Bradford
Waste Arisings and Capacity Evidence

Waste Arisings and Capacity Requirements

PART B Report Update

Revised December 2016

urbanvision

4Resources

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Due to their size the appendices are provided as separate documents

GLOSSARY OF TERMS

AD	Anaerobic Digestion
C&I Waste	Commercial and Industrial Waste
CDEW/CD&E	Construction Demolition and Excavation Waste
EA	Environment Agency
EfW	Energy from Waste
ELV	End of Life Vehicle
GVA	Gross Value Added
LACW	Local Authority Collected Waste
MBT	Mechanical Biological Treatment
ROCs	Renewable Obligations Certificates
RSS	Regional Spatial Strategy
WDA	Waste Disposal Authority
WEEE	Waste Electrical and Electronic Equipment
WDI	Waste Data Interrogator
WWTW	Waste Water Treatment Works

1. INTRODUCTION

This report presents an update to the 2013 detailed assessment of need for future waste management facilities over the plan period up to 2030 for the City of Bradford Metropolitan District Council. The report addresses the following waste streams:

- Commercial and Industrial (C&I);
- Local Authority Collected Waste (LACW);
- Hazardous Waste;
- Construction, Demolition and Excavation Waste (CDEW);
- Agricultural;
- Low Level Non-Nuclear Radioactive Wastes (LLW); and
- Water Waste/Sewage Sludge.

A detailed review of the robustness and limitations of currently available information on current and expected arisings of waste in Bradford has been carried out for a range of waste streams, the detailed findings of which are presented in the PART A Report[1].

This final report presents the modelling options used to identify the potential future waste requirements for Bradford up to 2030. A number of scenarios have been modelled and the findings of each are summarised. Each scenario presents a different option for modelling waste based on a range of recycling and recovery targets and growth levels being achieved. The final result of this work is to identify the capacity gap for each waste stream.

This study has been undertaken by Urban Vision and 4Resources on behalf of the City of Bradford. The previous study also included managing LACW collected from Calderdale through the development of a joint facility funded through PFI credits. Since the withdrawal of credits, both authorities have re-evaluated their position and have made the decision to no longer formally work together, as such this report does not include any assumptions for managing LACW from Calderdale.

1.1 Future Waste Management Requirements

1.1.1 Waste is generated by a vast range of processes although people are most familiar with waste collected from their households, such as packaging and food. However, these wastes (officially named Local Authority Collected Waste or LACW) only account for part of the overall waste arisings. Much larger quantities of other waste from the construction industry, such as broken

[1] Prepared by Urban Vision and 4Resources, August 2015

bricks and cables, and wastes from the commercial sector, such as food from restaurants, make up the total amount of waste produced within the City of Bradford. The majority of waste is produced as a result of producer demand for products and an important aspect of reducing the overall production of waste is through behavioural changes in how individuals consume goods and services.

1.1.2 The need for waste management facilities to deal with the wastes in a more sustainable way will form an integral part of any Waste Management Development Plan Document. This section considers two key issues: How much waste will need to be managed over the Plan period (to 2030) and what facilities will be required to manage this waste.

1.1.3 This report sets out the expected waste management capacity that will be provided by waste facilities over the Plan period, as well as expected waste arisings over the same period. If the expected arisings are greater than the known waste management capacity then the difference in values is called the 'capacity gap. Where the expected arisings are smaller than the known waste management capacity, this is called a 'surplus in capacity'. The capacity gap is what the City of Bradford will need to plan for though the Waste Management Document. 'Capacity requirements' shows what is needed to be provided to meet expected levels of waste arising over the plan period for each management type e.g landfill, recycling etc. The capacity gap is what is needed after capacity at existing facilities is used it.

1.2 Future Waste Capacity Requirements

1.2.1 To identify any requirements for new waste management facilities, it is important to gain as accurate a picture as possible of current waste arisings and the capacity of existing permitted waste management facilities. Economic and waste trends can then be used to forecast future waste growth and subsequently the need for new facilities can be projected based on the capacity gap identified.

1.2.2 To enable future planning for waste, the City of Bradford commissioned Urban Vision Partnership Ltd and 4Resources Ltd to produce an update to the 2013 study on the detailed projection of future waste capacity requirements. This Report is the final of a two stage reporting process to plan for future waste management requirements. The PART A Report[2] set out information relating to the arisings for the waste streams in the City of Bradford and this final report should be considered in conjunction with the PART A Report. The main changes in arisings noted in this update where an increase in arisings of

[2] Prepared by Urban Vision and 4Resources, August 2015

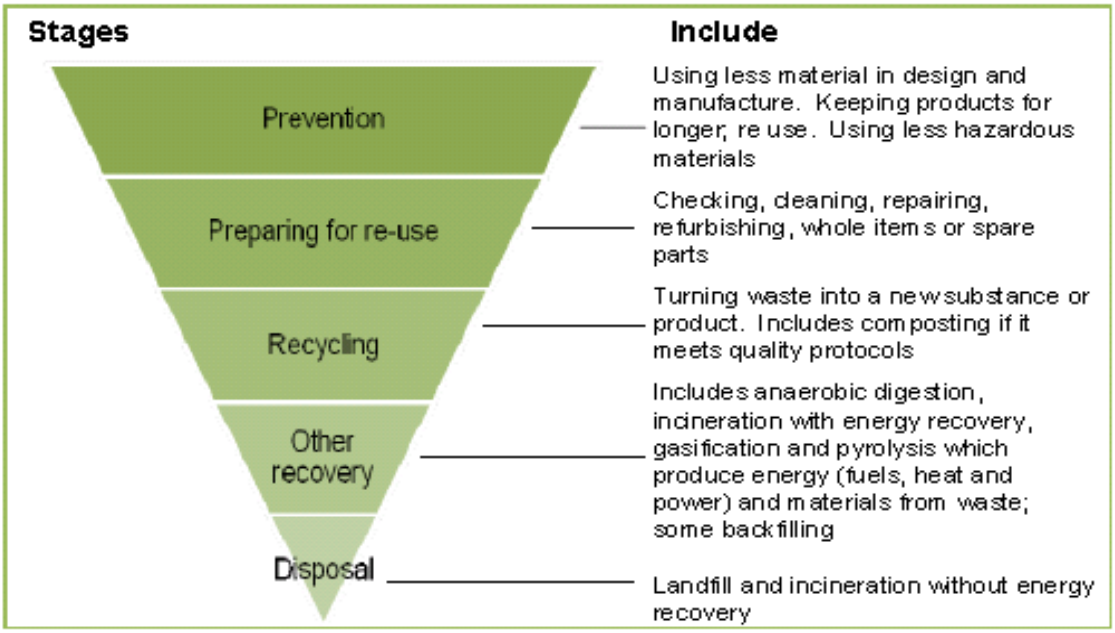
CD&E waste which is attributed to boost on building activity following the recession, and a slight increase in hazardous waste. Agricultural waste increased slightly due to a change in the number of farm holdings, Levels of C&I are extrapolated from the regional surveys and as such no change in arisings of this waste stream have been seen.

1.2.3 This PART B Report provides information on waste arisings for the principal waste streams namely, C&I, CDEW, LACW, agricultural, waste water and sewage, hazardous and low level radioactive waste, and identifies where there may be a capacity gap up until 2030. This report provides a level of detail and consistency that has not previously been available. Not only does the projection of future waste capacity requirements look at waste arisings and their management but also the potential for recycling or energy recovery with the aim of managing waste more sustainably and moving it up the waste hierarchy.

1.2.4 This approach is consistent with the Government's sustainable development agenda generally and their approach to delivering sustainable waste management in particular. National Planning Policy for Waste 2014 (NPPW) refers to a key planning objective of *"delivery of sustainable development and resource efficiency, including provision of modern infrastructure, local employment opportunities and wider climate change benefits, by driving waste management up the waste hierarchy"* The Waste Hierarchy has been transposed into UK law through the Waste (England and Wales) Regulations 2011.

1.2.5 The need to decouple waste growth from economic growth has its roots in the need for sustainable development in the UK, particularly the idea of sustainable production and consumption of resources. By implementing the principles of the waste hierarchy, there will be a move towards reducing the amount of waste produced in the first place, thus helping to break the link.

Figure 1 The Waste Hierarchy

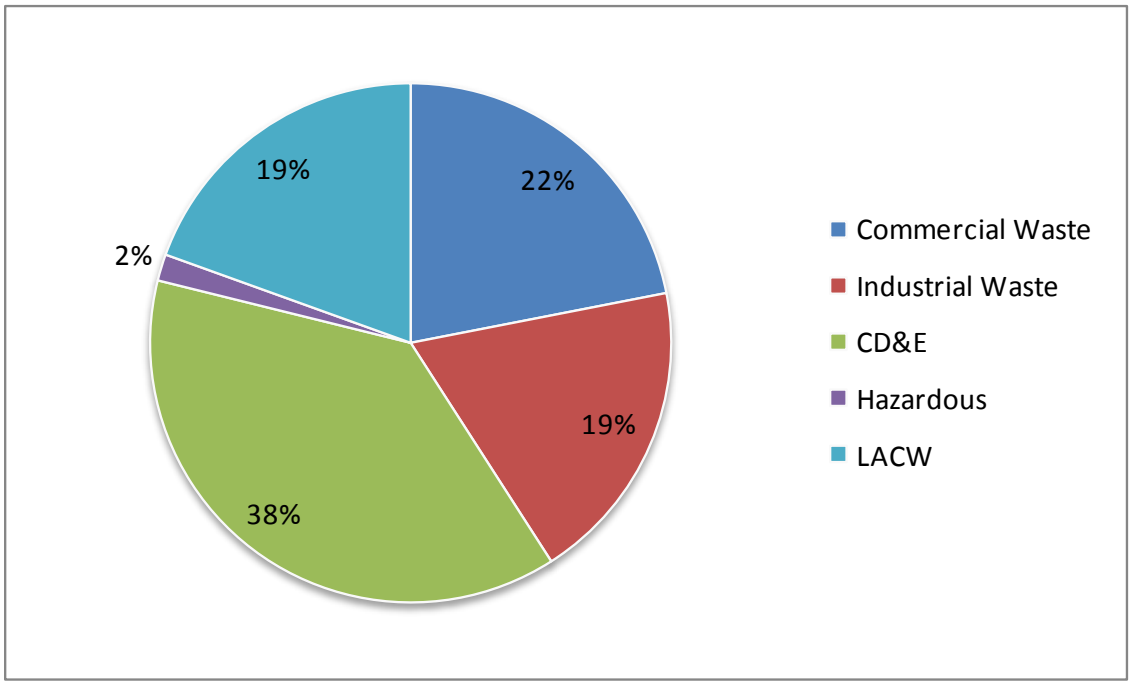


Source: www.Defra.gov.uk

1.3 Principal Waste Streams

1.3.1 Figure 2 and Table 1 below show the relative sizes of the principal waste streams arising in the City of Bradford (Data: 2013 Arisings from PART A Report 2015). They do not include agricultural, waste water and sewage and low level radioactive wastes, inclusion of which will distort the quantities for which capacity needs to be provided as they do not constitute principal waste arisings for the City of Bradford. Managing these streams requires specialist facilities which are detailed later in this report. In addition, secondary waste produced through management of LACW is not included here. It should also be noted, that once the secondary LACW waste enters the system, some of this waste then becomes C&I waste. For modelling purposes, it is estimated that 35,000 tonnes of secondary waste will be produced which will need to be managed as part of the C&I waste stream, however this tonnage is not attributed to the overall arisings as this would result in double counting.

Figure 2 Proportion of principal waste streams in the City of Bradford



[Sources: Environment Agency Waste Data Interrogator 2013; C&I waste estimates extrapolated from Environment Agency survey of C&I Arisings in North West England, 2009]

Table 1 City of Bradford Waste Arisings (tonnes rounded)

Principal Waste Arisings Year 2013	**Tonnes (rounded)**
Commercial Waste	254,314
Industrial Waste	219,773
CD&E	440,000
Hazardous	19,084
LACW	226,085
Total arisings	**1,159,256**

[Sources: Environment Agency Waste Data and Hazardous Waste Data Interrogators 2013, and Defra WasteDataFlow]

Commercial & Industrial Waste

1.3.2 There is no data on C&I waste specific to the City of Bradford to use as a base, therefore extrapolation from other sources is necessary. There are two principal data sources which can be used to estimate commercial and industrial (C&I) waste arisings within the sub-region. The National DEFRA C&I survey (2009) only reports data at the level of the Yorkshire and Humberside region. Using the National Defra C&I survey (2009) (Yorkshire and

Humberside region), a total for the City of Bradford of 404,324 tonnes of C&I waste arisings was identified in 2009. Using extrapolated figures from the second source, the 2009 North West C&I Survey, a total of 474,087 tonnes was identified (not including arisings from the Power and Utilities sector).

1.3.3 However, the comparison of the two survey projections at a regional level with field data from the Environment Agency on landfill records suggests that for this category the NW survey is much closer to the observed quantities deposited at permitted sites. Whilst it is not possible to provide comparable data from the EA Interrogator other than for landfill, this suggests that the NW survey may provide a better projection for WPAs within the Yorkshire and Humberside region than the Defra National Survey. The extrapolated NW survey data is used as the main baseline data for C&I waste. Further information about the two data sources is included in the PART A Report.

Local Authority Collected Waste

1.3.4 Figure 2 shows the proportion of principal waste streams in the city of Bradford in 2013, excluding secondary waste from LACW.

1.3.5 LACW collected in Bradford is currently managed in mechanical treatment facilities to produce a "secondary waste" commonly referred to as Refuse Derived Fuel (RDF), which is normally used as fuel for Energy from Waste (EfW) facilities. It is estimated that 20% of the material passing though the initial treatment process comprises recyclates (plastic, glass, etc.) that are removed, with the remaining 80% being converted into the RDF. The forecasting model has been modified so that it evaluates the capacity needed to process waste into RDF and also the EfW capacity needed to use the secondary waste product. This approach does not result in waste being double-counted as the two processes involve different technologies and it ensures that all of the capacity needed to manage LACW can be provided in Bradford over the plan period. The outcome of this approach is that the model identifies that there is a need for EfW capacity to take the RDF produced from Bradford's LACW.

1.3.6 The amount of secondary products arising from the mechanical treatment is based on information provided by Bradford City Council. The PFI business case projected that in 2012 a facility managing RDF would handle 192,000 tonnes of LACW arising in Bradford and Calderdale, and a further 35,000 tonnes of commercial waste arising in Bradford only. Although the PFI process is not continuing and Calderdale no longer form part of this proposal, soft market testing has shown that the likely outcome for the on-going procurement exercise, which Bradford have now entered into, is that the authority will continue to produce RDF from LACW and that a facility could be

developed locally to manage this. The current contract to produce an RDF is due to come to an end in 2017, at which point it is assumed that the council will have entered in to a new contract to manage the treatment of its LACW. At this point in time it is not possible to say where treatment will take place. There are sites with planning permission in Bradford that could provide this requirement as well as facilities within the wider Yorkshire and Humber region. Table 10 provides further detail on this.

1.3.7 Table 2 below summarises the resulting quantities of RDF and recyclates that would be produced reflecting the proportions stated earlier. Note that the business case anticipated that a 100% conversion of the residual waste into secondary products would occur. Once the secondary products enter the system, they cease to be LACW and are attributed to C&I waste for management.

Table 2 Projected secondary products requiring treatment in Bradford, 2013 (tonnes (rounded)

Material	**Tonnes**
Refuse Derived Fuel	135,000
Recyclate	60,000
Total	**195,000** (just includes HHW and not total LACW)

[Source: Bradford City Council]

Construction, Demolition and Excavation Waste (CD&E)

1.3.8 An estimate of how much CD&E waste is produced in Bradford can be made with respect to CD&E managed through permitted sites. Data has been published by the Environment Agency for 2013 (EA Waste Data Interrogator database). This gives quantities of CD&E waste deposited at sites which are subject to Environment Agency permit. This data provides some information on origin and waste movements but is incomplete as some CD&E wastes are not fully recorded for all details.

1.3.9 Data on CD&E has been gathered from the EA Waste Data Interrogator (2013 deposit data) and an analysis of the waste categories has taken place to enable the separation of construction and demolition waste from excavation waste. Further information about this is included in the PART A Report.

1.4 Predicting Future Requirements

1.4.1 As part of the forecast of future waste capacity requirements, a number of scenarios were considered that reflected a realistic range of possibilities that

could be implemented. In developing the scenarios certain assumptions were made, in particular how, in general terms, the various categories of waste arisings would be managed in the future.

1.4.2 The initial modelling considered three waste management scenarios:

- Scenario 1 – baseline, which reflects the current status and forward planning position.
- Scenario 2 – maximised recycling and recovery of C&I and CD&E wastes.
- Scenario 3 – a median level of increased recycling and recovery.

1.4.3 In addition to the 3 scenarios, modifier factors have been selected as shown in Table 3 to reflect future uncertainties and their scale that could influence the future quantity of waste arisings and their subsequent management. These factors seek to reflect future economic activity (using historic trends[3] and projections on Gross Value Added (GVA) outcomes), fiscal/financial/legislative factors (landfill tax charges driving waste away from landfill and financial incentives such as ROCs (Renewable Obligations Certificates) increasing the competitiveness of energy recovery). The use of 33% estimated GVA growth projections, which is approximately 0.8% per annum, is based on an analysis of historic trends for growth in industrial, commercial waste and construction, demolition and excavation wastes.

Table 3 Modifier Factors

Growth Value	Modifier Value
NO GROWTH	All wastes no growth
GROWTH	Industrial wastes – growth @ 33% estimated GVA Commercial wastes (including LA collected commercial waste) – growth @ 33% estimated GVA CD&E wastes – growth @ 33% estimated GVA Agricultural wastes – no growth LA Collected Household Waste – growth projections as defined by the WDA
MINIMISED GROWTH	Industrial wastes – arisings declining at 1% per annum Commercial wastes – no growth CD&E wastes – no growth Agricultural wastes – no growth

[3] Source: Environment Agency national surveys 1998 & 2003, NW survey 2006 & 2009 and Defra national Survey 2009

	LA Collected Household Waste– growth at projections as defined by the WDA

1.4.4 Table 4 shows the forecast size of the principal streams under the Growth and Minimised Growth scenarios before assumptions about recycling, recovery and landfill performance are applied. Table 4 also provides details of the split between LACW collected from households (LACW primary) and LACW which goes through a secondary processing stage to produce RDF and recyclates (LACW Secondary). The secondary element is included in the overall arisings forecast as Bradford is committed to finding a local solution to managing LACW and has indicated the need to account for secondary processing of waste going forward in order that the contracts awarded account for this need.

Table 4 Annual Arisings Forecasts Under the Growth and Minimised Growth Assumptions[4]

Growth	2015	2016	2017	2018	2019	2020	2021
C&I	498,621	503,216	507,858	512,549	517,288	522,078	526,920
LACW Primary	200,419	205,018	212,056	218,277	224,613	226,684	228,747
LACW Secondary	145,648	148,990	154,104	158,625	163,229	164,735	166,235
Hazardous	19,338	19,595	19,856	20,119	20,386	20,657	20,932
CD&E	443,504	446,166	448,843	451,536	454,246	456,971	459,712
Agricultural	296,902	296,902	296,902	296,902	296,902	296,902	296,902
TOTAL	**1,604,432**	**1,619,887**	**1,639,619**	**1,658,008**	**1,676,664**	**1,688,027**	**1,699,448**

Growth	2022	2023	2024	2025	2026	2027	2028	2029	2030
C&I	531,811	536,753	541,749	546,797	551,900	557,058	562,269	567,539	572,863
LACW Primary	200,419	205,018	212,056	218,277	224,613	226,684	228,747	243,995	245,629
LACW Secondary	167,730	169,061	170,385	171,793	173,196	174,594	175,958	177,317	178,504
Hazardous	21,209	21,491	21,776	22,066	22,359	22,656	22,957	23,261	23,570
CD&E	462,471	465,245	468,036	470,844	473,670	476,512	479,372	482,248	485,141
Agricultural	296,902	296,902	296,902	296,902	296,902	296,902	296,902	296,902	296,902
TOTAL	**1,710,928**	**1,722,089**	**1,733,307**	**1,744,798**	**1,756,354**	**1,767,971**	**1,779,582**	**1,791,262**	**1,802,609**

Minimised Growth	2015	2016	2017	2018	2019	2020	2021
C&I	492,030	490,002	487,995	486,007	484,039	482,092	480,164
LACW Primary	200,419	205,018	212,056	218,277	224,613	226,684	228,747
LACW Secondary	145,648	148,990	154,104	158,625	163,229	164,735	166,235
Hazardous	18,893	18,705	18,518	18,333	18,151	17,969	17,790
CD&E	440,858	440,858	440,858	440,858	440,858	440,858	440,858

[4] N.b. LACW figures remain the same under all growth scenarios because these are based on figures provided by the Waste Disposal Authority

Agricultural	296,902	296,902	296,902	296,902	296,902	296,902	296,902
TOTAL	**1,594,750**	**1,600,475**	**1,610,433**	**1,619,002**	**1,627,792**	**1,629,240**	**1,630,696**

Minimised Growth	2022	2023	2024	2025	2026	2027	2028	2029	2030
C&I	478,256	476,365	474,495	472,643	470,811	468,996	467,199	465,420	463,658
LACW Primary	230,805	232,637	234,459	236,396	238,327	240,249	242,124	243,995	245,629
LACW Secondary	167,730	169,061	170,385	171,793	173,196	174,594	175,958	177,317	178,504
Hazardous	17,612	17,437	17,263	17,091	16,921	16,752	16,585	16,420	16,256
CD&E	440,858	440,858	440,858	440,858	440,858	440,858	440,858	440,858	440,858
Agricultural	296,902	296,902	296,902	296,902	296,902	296,902	296,902	296,902	296,902
TOTAL	**1,632,163**	**1,633,260**	**1,634,362**	**1,635,683**	**1,637,015**	**1,638,351**	**1,639,626**	**1,640,912**	**1,641,807**

[Source: Needs Assessment forecasting model]

1.4.5 Modelling the change of practice in the management of waste arisings must also consider the increasing recycling potential resulting from changes in practice of waste collection, processing and treatment, particularly for commercial and industrial waste. There are increasing opportunities for recycling or energy recovery from commercial and industrial mixed waste which is not currently source segregated. A series of three factors have therefore been chosen to reflect the potential changes in recycling and energy recovery as shown in Table 5. Scenario 1 reflects the current baseline position and assumes this remains throughout the plan period, current levels are shown in Table 1. Scenario 2 reflects a maximised approach to recycling through proposing to achieve levels of 65% for Commercial Waste and 75% Industrial Waste as this represents a high level of recycling but also reflects the practicality that not all mixed waste can be recycled, with 7% of mixed waste going to energy recovery[5] and the remainder to landfill. Scenario 3 reflects a median level of recycling with higher level of recovery. This scenario seeks to achieve recycling levels of 50% for Commercial Waste and 60% Industrial Waste to reflect a lower level of source segregation and recycling and energy recovery of 25% for commercial and 23% for industrial waste with the remained to landfill. These modifiers are estimates and can be amended and re-modelled to meet any future changes in projections.

Table 5 Change in Practice Modifiers

Behaviour change	Modifier Value
BASELINE	All wastes no change. Baseline recycling based on 58% Commercial and 68% Industrial with 8% recovery and the remainder to landfill LACW based on recycling 26% (total 51%), composting 17.4%, Recovery 27.2% and landfill 20.1% by 2015 with recovery increasing to 37.3 % by 2020 and landfill reducing to 10%.
MAXIMISED RECYCLING AND RECOVERY	Maximised recycling based on 65% Commercial waste recycling, 75% Industrial waste recycling with 8% recovery on both streams and the remainder to landfill, 75% CD&E recycling, remaining CD&E to landfill. LACW based on Kerbside recycling 35% (Total 70%) as defined by the WDA for long term waste contract.
MEDIAN RECYCLING AND RECOVERY	50% Commercial waste recycling (25% EFW), 60% Industrial waste recycling (23% EFW), 50% CD&E recycling, 50% mixed ordinary Commercial waste & Industrial waste. LACW as baseline defined by the

[5] Defra national Survey shows 1.5% energy recovery, Extrapolated NW Survey 2009 shows 2% energy recovery

	WDA for long term waste contract based on Kerbside 30% (Total 60%).

1.4.6 Scenarios have therefore been modelled using the 3 sets of modifier factors (no growth, growth and minimised growth) with the 3 changes in practice modifiers (Baseline, Maximised and Median recycling and recovery) to produce 9 outcomes with a range of different capacity requirements depending on how waste is managed within the waste management hierarchy.

1.4.7 The capacity of all the available sites with planning permission for waste management are included in the model, together with information on annual capacity of the site and duration of activity according to the planning permissions. This information was updated using the EA WDI 2013 and planning permission information provided by Bradford in July 2015. The existing sites were identified through a review of the list of sites identified from the EA Waste Data Interrogator, and the list of permitted waste sites as supplied by the EA. The final list for was sent to Bradford at this stage to provide any further information from the planning permission regarding the capacity and end date of each site.

1.4.8 For all sites included in the model, the capacity information was taken from the EA licence, Planning Permission information where available, and EA permits. However it is important to note that this information does not always correlate due to the way in which the EA issues its waste licences (the EA uses standard maximum capacity limits) and therefore a review of past annual throughputs was also undertaken to ascertain the most accurate information for the available capacity at each site. This figure, once agreed with Bradford is the figure used for available capacity at that site.

1.4.9 A comparison of the capacity gap at the end of the plan period across the scenarios is shown in Tables 6-8. C&I waste arisings and management are extrapolated from the North West survey results as explained previously. Negative figures identify where there is no capacity gap.

Table 6 Comparison of the capacity gap at year 2030 across the 3 scenarios, assuming NO GROWTH for all wastes except Sewage and Low Level Radio Active wastes (tonnes)

Waste Management	Scenario 1 Baseline	Scenario 2 Maximised Recycling	Scenario 3 Median Recycling
Landfill (C+I & LACW)	97,822	51,310	47,413
Landfill (Hazardous)	4,076	4,076	4,076
Landfill (C+D)	195,924	68,104	136,207
Energy from waste	100,607	86,601	181,218
Incineration (Specialist High Temp)	861	861	861
Recycling (C+I & LACW)	316,756	366,199	281,918
Recycling (C+D)	116,141	303,802	203,814
Recycling (specialist material)	-2,322	-2,322	-2,322
Composting	-18,457	-7,382	-13,821
Residual Mechanical Treatment	179,500	161,751	171,501
Treatment plant	-49,078	-49,078	-49,078

Table 7 Comparison of the capacity gap at year 2030 across the 3 scenarios, assuming GROWTH for all wastes except Sewage and Low Level Radio Active wastes (tonnes)

Waste Management	Scenario 1 Baseline	Scenario 2 Maximised Recycling	Scenario 3 Median Recycling
Landfill (C+I &LACW)	117,785	61,655	56,384
Landfill (Hazardous)	5,035	5,035	5,035
Landfill (C+D)	215,606	74,945	149,890
Energy from waste	119,648	102,346	214,443
Incineration (Specialist High Temp)	861	861	861
Recycling (C+I & LACW)	384,474	444,225	345,355
Recycling (C+D)	128,323	334,834	224,804
Recycling (specialist material)	-2,306	-2,306	-2,306
Composting	-9,260	4,421	-3,534
Residual Mechanical Treatment	217,203	195,277	207,322
Treatment plant	-46,643	-46,643	-46,643

Table 8 Comparison of the capacity gap at year 2030 across the 3 scenarios, assuming MINIMISED GROWTH for all wastes except Sewage and Low Level Radio Active wastes (tonnes)

Waste Management	Scenario 1 Baseline	Scenario 2 Maximised Recycling	Scenario 3 Median Recycling
Landfill (C+I &LACW)	101,772	53,158	50,364
Landfill (Hazardous)	3,471	3,471	3,471
Landfill (C+D)	195,924	68,104	136,207
Energy from waste	111,314	94,015	187,556
Incineration (Specialist High Temp)	861	861	861
Recycling (C+I & LACW)	311,532	363,764	280,973
Recycling (C+D)	117,043	304,704	204,716
Recycling (specialist material)	-2,322	-2,322	-2,322
Composting	-11,190	2,491	-5,464
Residual Mechanical Treatment	213,504	191,578	203,623
Treatment plant	-50,414	-50,414	-50,414

1.4.10 There are additional facilities for managing waste in Bradford which have recently been granted permission, however they have not as yet been implemented and therefore have not been included in the capacity available within the model for managing Bradford's waste. Should the facilities be implemented, there could be an additional 290,000 tonnes per annum of capacity for management through Energy from Waste. This would provide a surplus of requirement under all scenarios for these management routes within Bradford.

1.4.11 The full projected capacity gaps across each of the scenarios for the period 2015-2030 are set out in Appendix 1; the tables identify the annual capacity requirements for each waste treatment type and can be used to identify pinch points when policies or allocations are likely to be required to prevent under-capacity issues. Appendix 2 sets out cumulative landfill capacity gaps under each scenario throughout the period 2013-2030 to assist the identification of the level of capacity required throughout the entire Plan period.

1.4.12 In order to ensure that sufficient opportunities are provided for new waste management facilities of the right type, in the right place and at the right time, it will be necessary for the Waste Management DPD to take a flexible approach to meeting future waste management requirements. Increasing

energy costs and non fossil fuel incentives could well result in an increased demand for energy recovery including in the form of smaller scale embedded combined heat and power sources. In order to achieve this, it will be important to provide a flexible approach in meeting future waste management requirements and identifying suitable sites/areas.

1.4.13 Utilising the latest data (collected as at July 2015), existing capacity information was assembled and collated into a Waste Facility Capacity Database and used to inform the future waste capacity requirements. The capacity database represents the best available information as supplied by the City of Bradford. A summary of available capacity is set out in Table 9[6]. Capacity shown is assumed to be available for the duration of the plan unless information on end dates has been provided. There are sixty-six operational waste management facilities in Bradford, an additional two sites with planning permission which have not yet been built, and two facilities for the management of animal by-products.

Table 9 Available Waste Capacity in Bradford (tonnes) 2015

Waste Type	Facility Type	Annual Capacity
LACW only	Transfer stations (non-hazardous)	46,676
LACW only	Transfer stations (hazardous)	73,186
LACW only	Household Waste Recycling Site	49,240
LACW only	Recycling (MRFS)	24,983
LACW and CI	Treatment facility (Composting Esholt)	57,729
LACW and CI	Recycling (MRFS)	456
LACW and CI	Recycling (ELVs)	40
LACW and CI	Treatment facility	1,264
LACW, CI and CDE	Residual Mechanical Treatment	161,646
CI only	Transfer stations (non-hazardous)	79,883
CI only	Transfer stations (hazardous)	523
CI only	Recycling (MRFS)	0
CI only	Recycling (ELVs)	171
CI only	Treatment facility	6,588
CI only	WEEE	2,299
CI and CDE	Transfer stations (non-hazardous)	210,620
CI and CDE	Transfer stations (hazardous)	1,462
CI and CDE	Recycling (MRFS)	37,014
CI and CDE	Land spreading	11,570
CDE only	Transfer stations (non-hazardous)	27,743

[6] Capacity is based on average annual capacity based on past years performance and NOT EA licenced capacity figures as this is not considered the most accurate figure for calculating actual available capacity due to the way in which the EA licence system works.

Waste Type	Facility Type	Annual Capacity
CDE only	Transfer stations (construction & demolition)	40,906
CDE only	Land spreading	6,304
CDE only	Treatment facility	54,028
Metallic wastes	Recycling (ELVs)	4,732
Metallic wastes	Recycling (Metals)	241,723
Metallic wastes	WEEE	16,973
	TOTAL	**1,157,729**

[Sources: Environment Agency Waste Data Interrogators 2006-2013 supplemented by results of a survey undertaken for this assessment]

1.4.14 It is recommended that the City of Bradford consider the implications and requirements of each of the proposed scenarios and select one set for the purposes of planning for future waste facilities. In principle it is possible to utilise different scenarios for the individual waste streams, however significant modification will be required to the accompanying model supporting this report and justification would be required as to why alternative scenarios have been chosen from that agreed in preparation of this report.

1.4.15 The future management for residual LACW is currently under review. The Council agreed in Jan 2015 to go out to a Competitive Dialogue Procedure tendering to the open market for a long term solution to the management of LACW from 2017. Each of the scenarios modelled have adopted the same approach for LACW in line with the current procurement programme.

1.4.16 Following the completion of a soft market testing phase, the council expect that the solution for LACW will be to pre-treat the waste stream to form an RDF. However they are not specific on where either the pre-treatment facility or thermal treatment facility would be provided and this could be within or outside of Bradford. The waste modelling process has taken into account both active existing sites and also sites with planning permission but not yet constructed or operational which could all help provide capacity. In addition information has been gained on facilities within the West Yorkshire region which could possibly contribute to the need, although it is acknowledged that a number of the facilities have already contracted out their capacity.

1.4.17 To cover a wider appraisal a review was undertaken of sub-regional capacity for both LACW and C&I non-hazardous waste materials, highlighting any known restrictions. Any capacity identified however may not necessarily be available for the use of waste arisings from Bradford and may also be subject to the Duty to Co-operate requirements. Findings are shown in Table 10.

Table 10 Sub-regional Waste Capacity

Site Name	Facility type	Status	Known Capacity/limitations
Cross Green Industrial Estate, Leeds EFW Veolia	EFW (CHP)	PP permitted – proposed start 2016	Leeds LACW only PFI 25 yr contract – 164,000 te
Skelton Grange Power Station, Leeds EFW Biffa[7]	EFW	PP permitted Feb 2013	C&I waste – 300,000 te
South Kirkby, West Yorkshire, Wakefield Shanks Group	MBT/autoclave/AD	Contract signed January 2013 – Operational since 2015	LACW only PFI – 25 yr contract – 230,000 te
Vine Street, Huddersfield, SITA	EFW	Operational since 2000	Processes 136,000 te LACW residual waste – contract with Kirklees Council
FerryBridge Biomass Power Station, West Yorkshire	EFW & Biomass Power Station	First phase operational early 2015 Ferrybridge Facility 2 final decision due October 2015	Will use biomass and waste, the latter including 200,000 te of waste wood + 300,000 te of C&I waste + 300,000 te of RDF processed from LACW. First phase already taken up.
Bradford Sites not yet operational			
Former gas works site Airedale Road, Marley, Keighley Halton Group	EFW and pyrolysis.	Planning submitted to Bradford Council November 2013 – granted – however further application made in April 2015 for a larger building (original building insufficient for needs) refused in August 2015.	Use only processed C&I as RDF feedstock. 130, 000 te (90,000 te RDF, 10,000 te tyre crumb, 30,000 te waste plastics)

[7] At the time of writing this report there is no information available indicating this facility is likely to progress, however it has been included for completeness.

Site Name	Facility type	Status	Known Capacity/limitations
Biogen/Energos) Ripley Road	Gasification	Planning permission granted 2010 and renewed in 2013	160,000 te of C&I waste only

[Sources: Bradford City Council; desk research of industry news sites]

1.4.18 In addition to the above facilities, 17,687,000 cubic metres of landfill is available in West Yorkshire, with 12,062,000 cubic metres of this for non-hazardous waste and 3,655,000 cubic metres for inert disposal (2013 data)[89]. There has been a further update on landfill capacity in 2015/2016, through the Yorkshire & Humber Waste Technical Advisory Body (Y&H WTAB), which has shown that there remains landfill capacity of over 13 million cubic mtrs of non-haz, 14.7 million cubic mtrs of inert and 1.8 million of hazardous (due the recent re-classification of a site).

1.4.19 As such West Yorkshire has sufficient landfill capacity to support the requirements of Bradford, and it is expected that the waste will continue to be exported to sites around the sub-region in the first instance and in the region if necessary in the plan period, for which there is still significant landfill void capacity as shown in the table below. Bradford has entered into discussions with relevant authorities to identify continued export of waste requiring landfill.

Landfill type	Capacity remaining in Y&H 2014/2015 – mill3
Non Haz	44.0
Inert	22.9
Restricted	19.9
Haz merchant	2.68
Non Haz (SNRHW)	2.4
TOTAL	**94.3**

[8] Source Environment Agency Waste Data Tables 2012 Yorkshire and the Humber - https://www.gov.uk/government/statistics/waste-management-for-england-2013

[9] Capacity in cubic meters can be converted to tonnes using the conversion factor of 1:1 for non-hazardous waste.

1.4.20 It is recommended that the City of Bradford includes, within the Waste Management DPD, information on existing capacity and an indication of the number, scale and potential location for any facilities indicated as required to meet future capacity needs as informed by this Report.

2. FUTURE CAPACITY REQUIREMENTS

2.1 Introduction

2.1.1 This section of the report deals with each of the principal waste streams in turn, setting out:

- Current arisings and capacity of existing facilities;
- Future Arisings; and
- Capacity of required facilities.

2.1.2 For each of the three scenarios explained in Paragraphs 1.4.2 a further set of growth modifiers were applied, these are explained in paragraphs 1.4.3-1.4.5 and Table 3. A summary of the findings of the modelling process are discussed below and presented in detail in Appendix 1.

2.2 LOCAL AUTHORITY COLLECTED WASTE (LACW)

Current Arisings and Capacity of Existing Facilities

2.2.1 A total of 226,085 tonnes of LACW was produced in 2013/14 in the City of Bradford (Waste Arisings and Capacity Requirements PART A Report 2015).

2.2.2 The City of Bradford currently relies on a local merchant facility which uses mechanical and hand sorting to extract recylates. Resulting RDF is subsequently exported for energy recovery under interim arrangements. The interim waste treatment arrangements are currently in place up to 2017 until the Council adopts longer term arrangements for which it is currently procuring.

2.2.3 Green waste composting takes place at Esholt WWTW within Bradford. There is sufficient capacity at this site for LACW green waste composting; therefore no sites are envisaged being required to meet this need.

2.2.4 LACW materials sent for recycling are managed through a wide variety of outlets. Bradford has sufficient facilities for transfer of recyclable materials, however, there appear to be few facilities available for recycling within Bradford for LACW. There is a capacity gap identified for recycling throughout the plan period for this waste stream.

2.2.5 However, local knowledge of transfer stations informed us of the recycling being undertaken at some sites. This resulted in a more detailed review of transfer stations being undertaken to see what was happening with waste received at these sites through use of the EA WDI, and to identify if recycling or other processing of waste was taking place. This was also supplemented by information ascertained through phone calls with the site operators and information provided by them as to the operations. When it could be ascertained that transfer stations undertook recycling, an average recycling rate of 35% was applied with the remaining capacity assumed to be transfer. This has resulted in an increase in recycling capacity and a corresponding reduction in transfer capacity within Bradford.

Future Arisings

2.2.6 The modelling reflects growth forecasts for LACW provided by the WDA. Residual waste treatment capacity in the order of 130,000 – 135,000 tonnes per annum as set out in the existing LACW contract will be needed to provide for Bradford's residual waste as a replacement for the interim arrangements. Residual waste treatment and contract options are currently under consideration.

LACW Required Facilities: Recycling Facilities

2.2.7 There is a gap in recycling capacity within Bradford, and currently most waste is bulked up at transfer stations and managed elsewhere. Therefore there is a capacity requirement of at least 45,000 tonnes per annum (no growth base line recycling) up to almost 61,000 tonnes (growth and maximised recycling) throughout the plan period (figures include recycling from secondary processing).

LACW Required Facilities: Residual Mechanical Treatment Facilities

2.2.8 Whilst there is an initial gap in required facilities for residual mechanical treatment as an option for the treatment of LACW waste (existing facility is contract is due to end in 2017), contracts at existing sites could be extended. However, the main site currently contracted may revert to C&I or to primarily a waste transfer activity. Therefore, Bradford will need to consider identifying capacity of at least 135,000 tonnes per annum to meet supply requirements for LACW going forward. To ensure that an oversupply does not occur, Bradford should continue to liaise with operators to assess the future potential contribution to capacity needs the facility could meet, as well as ensuring they

account for any capacity provided through contract secured by the Waste Management team.

LACW Required Facilities: Composting

2.2.9 Green waste is taken to Esholt WWTW by the Council to be mixed with sewerage sludge for composting. A total of 30,175 tonnes of green waste was collected in 2013/14 from both kerbside collections and Household Waste Recycling Centres. This appears to as a direct result of an implemented change in kerbside collection from sacks to wheelie bins in 2012 which has resulted in an increase in the quantity of green waste collected. It is assumed that the current arrangements retain adequate capacity to absorb any likely increase in arisings as capacity at Esholt was above this.

LACW Required Facilities: Landfill

2.2.10 There is an identified need for landfill throughout the plan period, however as discussed under 1.4.16, there is sufficient landfill capacity with West Yorkshire which could help meet this need and if particular sites closed in West Yorkshire, there is still considerable capacity cap within the Yorkshire and Humber regional area. Bradford will need to continue to work closely with neighbouring WPAs to discuss future landfill requirements for Bradford.

LACW Required Facilities: Energy Recovery

2.2.11 As referred to in Section 1.3, LACW collected in Bradford currently undergoes mechanical treatment that produces a secondary product called RDF which remains a waste even though it has been processed. Table 2 summarises the quantity of RDF that was produced by this process in 2012. The forecasting model identifies that there is a need for EfW capacity in Bradford to use this RDF as a fuel to ensure that it is managed locally rather than exported to other authorities or outside the UK, as happens currently. Bradford are currently looking at options to manage this waste following the loss of PFI Funding in 2013 and are expected to enter in to a new contract from 2017.

2.2.12 The main input to the mechanical treatment processes will be LACW with an assumed level of 135,000 tonnes for management of waste arising in Bradford in 2012. Both the mechanical treatment and energy from waste management processes are able to co-treat C&I waste that is similar in composition to LACW. An allowance has therefore been made similar to that outlined in the Bradford PFI business case for secondary products arising from the mechanical treatment of 35,000 tonnes per annum of C&I waste. This additional load been included in the modelling to assess the total capacity

needed to produce RDF, manage extracted recyclables and for energy recovery facilities.

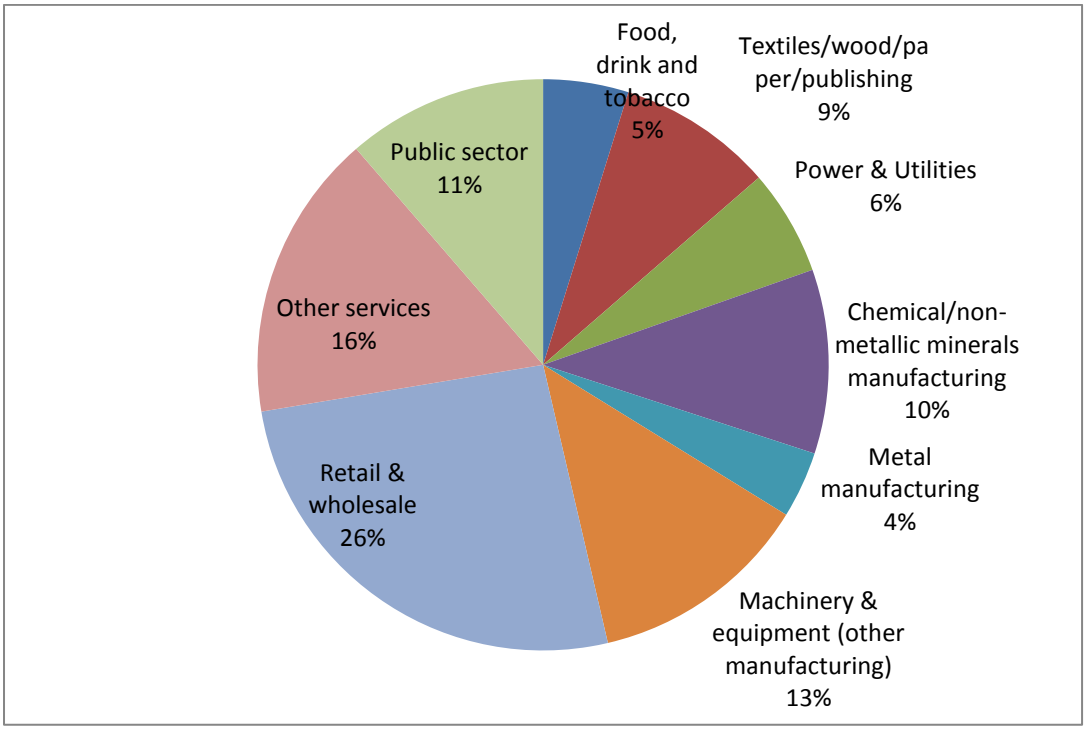
2.2.13 RDF produced from LACW in Bradford is currently exported to Holland or Denmark. It is proposed that this current interim contract and treatment arrangements for Bradford's residual LACW will only run until 2017. Bradford is currently in the process of securing long term arrangements for the management of LACW. There are two sites with planning permission (see Table 10) which could help to meet the need for this element of LACW requirement. If both facilities become operational, they will provide sufficient capacity to meet the identified need for LACW and C&I. Should these facilities not come forward then Bradford will need to consider how to meet the identified gap throughout the plan period.

2.3 COMMERCIAL AND INDUSTRIAL (C&I) WASTE

Current Arisings and Existing Facilities

2.3.1 C&I data estimates have been based on 474,087 tonnes (2009, Extrapolated NW C&I survey).

Figure 3 C&I waste arisings by sector



[Source: extrapolated from Environment Agency survey of C&I Arisings in North West England, 2009]

2.3.2 The NW extrapolated survey gives a high level of commercial waste although this reflects a high level of commercial waste recycling in the NW extrapolated survey (62% of commercial waste estimated as recycled). However, the EA Interrogator database indicates that a significantly higher proportion of waste in the City of Bradford is managed through transfer facilities.

2.3.3 Waste transfer operations are increasingly undertaking waste segregation to increase recycling rates and avoid the increasing cost of landfill disposal. It is also the case that significant quantities of waste sent for recycling will be managed through sites that are exempt from the full permitting requirements and thus data is not captured by the EA Interrogator database. Many recycling locations will be outside of the Plan area and indeed the exportation of recyclate from the UK is a significant management route.

2.3.4 Recycling potential, particularly for commercial and industrial waste, is increasing, with the greatest opportunity for mixed waste which is not currently source segregated. Analysis of the 2009 extrapolated NW C&I survey indicated that 80% of the category of mixed waste could be capable of recycling or use for energy recovery.

Future Arisings Scenarios and Subsequent Capacity Gap

C&I Required Facilities: Transfer Stations

2.3.5 Waste transfer stations and bulking facilities provide a valuable component in the efficient management of waste materials. In particular they are useful when waste arisings are relatively small in quantity and widely distributed. For this reason transfer stations are seen to be a significant feature of waste management provision within the Plan area.

2.3.6 Under all growth projections and scenarios modelled there is no gap in transfer station facilities within the Plan period. Transfer capacity exceeds 570,000 tonnes throughout the Plan period even with applied growth and maximised recycling modifiers and therefore this is not shown in the tables at the end of this report as a requirement during the Plan period. In the model, capacity is allocated to recycling, treatment or disposal options. Transfer facilities are therefore shown as a surplus although they may play an important role in the chain of facilities used for any particular waste stream. It should however be noted that due to the important role of transfer station facilities in the Plan area, further capacity may be required to provide suitable geographical distribution.

C&I Required Facilities: Recycling Facilities

2.3.7 The Baseline Scenario indicates that currently (2015) there is a gap in available recycling capacity within the Plan area. The gap is significant for both LACW and C&I waste streams. The gap is indicated to be in the order of 316,756 tonnes under no growth (estimated gap in 2015) rising to the order of 444,225 tonnes by 2030 under the maximised recycling and growth scenario[10]. Whilst a proportion of recyclate is currently managed through transfer and bulking facilities within the Plan area, final destination recycling and reprocessing facilities lie mainly outside of the Plan area and therefore current provision is met predominantly by export. However, it is understood that transfer facilities also undertake an amount of recycling (c. 35%) which would reduce the projected capacity gap for recycling facilities.

2.3.8 It is likely that increased national recycling provision for bulk recyclate materials such as paper, card, glass, plastics and metals will be met by increased capacity at regionally and nationally significant facilities, through economies of scale. It is therefore likely that provision for final management of increased levels of recyclate generated within the Plan area will be largely provided for by export to recycling and processing facilities outside the Plan area. However this does not prevent applications coming forward for recycling of these waste streams over the plan period and the required number of facilities/land take are indicated in tables 13-15 to address this. In the absence of new capacity, it is recommended that the City of Bradford make contact, under the Duty to Cooperate, with neighbouring/other Waste Planning Authorities in order to establish whether they are aware of any foreseeable changes which may affect the position over the expected life of the Plan (see PART A Report for details pertaining to waste movements and Duty to Cooperate)**.**

C&I Required Facilities: Composting

2.3.9 Modelling shows a small gap in composting capacity by 2030 under Scenario 2. There are no permitted Aerobic Composting facilities within the Plan area. Green Waste is taken to Esholt WWTW Biological Treatment Plant and managed through this route and this is expected to continue. In 2015, just over 57,000 tonnes of LACW and C&I green waste was treated at this facility.

2.3.10 A gap or surplus in treatment provision can be strongly influenced by the local absence or provision of specialised treatment facilities which may only be viable at a regional or national level. Specialised biological treatment capacity

[10] This assumes Canal Road facility becomes available to manage C&I waste in 2018 when the current LACW contract ends.

provided by Esholt WWTW for green waste currently provides annual capacity of around 58,000 tonnes per annum, and this is assumed to only accept LACW although the licence does allow for C&I waste. Bradford currently takes around 30,000 tonnes of Green Waste to this facility and the remaining amount comes from WPAs within the Yorkshire and Humber region. Although the Capacity available at this site would indicate a surplus in treatment capacity for LACW, this capacity may in practice be taken up by "imported" waste from neighbouring WPAs.

C&I Required Facilities: Metal Recycling Sites (specialist recycling; End of Life Vehicles, Metals and Waste Electronic and Electrical Equipment [WEEE])

2.3.11 Modelling shows a surplus capacity under all growth projections and scenarios throughout the Plan period therefore no additional ELV, Metals and WEEE processing sites are likely to be required during the Plan period.

C&I Required Facilities: Treatment

2.3.12 Treatment includes a wide range of processes that may be required to deal with specialist materials prior to recycling, energy recovery or final disposal. C&I waste requiring treatment also includes hazardous waste. Environment Agency hazardous waste records for 2013 show that in the order of 18,000 tonnes of hazardous waste were exported (see table 12 of the PART A Report). Most of these arisings are treated or disposed of outside of Bradford. The only hazardous waste treatment capacity within Bradford is clinical waste treatment and records for 2013 show that approximately 2,135 tonnes of healthcare arisings were treated in Bradford.

2.3.13 As detailed in paragraph 2.2.10, residual waste treatment processes are also able to deal with C&I wastes that are of similar composition to residual LACW. Table 8 summarises proposed treatment capacity which, could be supplemented by procurement of alternative facility to treat LACW waste that may offer capacity to manage C&I waste also.

C&I Required Facilities: Energy from Waste

2.3.14 In 2030 a requirement for energy recovery capacity is seen in all scenarios in the order of 86,601 tonnes to 214,443 tonnes per annum (this figure is for both C&I and LACW). The introduction of two energy recovery facilities with existing planning permission[11] would meet this need. Scenario 3 produces the greatest demand for energy recovery facilities. If these two energy

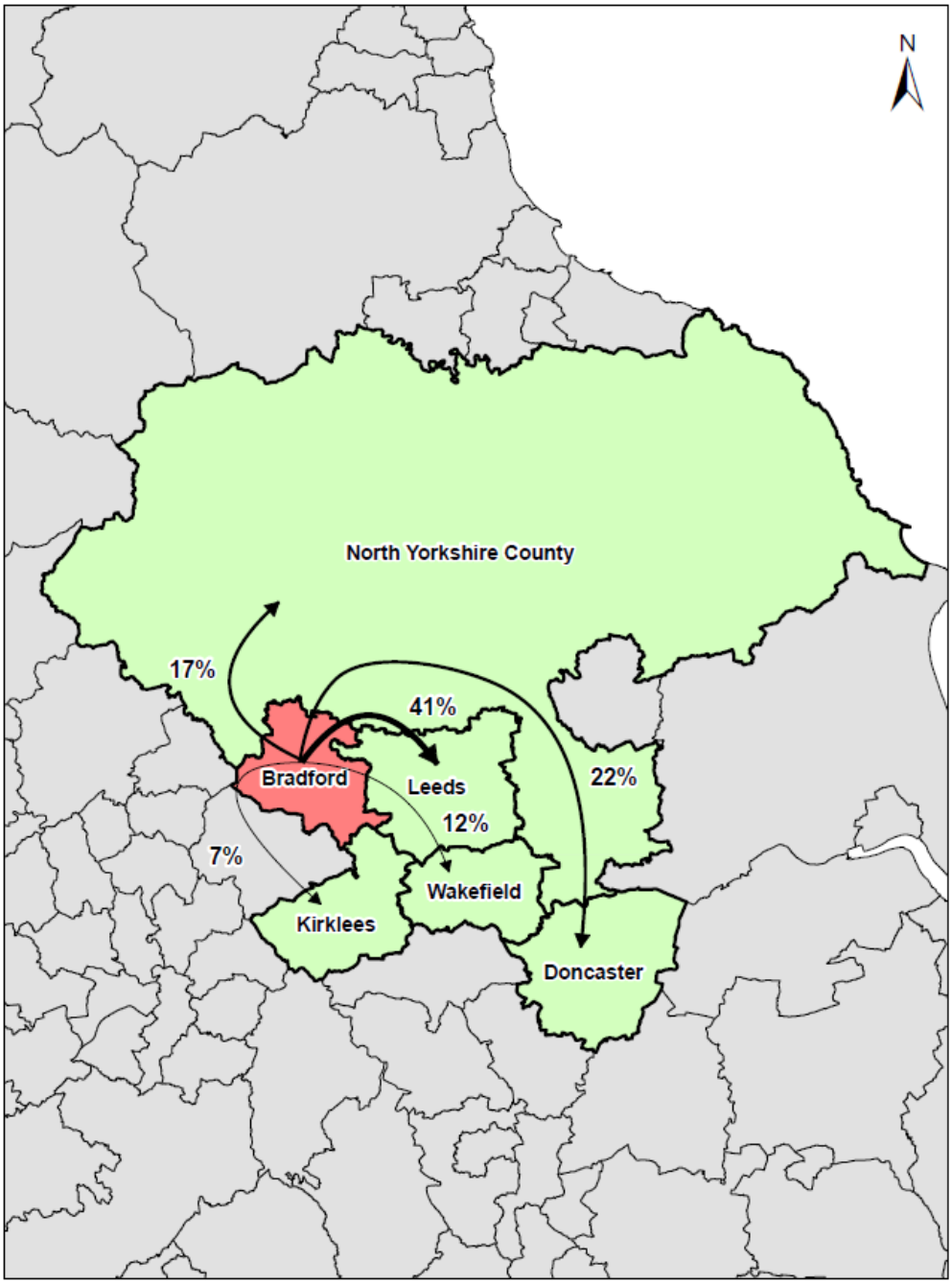
[11] Biogen/Energos (gasification) Ripley Road plant (180,000 tonnes per annum) and Aire Valley (130,000 tonnes per annum)

recovery facilities are not commissioned then the gap in energy recovery requirement would be in the order of 214,000 tonnes in 2030 under Scenario 3 (assuming growth).

C&I Required Facilities: Non-Hazardous Landfill

2.3.15 Landfill requirements in 2030 for C&I wastes range from 59,000 tonnes under Scenario 1 with no growth to 69,608 tonnes per annum in 2030 under Scenario 1 with growth. Under Scenario 2 and using minimised growth, the annual landfill requirement for C&I wastes falls to 34,863 tonnes per annum tonnes by 2030. Under scenario 3 and minimised growth, the requirement for landfill for C&I wastes drops from nearly 56,000 tonnes in 2015 to just over 26,000 tonnes in 2030. Currently, Bradford exports the majority of its landfill waste to sites within West Yorkshire, with over 80% going to Wakefield (EA WDI 2012), see Figure 3 below. As discussed above in paragraph 1.4.16, there is significant void space available in West Yorkshire, and as such, assuming agreement can be reached under Duty to Co-operate, it is not expected that Bradford would seek to provide landfill capacity.

Figure 4 Map showing movement of non-hazardous waste to landfill from Bradford



Note: Authorities taking <1% waste are not shown on the map and therefore figures do not add up to 100%.

2.4 CONSTRUCTION, DEMOLITION AND EXCAVATION (CD&E) WASTE

2.4.1 Waste materials generated from Construction, Demolition and Excavation (CD&E) operations include a wide range of surplus waste construction materials as well as materials generated by the demolition and maintenance of buildings and soils and sub-soils from excavation. Most of these materials are inert with respect to their pollution potential. However, materials such as wood are biodegradable, plasterboard produces a polluting leachate and asbestos is classified as hazardous.

Current Arisings and Existing Facilities

2.4.2 Accurate data on the quantity of CD&E waste arisings has historically been poor. Between 1999 and 2005 the Department of Communities and Local Government conducted national surveys of arisings and use of alternatives to primary aggregates. The latest national survey in 2005[12] suggested that the production of recycled aggregate in the region had increased slightly since the previous 2003 survey. However, due to the limited level of returns and at +/- 15% confidence level, the apparent changes in the 2003 and 2005 surveys are not statistically significant. The data at a regional level is even less robust.

2.4.3 The PART A Report is based on data from the EA WDI (Waste Data Interrogator, 2013) which showed a total of just over 214,306 tonnes of CD&E waste is deposited in Bradford, with over 174,049 tonnes of this being construction and demolition waste and just over 40,258 tonnes being excavation waste. The EA WDI also showed 57,893 tonnes of CD&E waste as originating in Bradford deposited in adjacent waste planning authority areas. These totals represent a minimum as more CD&E will be coded generally as Yorkshire and Humberside waste or managed through exempt facilities. In practice most CD&E waste is managed through transfer stations in Bradford or may be removed directly to sites outside the plan areas. If it is assumed that CD&E waste arisings in the Yorkshire and Humberside region are essentially managed within the region, a proportion of this total can be estimated as arising in Bradford. Analysis of the EA Interrogator database for 2013 shows that when double counting of waste managed through transfer and treatment facilities and final disposals are taken into account a total in the order of 4.4 million tonnes was managed through permitted waste management facilities.

2.4.4 Based on population, the ONS gives a Yorkshire and Humberside total of 5.3 million tonnes and Bradford 513,000 tonnes per annum, therefore the

[12] Survey of Arisings and Use of Alternatives to Primary Aggregates in England, 2005. *Construction, Demolition and Excavation Waste*, Communities and Local Government.

proportion of waste arisings would be approximately 10%. Based on the most recent ONS data release GVA for the Yorkshire and Humberside region, the GVA in 2011 was £86.8 billion whereas Bradford's total GVA for 2011 was almost £8.3 billion giving again a proportion in the order of 10%. This would give C&D arisings for Bradford in the order of 180,000 tonnes and Excavation waste arisings of 260,000 tonnes.

2.4.5 There is no available data covering "Registered Exemptions" for CD&E which would include registered exempted composting sites, burning practices on land, spreading waste on land for reclamation/improvement and or sites used for the storage of CD&E materials and mobile recycling of C&D. It is likely that the level of arisings managed through exempt operations will continue into the future and thus these arisings will not require additional future planned capacity.

Future Arisings and Subsequent Capacity Gap

CD&E Required Facilities: Transfer Stations

2.4.6 Waste transfer stations and bulking facilities often provide a valuable component in the transfer and bulking of CD&E waste materials. Modelling under all scenarios and growth factors shows no gaps in provision over the whole Plan period.

CD&E Required Facilities: Recycling

2.4.7 There is a shortfall of capacity for recycling of CD&E materials (principally C&D waste) under Scenarios 2 and 3 over the plan period. Increasing recycling rates will widen the gap, as would growth in waste arisings.

2.4.8 CD&E is also currently recycled / treated on site through mobile machinery. These operations are permitted by local authorities and data on waste types and throughput are not recorded in the EA Interrogator database and thus no quantitative data is available. These operations are likely to remain an important methodology for C&D recycling.

2.4.9 There is an identified need for additional capacity to support higher levels of CD&E recycling early in the Plan period. Recycling of CD&E waste is economically more viable at more localised facilities due to the lower value and costs of transporting lower value higher density wastes and therefore the recycling facilities for this waste stream are more likely to be required within the Plan Area. CD&E recycling can be achieved by mobile plant working at demolitions sites as well as at fixed facilities. Developments which produce a

high level of CD&E are encouraged to recycle this material on site using mobile plant and it is expected that Bradford will continue to encourage such practices to move the management of this waste up the hierarchy. The capacity gap for CD&E is identified from the start of the plan period, therefore facilities to process CD&E will be required from the outset. The gap ranges from just over 116,000 tonnes in 2015 under scenario 1 with no growth up to 335,000 tonnes per annum under scenario 2 when applying growth in 2030. It is considered that the gap could be met by the implementation of an extant permission, which has a capacity of 200,000tpa, and by the continuation of the management of CD&E on site.

CD&E Required Facilities: Landfill

2.4.10 Under the Baseline scenario with no growth the initial gap of 196,000 tonnes in 2015 rises to just under 216,000 tonnes per annum at 2030 with growth. Under maximised recycling with no growth the gap will be 68,104 tonnes per annum by 2030 and 74,945 tonnes per annum with waste growth. Under median recycling with no growth the gap will be 136,207 tonnes per annum by 2013 and 149,890 tonnes per annum with waste growth. However, as there is in excess of 22 million cubic metres of inert waste capacity available in West Yorkshire and planning permission (not yet implemented) for 2 million tonnes in Bradford, it is considered there is sufficient landfill to meet this need. In addition, infrastructure projects coming forward in Bradford and neighbouring areas may require such materials for engineering purposes and therefore Bradford are encouraged to look at the need for engineering material over the plan period.

CD&E Required Facilities: Hazardous Landfill

2.4.11 There are no provisions for landfill of hazardous CD&E waste, namely asbestos and asbestos contaminated waste, within the City of Bradford. Whilst asbestos contaminated CD&E waste amounted to 880 tonnes in 2013,850 tonnes in 2012 indicating significant year on year variance, there will be a gap in landfill provision for hazardous waste (from CD&E) under all growth factors. Bradford does not have a landfill site which can manage this waste, and there is insufficient need to warrant investment in landfill specifically to meet the small requirement of Bradford. However, within West Yorkshire, there are two sites licensed to take such waste, Skelton Grange in Leeds and Thornhill Quarry in Kirklees. Bradford has worked with Kirklees and Leeds through the Yorkshire and Humber Waste Technical Advisory Body (Duty to Co-operate) to assess the potential for use of these sites throughout the plan period.

2.5 HAZARDOUS WASTE

2.5.1 The 2005 Hazardous Waste (England and Wales) Regulations and the List of Wastes (England and Wales) Regulations set out what is defined as hazardous waste. Waste is classified as “Hazardous Waste” if it has characteristics that make it harmful to human health, or to the environment, either immediately or over an extended period of time.

2.5.2 Hazardous waste is a sub category of Local Authority Collected Waste, Commercial and Industrial waste and CD&E classed materials. Estimated totals for LACW, C&I waste and CD&E waste are inclusive of waste in the sub-category of hazardous.

Current Arisings and Existing Facilities

2.5.3 A total of 19,084 tonnes of hazardous waste was recorded as arising in the City of Bradford in 2013. The City of Bradford is a net exporter of hazardous waste. In 2013 it imported 3,214 tonnes and exported 18,039 tonnes. A total of 4,258 tonnes were managed in Bradford of this 2,185 tonnes were recorded as healthcare treatment, 1,409 tonnes were managed through transfer stations with 664 tonnes managed by recovery operations.

2.5.4 The future capacity requirement for hazardous waste has already been taken into account under the main classes of waste materials for which hazardous waste is a sub-set. However, hazardous waste facilities for treatment, incineration and landfill are located outside the Plan area and it is anticipated that provision will continue and remain available throughout the Plan period. It should be noted that hazardous waste facilities require economies of scale so that provision of facilities within the Plan area for the small quantities of arisings would be unlikely to be viable unless a new facility were to import significant quantities from outside the Plan area.

2.6 SEWAGE SLUDGE

2.6.1 There is one company who operate Waste Water Treatment Works (WWTW) within Bradford and that is Yorkshire Water. The WWTW is one of the largest sites in Europe at 388 hectares, providing sewerage treatment for a large proportion of households within Bradford.

Future Arisings and Subsequent Capacity Gap

2.6.2 Yorkshire Water was contacted in order to gain a broad overview of their future capacity requirements as far into the future as possible. The responses indicated that at this stage they cannot give any indication of what future

requirements are likely to be with regard to waste water, especially not for the entire Plan period up to 2028. However, Yorkshire Water have been involved in consultations on Local Plans in the area and will continue this role going forward, which would help inform any changes in growth requirements. Yorkshire Water did not anticipate building new WWTW in Bradford but would almost certainly be undertaking works at the existing WWTW over the plan period.

2.6.3 Yorkshire Water published a 25-year document '*Our Blueprint for Yorkshire: The Next 25 Years*' in December 2013. A 5-year summary plan was published in February 2015 which focuses on water quality compliance.

Required Facilities[13]

2.6.4 As a general principle, when greater capacity is required, WWTW operators would try and place new plant on existing treatment works, or failing that purchase land from an adjacent land owner. Therefore it is unlikely that new sites will be required within the Plan area to handle waste water/sewage sludge, particularly in view of the significant size of the existing YW site at 333 ha.

2.6.5 At present it is not envisaged that sites or capacity should be identified within the Waste Management DPD for future use as WWTW as there is no current requirement for additional facilities. Should any further land be required to support the operation of Yorkshire Water, there is capacity within the existing Esholt site which could meet that need. Yorkshire Water should be kept informed of the plans progress and invited to comment at consultation stages.

2.7 AGRICULTURAL WASTE

2.7.1 Agricultural Waste is waste produced at agricultural premises as a result of agricultural activity. Agricultural premises are defined in the Agriculture Act 1947 as land used for: horticulture, fruit growing, seed growing, dairy farming, livestock breeding and keeping, grazing land, meadow land, osier land (growing willow), market gardens and nursery grounds. It also includes woodlands where that use is ancillary to the use of land for other agricultural purposes. This definition includes all arable farming.

2.7.2 This waste is made up of the following substances, many of which can also be defined as by-products and not necessarily wastes due to the fact they

[13] The figures associated with waste water treatment capacity have not been included in Appendix 1(but can be found within the Forecasting Model Access Database) as the future capacity requirements are dependent upon the issues outlined under paragraph 2.6.2 of this report.

contain important nutrient resources and they are not defined as wastes when applied to the land as fertiliser for the benefit of agriculture:

- Compostable and digestible materials (farm yard manure, slurry, vegetable);
- Combustible materials (straw, silage wrap (plastic), bale twine and net (plastic), fertiliser and seed bags (plastic), animal feed bags (plastic), animal feed bags (paper & card), horticulture (plastic), tree guards (plastic), paper seed bags (paper & card), and oil);
- Hazardous and Difficult Waste[14];chemical materials (silage effluent), agrochemical (plastic), agrochemical (paper & card), animal health (plastics), animal health (paper & card), animal health (glass), animal health (rubber/metal), pesticide washings, sheep dip (organic phosphates) and sheep dip (synthetic pyrethroids); and
- Other (milk).

Current Arisings and Existing Facilities

2.7.3 There are 427 holdings in Bradford (DEFRA Local Authority Breakdown for Key Crop Areas and Livestock numbers on agricultural holdings, Oct 2014 and DEFRA stats Food Farm Land use Livestock Results National Park Nov 2014). Therefore, the figures used are based on the best estimates available. The City of Bradford generates around 291,000 tonnes of waste, the majority of which is managed within the generating farm holding (Table 21 PART A Report).

Future Arisings and Subsequent Capacity Gap

2.7.4 It will be necessary to provide for waste leaving the farm holdings amounting to approximately just over 1,700 tonnes per annum (assuming no growth in the volume of agricultural waste arisings). It is likely that in the future more waste may be diverted from landfill for recycling, fulfilling the aspirations of waste management moving up the waste hierarchy.

2.7.5 It is likely that the majority of agricultural waste will still be managed within the farm holdings via land treatment/spreading and composting despite new agricultural exemptions currently being implemented (PART A Report). The quantities involved for management off-site from farm holdings are likely to be so small they will be of low significance in the overall waste arisings for the City of Bradford.

[14] Difficult waste are those wastes which may be non hazardous but require special handling or treatment requirements

Required Facilities

2.7.6 The future arisings are very small (in the order of 1,000 tonnes per annum assuming no growth in agricultural activity or significant change in agricultural practice) and any required facilities to cover off farm holding recycling and hazardous landfill would, in practice, be likely to require additional waste materials to make any new facility viable. The capacity allowance should be noted for the specialised treatment requirements for certain types of agricultural waste such as animal by-products incineration and hazardous landfill. The figures reflect the optimum level of treatment according to the waste hierarchy and in reality some of the waste may not be able to be practically or cost effectively recycled and therefore require treatment by other methods such as landfill.

2.7.7 There is no immediate need to provide any new facilities solely to cover agricultural wastes, the small capacity requirements for agricultural wastes recycling are combined with C&I wastes and capacity gaps and new facility requirements are therefore included within the totals in the section of the report under C&I wastes. The "specialised" wastes generated that require specialist treatment are likely to continue to be treated at such existing specialised facilities over the plan period. It is noted that there are specialist storage plants, processing (rendering) plants, incineration, co-incineration plants and combustion plants all licensed and registered specifically for animal by-products treatment only located already in Bradford[15] (such as the Incineration plants at Keighley and Bradford (operated by G and A Fort and Mitchell by-products Ltd), and rendering/processing plants operated by Omega Proteins Ltd and P Waddington and company). The rendering facilities are specailised facilities of which there are a very limited number across the UK (less than 10) and Bradford remains net importer of animal by-products.

2.8 LOW LEVEL RADIOACTIVE WASTE

2.8.1 Most (98%) of Low Level Waste (LLW) in the UK arises from operation of nuclear power stations, nuclear fuel reprocessing facilities and also from the decommissioning and clean-up of nuclear sites. The remaining 2% is produced by non-nuclear industry users of radioactivity. As no nuclear sites are located in the plan area, these non-nuclear industries are the sole producers of LLW that will need to be planned for. Therefore, when compared to the total LLW produced in the UK, the amount produced in Bradford is very small.

[15] http://www.defra.gov.uk/ahvla-en/disease-control/abp/premises/

Current Arisings and Existing Facilities

2.8.2 The EA were contacted to provide a list of sites where LLW arises in Bradford. The results of this work identified two facilities: Bradford Royal Infirmary and Bradford University.

2.8.3 The information received indicates that levels of LLW produced in Bradford are minimal. This waste includes general items such as gloves, overshoes and tissues which are disposed of as general laboratory waste, as well as glassware and sharps which are contained in sharpsafes and assigned as radioactive and disposed of as radioactive.

2.8.4 Volumes of waste are not requested from producers of LLW, however an estimate has been made that the annual arising of LLW in the Sub-Region is likely not to exceed 100m3.

Future Arisings and Subsequent Capacity Gap

2.8.5 There is no likelihood of a nuclear facility being located in Bradford in the next 20 years, which means it is highly unlikely that LLW will increase significantly above current levels.

2.8.6 In March 2012 the UK Government produced 'A Strategy for the Management of Solid Low Level Radioactive Waste from the Non Nuclear Industry'. The Strategy aims to:

- Provide guidance and background information on this type of waste to enable planning authorities to make informed decisions on planning applications and to respond to concerns from their elected members and constituents.
- Clarify the respective roles of waste producers, the environment agencies, planning authorities and the Nuclear Decommissioning Authority to enable decisions to be made that properly recognize the responsibilities of others.
- Ensure that waste producers and regulators are fully aware of how the regulatory framework should be applied to LLW, particularly the need for waste management plans, waste minimisation at source and use of the waste hierarchy.

2.8.7 This Strategy has been produced in conjunction with the Nuclear Decommissioning Authority, under the auspices of the Government's Radioactive Waste Policy Group (RWPG) to ensure appropriate integration with the nuclear industry LLW strategy.

2.8.8 Research undertaken for the Strategy estimated that total UK arisings from the non-nuclear industry are very unlikely to exceed 100,000 m3 per year. In comparison, total waste arisings in England are around 272 million tonnes. Non-nuclear LLW arisings are therefore very unlikely to exceed 0.1% by volume of conventional waste arisings from the whole of the UK.

2.8.9 However, the document notes that participation in the LLW survey was less than anticipated and therefore the quantification of waste arisings from the non-nuclear industry across the whole of the UK remains very uncertain and is to be treated with caution.

2.8.10 The Strategy concludes that the disposal network available to the non-nuclear industry for radioactive waste is fragile and non-existent in some parts of the country. This means waste can travel some distance from source to disposal location.

Required Facilities

2.8.11 There are no landfill sites in Bradford permitted for controlled burial of LLW. The nearest landfill to Bradford able to accept LLW is Clifton Marsh in the county of Lancashire, which is permitted until 2035. The latest planning permission relating to Clifton Marsh (Ref: LCC/2014/0162) restricts the amount of LLW originating from outside the North West Region and imported into the site to not more than 4,000 tonnes per annum.

2.8.12 Two facilities exist within Leeds to manage LLW, at the Knostrop treatment works and these are identified in the Y&H Waste Position Paper as waste management facilities in Y&H. The two sites are in close proximity at the Knostrop treatment works, one taking aqueous LLRW of up to 109,500tpa and the other taking primarily healthcare waste to a incineration facility with a capacity of 17,000tpa.

3. SUMMARY OF FUTURE WASTE MANAGEMENT REQUIREMENTS

3.1 This section looks at the future waste management requirements for the City of Bradford in line with the waste hierarchy. According to the Needs Assessment, the indicative requirements for future waste management facilities in the City of Bradford can be summarised as follows:

Future Capacity Requirements for LACW

- There is surplus capacity for composting for LACW throughout the plan period under all Scenarios assuming all available capacity can be utilised by Bradford.
- Residual waste treatment capacity initially in the order of 135,000 tonnes per annum will be needed as a replacement for the interim arrangements from 2017.
- Part of the contract for LACW is management of residual waste. Until a contract is in place to treat residual waste to form RDF, there is a gap of 135,000 tonnes from 2017 to the end of the plan period.
- Scenario 1, no growth gap of 179,500 tonnes for residual mechanical treatment from 2018 when the contract with Canal Road comes to an end. Under baseline growth the gap widens from 19,222 tonnes in 2015 to 217,203 tonnes by 2030 and under baseline with minimised growth, the gap is 19,002 tonnes in 2015 and by 2030 is 213,504 tonnes. The contract at Canal Road ends in 2017 and the capacity gap widens sharply after this to 194,515 tonnes (2018, baseline with growth) and 193,625 tonnes (2018, baseline with minimised growth). Landfill requirements remain static at 39,000 tonnes through the plan period under baseline no growth rising to just over 48,000 tonnes under growth.
- Scenario 2 (Maximised recycling and no growth) the gap for Residual Mechanical Treatment of 14,730 tonnes in 2015 becomes a gap of 161,751 tonnes by 2030. Under maximised recycling with growth the gap increases from 16,073 tonnes in 2015 to reach 195,277 tonnes by 2030 and under maximised recycling with minimised growth the capacity grows from 15,853 tonnes in 2015 to 191,578 tonnes by 2030. Landfill requirements reduce from just under 36,000 tonnes in 2015 to 19,500 by 2030 under no growth, and reducing to just over 24,000 tonnes under the growth option.
- Scenario 3 (Median recycling and no growth) the gap for Mechanical residual Treatment rises from 16,355 tonnes in 2015 to 171,501 tonnes in 2030. With median recycling and growth the gap increases from 17,710 tonnes in 2015 to 207,322 tonnes by 2030 and with median recycling and minimised growth the gap rises from 17,490 tonnes in

2015 to 203,623 tonnes in 2030. Landfill requirements are the same as for maximised recycling for LACW.

Future Requirements for RDF and Recyclable Material for C&I and LACW

- RDF is currently produced at a site in Bradford and the resulting product is exported from the Plan area. However, it is assumed that treatment of LACW at this site will cease on termination of an interim contract in 2017.
- Provision of Residual Mechanical Treatment will result in secondary products from treating both LACW waste and C&I as RDF 80% of original input and recyclate 20% of the original input.
- Total EfW requirements, including that for secondary RDF, are 100,607 tonnes per annum under the initial baseline and 214,443 tonnes per annum under median recycling and growth by 2030.
- There are a number of EfWs within the sub-region that are built, being built or in the planning process, which specifically require RDF. The pre-treatment of waste to create a RDF for export is possible and this energy source may be used within Bradford. Should the plan provide for EfW facilities to manage both LACW and C&I, the plan would need to provide for 1 large EfW facility with an annual throughout sufficient to manage up to 200,000 tonnes per annum, or up to 2 smaller facilities with an annual throughout of 100,000 tonnes per annum (under baseline levels of recycling).
- There are a limited number of existing facilities for processing recyclable LACW and C&I materials within Bradford. Therefore, these materials are currently exported from the Plan area. There is an identified gap throughout the Plan period. Work has been done to assess the level of recycling taking place at WTS, where sites are known to undertake recycling, an estimate of the level undertaken on site has been undertaken and used to inform modelling, recycling is assumed to be in the region of 35%.
- Recycling facilities (e.g. Materials Recycling Facilities (MRF's)) are required to manage both LACW and C&I. Under baseline no growth the requirements in 2030 are 316,756 tonnes rising to 444,225 tonnes in 2030 under growth and maximised recycling. The plan would need to provide for either up to 4 large facilities with an annual throughout of 128,000 tonnes per annum (expected land take of 4ha), or up to 10 smaller facilities with an annual throughout of 50,000 tonnes per annum (under baseline levels of recycling). However, it should be noted that the outputs from recycling facilities can either be a product or a recyclate. If a product is produced from the recycling facility then there is no further management of waste required as it ceases to be a waste. If recyclate is

produced, this material can still be considered a waste requiring further management. The management of the recyclate is currently largely dependent on export from the Plan area and it is expected that this position will continue in the current markets. However, if the plan needs to provide facilities for the treatment for recyclate, then co-location on allocated recycling facility sites should be considered in the first instance, with sites of sufficient size to accommodate such co-location. It is recognised that some WTS undertake recycling on site, where it can be identified this is taking place, the modelling work recognises this, however, in reality levels may be higher than estimated and the requirement for recycling facilities could be lower.

Future Waste Capacity Requirements for C&I Waste

- Waste requiring treatment consists largely of specialist hazardous wastes which are treated outside of the Plan area and, due to the specialist nature of the facilities that treat this waste, it is assumed that this practice will continue throughout the Plan period;
- There is no capacity gap for the recovery of energy from suitable C&I waste provided that the new energy from waste capacity with planning permission becomes operational. Should the permissions not come forward, as stated above a single EfW with capacity of 200,000 tonnes per annum would be required to manage both Bradford's C&I and LACW waste or up to 4 smaller facilities with an annual throughout of approx 50,000 tonnes per annum over the plan period, however should the 2 permitted facilities be built then this will meet Bradford's requirements for the plan period;
- The requirement for non-hazardous landfill of C&I waste is in the order of 37,566 tonnes per annum by the end of the plan period if a maximised recycling (growth) scenario is realised. However, there are no existing landfill sites within Bradford, therefore it is assumed that there will be a continued reliance on export for waste managed this way throughout the plan period. The maximum requirement in 2015 is 58,822 tonnes per annum under scenario 1 no growth.
- Reviewing results by scenarios the following results can be seen for landfill of C&I waste (assuming LACW has gone for residual waste management treatment;
- Scenario 1 (baseline, no growth) the landfill deficiency remains at 58,822 tonnes per annum for the whole plan period, under baseline with growth the deficiency rises from 2015 to reach 69,608 tonnes by 2030 and under baseline with minimised growth the deficiency is 58,470 in 2015 reducing to 53,595 tonnes by 2030.

- Scenario 2 (maximised recycling, no growth) the deficiency reduces from 56, 367 tonnes in 2015 down to 31,810 tonnes by 2030 and with maximised recycling minimised growth, the fall in landfill requirement reduces to 29,069 tonnes by 2030.
- Scenario 3 (median recycling, no growth) landfill requirements are 27,913 tonnes by 2030. Applying growth this rises to 32,295 tonnes by 2030 and by applying minimised growth the deficiency reduces to 26,275 tonnes by 2030.
- There is a gap for composting of C&I waste by 2030 if this waste cannot use Esholt. Should Esholt not be available, the maximum required by 2030 under Scenario 2 with growth would be 4,421 tonnes which could be met by one small facility.

Future Waste Capacity Requirements for CD&E Waste

- Additional recycling facilities are indicated as being required under all scenarios. If the maximum recycling option is to be achieved by 2030, facilities will be required to manage 334,834 tonnes per annum. It is considered that this requirement could be met by the implementation of an extant permission in Bradford, which has a capacity of 200,000tpa and by the continuation of the management of CD&E on site.
- Landfill capacity will be required principally for excavation waste for which no alternative option is available. There is currently limited operational landfill capacity within Bradford, however planning permission was granted in 2013 for an inert landfill site with a capacity of 2 million tonnes, which would serve the needs for the plan period. Until operational and if this site does not become operational, it is expected that this waste will continue to be managed through exportation outside of Bradford. As discussed earlier in the report, there is significant capacity in West Yorkshire to manage this waste, and in addition Bradford should consider future infrastructure requirements to assess the use of such material for engineering works.
- Hazardous landfill; asbestos and asbestos contaminated waste from CD&E is currently exported for landfill which is the only management option for this waste, a gap in the order of 5,035 tonnes per annum appears by 2030 under growth, all scenarios. It is expected that this waste will continue to be managed through exportation outside of Bradford. There are landfill site licensed to take such waste within West Yorkshire.
- Reviewing results by scenarios the following results can be seen for landfill and recycling;
- Scenario 1 (baseline) the landfill gap under no growth is 195,924 tonnes and for recycling 116,141 tonnes for the whole plan period. With growth

this rises for landfill from 197,100 in 2015 to reach 215,606 tonnes by 2030 and for recycling 116,845 in 2015 rising to 128,323 tonnes by 2030.

Scenario 2 (maximised recycling) the landfill deficit under no growth/minimised growth is 174,618 tonnes in 2015, falling to 68,601 by 2030. Under growth, the landfill gap decreases from 175,666 tonnes in 2015 to 74,945 in 2030. Under no growth, the gap in C&D recycling capacity increases from 147,422 (2015) to 303,802 (2030). Under minimised growth the gap in C&D recycling capacity is 147,542 (2015) and rises to 304,339 by 2030. Under growth, the gap at 2030 is 334,834 tonnes.

- Scenario 3 (median recycling) under no growth the landfill gap is at 185,969 tonnes in 2015 falling to 136,207 tonnes by 2030. With growth the gap is 149,890 tonnes by 2030. Under no growth, the gap in recycling rises from 130,757 tonnes in 2015 to 203,814 by 2030. Under growth, the gap in C&D recycling is 316,882 tonnes in 2015, rising to 345,355 by 2030.

Future Waste Capacity Requirements for Agricultural Waste

- Off-farm disposal is included within C&I waste provision;
- There is no requirement for new facilities over the Plan period.

Future Waste Capacity Requirements for Sewage Sludge

- Anticipate adequate provision by the Water Companies with any additional requirement being met within existing operations.
- Asset management plans to continue throughout the Plan period.

Future Waste Capacity Requirements Low Level Radioactive Waste

- It is assumed that existing exports of LLW will continue during the Plan period. The quantity of LLW arising in, and exported from, Bradford is small and not considered significant. Therefore it is not proposed that authorities accepting these wastes will be contacted under DtC.

Duty to Co-operate

Under all scenarios where the continued export of waste is likely to be the management option going forward, it is recommended that Bradford engage in early discussion with those authorities to which it is known waste is currently exported to assess the continuation of the practice throughout the life of the Waste Management DPD.

Summary Tables

Tables 13 to 15 show the capacity gaps across each scenario and growth modifier. The gap identified assumes that all the waste generated in Bradford is treated within the geographical boundary of Bradford and NOT exported to other MPA's, with the exception of waste requiring disposal via landfill for which there are no facilities available in Bradford. The following assessment is based on facilities with expired or live planning consents, and are considered reflective of the type of facilities that are likely to come forward in Bradford (supporting information in Table 11). Representative annual capacities of standardised waste management facilities have been assumed utilising this and ODPM information (Table 12)[16].

Table 11 Supporting information

Site ref	Site name	Tonnages (TPA)	Size (ha)	Supporting Info.
WM2	Ripley Road, Bowling	160,000	2.35	13/01257/FUL - Gasification
WM3	Aire Valley Road, Worth Village, Keighley	130,000	2.8	13/04217/FUL – Energy from Waste (90,000), Tyre Crumb(10,000), Plastics Recycling (30,000) 15/01381/FUL - Energy from Waste (100,000), Plastics Recycling (30,000)
N/A	Waddington Recycling	75,000	0.85	06/09330/FUL - Autoclave
N/A	Canal Road Material Recycling Plant	100,000	0.55	12/04165/FUL - MRF Permitted to 150,000.
WM4	Bowling Back Lane Household Waste Collection and Recycling Site	230,000	4.27	12/01947/FUL Energy from Waste
	Birksland Street, Bradford	40,000	0.4	13/04276/FUL – C&I/LACW - WTS/Recycling
	Spartan Road,	45,000	0.35	09/05717/FUL - C&I/LACW - WTS/Recycling

[16] Office of the Deputy Prime Minister, Planning for Waste Management Facilities, 2004.

	Bradford			
	Victoria Works, Bradford	75,000	0.48	04/01425/FUL – C&I/LACW - WTS/Recycling
	Neville Road, Bowling	104,000 C&D 13,000 &I/LACW	2.69 total 2.57 -C&D recycling 0.12 – WTS/Recycling C&I/LACW	04/03348/FUL and 06/03183FUL 2.57 -C&D recycling 0.12 – WTS/Recycling C&I/LACW
	Hammerton Street, Bradford	75,000	0.85	04/04371/FUL – C&D Recycling
	Progress Works, Hall Lane, Bowling	50,000	2.18	06/00502/FUL - C&D Recycling
	Hallas Rough Quarry	200,000	1.2	10/01152/FUL & 13/01091/MAF – C&D Recycling

Table 12 Assumptions made

Facility Type	Tonnage	Land take
Materials Recycling/Reprocessing Facilities (LACW & C&I waste)	128,000 tonnes	1 ha
Materials Recycling/Reprocessing Facilities (C&D waste)	63,000 tonnes	1 ha
Non-hazardous non-inert landfill	100,000 to 500,000 tonnes (or the equivalent void space)	N/A
Non-hazardous inert landfill	100,000 tonnes	N/A
Hazardous landfill	20,000 tonnes	N/A
Composting	25,000 to 35,000 tonnes.	1 – 2 ha
Energy Recovery	100,000 – 200,000 tonnes	2 – 3 ha
Residual Mechanical Treatment	100,000 tonnes	1 ha

The assumed representative annual capacities of standardised waste management facilities, set out in Table 12, have been applied to the capacity

gap forecast. The purpose of doing this is to provide an indication of the land take that would be required in order to meet future waste management requirements. Tables 13 – 15 set out the anticipated land take required to meet forecast gaps in waste management capacity. The total number of hectares of the sites set out in the Waste Management DPD (17.62ha) is greater than the maximum land take required under the capacity gap forecasts. A surplus land take requirement, as put forward in the Waste Management DPD, is advised for the following reasons:

- Providing a choice and mix of potential waste management sites across the District is important to support waste hierarchy objectives;
- It ensures flexibility of the Plan respond to future circumstances and changing approaches to waste management including technological advancement;
- An appropriate mix of sites will help accommodate different waste streams allowing waste operators flexibility to develop the necessary waste management facilities the District needs.

Table 13 Comparison of the capacity gap at year across the 3 scenarios, assuming NO GROWTH (Negative figures indicates no gap), all wastes except Sewage and Low Level Radioactive waste (tonnes) indicating total number of facilities required and landtake.

Waste Management	Year	Scenario 1 Baseline	Scenario 2 Max. Recycling	Scenario 3 Med. Recycling	Min no Facilities	est. Land take (ha)
Landfill (non-hazardous C&I and LACW)	2015	97,822	92,111	91,757	N/A	N/A
	2020	97,822	63,589	61,464	N/A	N/A
	2030	97,822	51,310	47,413	N/A	N/A
Landfill (hazardous)	2015	4,076	4,076	4,076	N/A	N/A
	2020	4,076	4,076	4,076	N/A	N/A
	2030	4,076	4,076	4,076	N/A	N/A
Landfill (CD&E)	2015	195,924	174,618	185,969	N/A	N/A
	2020	195,924	68,104	136,207	N/A	N/A
	2030	195,924	68,104	136,207	N/A	N/A
Energy recovery	2015	100,607	99,607	109,685	1	2 – 3 ha
	2020	100,607	86,601	147,073	N/A	N/A
	2030	100,607	86,601	181,218	N/A	N/A
Incineration (Specialist High Temp)	2015	861	861	861	<1	N/A
	2020	861	861	861	<1	N/A
	2030	861	861	861	<1	N/A
Recycling (C&I and LACW)	2015	316,756	322,508	313,401	3	3 ha
	2020	316,756	353,920	302,012	N/A	N/A
	2030	316,756	366,199	281,918	N/A	N/A
Recycling (aggregates CD&E)	2015	116,141	147,422	130,757	4	Extant PP in place

Waste Management	Year	Scenario 1 Baseline	Scenario 2 Max. Recycling	Scenario 3 Med. Recycling	Min no Facilities	est. Land take (ha)
	2020	116,141	303,802	203,814	1	Extant PP in place
	2030	116,141	303,802	203,814	N/A	N/A
Recycling (specialist materials– including metal recycling, End of Life Vehicles and WEEE	2015	-2,322	-2,322	-2,322	Surplus	Surplus
	2020	-2,322	-2,322	-2,322	Surplus	Surplus
	2030	-2,322	-2,322	-2,322	Surplus	Surplus
Composting	2015	-18,457	-17,042	-18,115	Surplus	Surplus
	2020	-18,457	-7,382	-13,821	Surplus	Surplus
	2030	-18,457	-7,382	-13,821	Surplus	Surplus
Residual Mechanical Treatment	2015	17,854	14,730	16,355	1	0.5 -1 ha
	2020	179,500	161,751	171,501	1	1 ha
	2030	179,500	161,751	171,501	N/A	N/A
Treatment Plant (including Anaerobic Digestion, specialised treatment of biodegradable liquids and wastes, organic waste treatment by distillation)	2015	-49,078	-49,078	-49,078	Surplus	Surplus
	2020	-49,078	-49,078	-49,078	Surplus	Surplus
	2030	-49,078	-49,078	-49,078	Surplus	Surplus
Total estimated land take						8 ha

Table 14 Comparison of the capacity gap at year across the 3 scenarios, assuming Minimised Growth (Negative figures indicates no gap), all wastes except Sewage and Low Level Radioactive waste (tonnes) indicating total number of facilities required and landtake.

Waste Management	Year	Scenario 1 Baseline	Scenario 2 Max. Recycling	Scenario 3 Med. Recycling	Min no Facilities	Size (ha)
Landfill (non-hazardous)	2015	97,780	92,057	91,710	N/A	N/A
	2020	101,224	64,795	62,907	N/A	N/A
	2030	101,772	53,158	50,364	N/A	N/A
Landfill (hazardous)	2015	4,035	4,035	4,035	N/A	N/A
	2020	3,837	3,837	3,837	N/A	N/A
	2030	3,471	3,471	3,471	N/A	N/A
Landfill (CD&E)	2015	195,924	174,618	185,969	N/A	N/A
	2020	195,924	68,104	136,207	N/A	N/A
	2030	195,924	68,104	136,207	N/A	N/A
Energy recovery	2015	100,908	99,902		1	2 – 3 ha
	2020	107,331	91,365	153,351	N/A	N/A
	2030	111,314	94,015	187,556	N/A	N/A
Incineration (Specialist High Temp)	2015	861	861	861	<1	N/A
	2020	861	861	861	<1	N/A
	2030	861	861	861	<1	N/A
Recycling (C&I and LACW)	2015	315,860	321,162	312,522	3	3 ha

Waste Management	Year	Scenario 1 Baseline	Scenario 2 Max. Recycling	Scenario 3 Med. Recycling	Min no Facilities	Size (ha)
	2020	317,964	357,733	304,976	N/A	N/A
	2030	311,532	363,764	280,973	N/A	N/A
Recycling (aggregates CD&E)	2015	116,171	147,452	130,787	3	Extant PP om plave
	2020	116,678	304,339	204,351	N/A	N/A
	2030	117,043	304,339	204,716	N/A	N/A
Recycling (specialist materials– including metal recycling, End of Life Vehicles and WEEE	2015	-2,322	-2,322	-2,322	Surplus	Surplus
	2020	-2,322	-2,322	-2,322	Surplus	Surplus
	2030	-2,322	-2,322	-2,322	Surplus	Surplus
Composting	2015	-18,236	-16,809	-17,890	Surplus	Surplus
	2020	-13,984	-1,358	-8,699	Surplus	Surplus
	2030	-11,190	2,491	-5,464	<1	N/A
Residual Mechanical Treatment	2015	19,002	15,853	17,490	1	0.5-1 ha
	2020	199,735	179,500	190,616	1	1 ha
	2030	213,504	191,578	203,623	1	1 ha
Treatment Plant (including Anaerobic Digestion, specialised treatment of biodegradable liquids and wastes, organic waste treatment by distillation)	2015	-49,168	-49,168	-49,168	Surplus	Surplus
	2020	-49,604	-49,604	-49,604	Surplus	Surplus
	2030	-50,414	-50,414	-50,414	Surplus	Surplus
Total estimated land take						9 ha

Table 15 Comparison of the capacity gap at year across the 3 scenarios, assuming Growth (Negative figures indicates no gap), all wastes except Sewage and Low Level Radioactive waste (tonnes) indicating total number of facilities required and landtake.

Waste Management	Year	Scenario 1 Baseline	Scenario 2 Max. Recycling	Scenario 3 Med. Recycling	Min no Facilities	Size (ha)
Landfill (non-hazardous)	2015	98,749	92,985	92,624	N/A	N/A
	2020	107,094	69,162	66,776	N/A	N/A
	2030	117,785	61,655	56,384	N/A	N/A
Landfill (hazardous)	2015	4,130	4,130	4,130	N/A	N/A
	2020	4,412	4,412	4,412	N/A	N/A
	2030	5,035	5,035	5,035	N/A	N/A
Landfill (CD&E)	2015	197,100	175,666	187,085	N/A	N/A
	2020	203,085	70,593	141,186	N/A	N/A
	2030	215,606	74,945	149,890	N/A	N/A
Energy recovery (LACW & C&I)	2015	101,411	100,404	110,575	1	2 – 3 ha
	2020	110,379	94,412	160,107	N/A	N/A
	2030	119,648	102,346	214,443	N/A	N/A
Incineration (Specialist High Temp)	2015	861	861	861	<1	N/A
	2020	861	861	861	<1	N/A
	2030	861	861	861	<1	N/A
Recycling (C&I and LACW)	2015	320,723	325,611	316,882	3	3 ha
	2020	345,141	385,958	329,990	N/A	N/A
	2030	384,930	444,225	345,355	1	1ha
Recycling (aggregates CD&E)	2015	116,845	148,313	131,549	3	Extant PP in palce

Waste Management	Year	Scenario 1 Baseline	Scenario 2 Max. Recycling	Scenario 3 Med. Recycling	Min no Facilities	Size (ha)
	2020	120,782	315,301	211,660	2	N/A
	2030	128,323	334,834	224,804	N/A	N/A
Recycling (specialist materials– including metal recycling, End of Life Vehicles and WEEE	2015	-2,321	-2,321	-2,321	Surplus	Surplus
	2020	-2,316	-2,316	-2,316	Surplus	Surplus
	2030	-2,306	-2,306	-2,306	Surplus	Surplus
Composting	2015	-18,119	-16,692	-17,773	Surplus	Surplus
	2020	-13,275	-649	-7,990	Surplus	Surplus
	2030	-9,260	4,421	-3,534	<1	N/A
Residual Mechanical Treatment	2015	19,222	16,073	17,710	1	0.5-1 ha
	2020	201,079	180,844	191,960	1	1 ha
	2030	217,203	195,277	207,322	1	1 ha
Treatment Plant (including Anaerobic Digestion, specialised treatment of biodegradable liquids and wastes, organic waste treatment by distillation)	2015	-48,939	-48,939	-48,939	Surplus	Surplus
	2020	-48,222	-48,222	-48,222	Surplus	Surplus
	2030	-46,643	-46,643	-46,643	Surplus	Surplus
Total estimate land take						10 ha