltd	Northamptonshire WPA	East Midlands	0	3	0	**3**	**130**	**2%**
HP3094SQ (210134)	Reach Lane Quarry Landfill	L B Silica Sand Ltd	Central Bedfordshire WPA	East of England	0	3	0	**3**	**55**	**5%**
CP3435PR	Star Works Landfill Site	S Grundon (Waste) Ltd	Wokingham WPA	South East	0	1	0	**2**	**98**	**2%**

NP3036KR	Witcham Meadlands Landfill EPR/LP3996ND	Mick George Limited	Cambridgeshire WPA	East of England	0	0	1	**1**	**6**	**21%**
BV4584IU	Milton Landfill EPR/BV4584IU	East Waste Limited	Cambridgeshire WPA	East of England	0	1	0	**1**	**184**	**0.5%**
FP3235PA (210114)	Homefield Landfill Site	Chambers Runfold Plc	Surrey WPA	South East	0.0	0.3	0.0	**0.3**	**25**	**1%**
BV7168IX	Pound Bottom Landfill Site	Cleansing Service Group Limited	Wiltshire WPA	South West	0.0	0.0	0.3	**0.3**	**51**	**1%**
LP3434HA	BRADLEY PARK LANDFILL SITE	Bradley Park Waste Management Limited	Kirklees WPA	Yorks & Humber	0.0	0.0	0.1	**0.1**	**258**	**0.1%**
BU3671IY	WINGMOOR FARM	S Grundon (Waste) Ltd	Gloucestershire WPA	South West	0.0	0.0	0.1	**0.1**	**73**	**0.2%**
BL4940IU	HAZEL LANE QUARRY AND LANDFILL	Catplant Quarry Ltd	Doncaster WPA	Yorks & Humber	0.1	0.0	0.0	**0.1**	**165**	**0.1%**
BK6858ID	SANDS FARM LANDFILL	Viridor Waste Management Ltd	Wiltshire WPA	South West	0.1	0.0	0.0	**0.1**	**179**	**0.1%**
BV7214IR	Dix Pit Landfill EPR/BV7214IR	Waste Recycling Group (Central) Limited	Oxfordshire WPA	South East	0.1	0.0	0.0	**0.1**	**94**	**0.1%**
BW0991IX	ERIN LANDFILL	Viridor Limited	Derbyshire WPA	East Midlands	0.00	0.00	0.02	**0.02**	**292**	**0.01%**
BU5801ID	Lower Compton Landfill EPR/BU5801ID	Hills Waste Solutions Limited	Wiltshire WPA	South West	0.00	0.02	0.00	**0.02**	**158**	**0.01%**
BK0418IS	PARKGATE FARM WASTE MANAGEMENT FACILITY	Hills Waste Solutions Limited	Wiltshire WPA	South West	0.00	0.00	0.01	**0.01**	**33**	**0.03%**
BJ7824IK	Path Head LF EPR/BJ7824IK	SUEZ UK Environment Ltd	Gateshead WPA	North East	0.00	0.01	0.00	**0.01**	**347**	**0.002%**
YP3439SM	Wingmoor Quarry Landfill	Grundon Waste Management Limited	Gloucestershire WPA	South West	0.003	0.001	0.000	**0.004**	**69**	**0.01%**
BV1402IC	Port Clarence Non-Hazardous Landfill Site	Augean North Limited	Stockton-on-Tees WPA	North East	0.000	0.000	0.001	**0.001**	**91**	**0.001%**
LP3330XP	Thornhill Quarry Landfill EPR/LP3330XP	Demex Limited	Kirklees WPA	Yorks & Humber	0.000	0.000	0.001	**0.001**	**76**	**0.002%**
BW3125IA	Staple Quarry Landfill EPR/BW3125IA	FCC Recycling (UK) Limited	Nottinghamshire WPA	East Midlands	0.0003	0.0000	0.0000	**0.0003**	**295**	**0.0001%**
BS7951IB	PILSWORTH SOUTH LANDFILL	Viridor Waste Management Ltd	Bury WPA	North West	0.00000	0.00000	0.00002	**0.00002**	**548**	**0.0000%**
				Total	**1,937**	**4,657**	**29**	**6,622**	**17,573**	

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