Lincolnshire Minerals and Waste Local Plan Review- Evidence Base

Lincolnshire Waste Needs Assessment 2021 - Report 2

Management Requirements for Commercial and Industrial Waste in Lincolnshire

Final Issue

Issued: 24 June 2021

Prepared on behalf of

Lincolnshire County Council

BPP Consulting Document Control

Project: Lincolnshire Waste Needs Assessment 2021

Report: Commercial and Industrial Waste Management Requirements - Report 2

Version Description: Final Issue

Version No.: 1.1

Date: 24.06.2021

Version No.	Version Description	Author	Date	Reviewed	Date
0.1	Draft for Internal review	Alan Potter (Partner)	14.04.2021	Ian Blake (Partner)	15.04.21
1.0	Client review	Alan Potter (Partner)	20.04.2021	Matthew Michell (Client Contact)	
1.1	Final issue	Alan Potter (Partner)	24.06.2021		

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Abbreviations and Glossary of Terms

Abbreviations

Abbreviation	Explanation
AD	Anaerobic Digestion
C & I	Commercial and Industrial Waste
C, D & E / CDEW	Construction, Demolition & Excavation Waste
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EfW	Energy from Waste
EWC	European Waste Catalogue
HWRCs	Household Waste Recycling Centres
LACW	Local Authority Collected Waste
MRF	Material Recycling Facility
MRS	Metal Recycling Site
RDF	Refuse Derived Fuel
WDF	WasteDataFlow
WDI	Waste Data Interrogator
WNA	Waste Needs Assessment
WPA	Waste Planning Authority
WTS	Waste Transfer Station

Glossary of Terms

Term	Definition
Agricultural Waste	Waste produced on a 'farm' in the course of 'farming'. Agricultural waste takes both 'natural' (or organic) and 'non-natural' forms e.g. plastics.
Anaerobic Digestion	A process to manage organic matter including green waste and food waste, involving bacterial decomposition in the absence of air, producing a biogas and nutrient rich solid or liquid (digestate). The biogas can be used to generate energy or to power vehicles, and the digestate can be applied to land as a fertiliser and/or soil conditioner. Considered to be classed alongside composting on the Waste Hierarchy for the management of food waste even though it is an Energy from Waste process due to the LCA benefits offered.
Biodegradable waste/ biowaste	Waste that can break down over time due to natural biological action/processes, such as food, garden waste and paper.
Commercial Waste	As defined in The Controlled Waste (England and Wales) Regulations 2012. In brief: Waste arising from premises which are used wholly or mainly for trade, business, sport, recreation or entertainment, excluding industrial waste.
Construction and Demolition Waste	Controlled waste arising from the construction, repair, maintenance and demolition of buildings and structures.
DEFRA	The UK Government department responsible for developing national waste management policy.
Energy from Waste	The conversion of the calorific value of waste into energy, normally heat and/or electricity, through applying thermal treatment of some sort. May also include the production of gas that can be used to generate energy.
Environment Agency	The body responsible for the regulation of waste management activities through issuing permits to control activities that handle or produce waste. It also provides up-to-date information on waste management matters and deals with other matters such as water issues including flood protection advice.
Exemptions	Certain activities exempt from the need to obtain an environmental permit. Each exemption has specific limits and conditions that must be complied with to remain valid. Exemptions must be registered with the Environment Agency. Each registration lasts 3 years.
Green waste	Biodegradable plant waste from gardens and parks such as grass or flower cuttings and hedge trimmings, from domestic and commercial sources suitable for composting.
Hazardous Waste	Waste requiring special management under the Hazardous Waste Regulations 2005 due to it posing potential risk to public health or the environment (when improperly treated, stored, transported or disposed). This can be due to the quantity, concentration, or its characteristics.

Term	Definition
Household Waste	As defined in The Controlled Waste (England and Wales) Regulations 2012. In brief: Waste from households collected through kerbside rounds, bulky items collected from households and waste delivered by householders to household waste recycling centres and "bring recycling sites". Also includes waste from street sweepings, and public litter bins.
Household Waste Recycling Centres	A facility that is available to the public to deposit waste not collected through kerbside collection (also known as a civic amenity site).
Incineration	The controlled combustion of waste. Energy may also be recovered in the form of heat (see Energy from Waste). If energy is not recovered to a certain standard it sits at the bottom of the waste hierarchy being classed as 'disposal' alongside landfill.
Industrial Waste	As defined in The Controlled Waste (England and Wales) Regulations 2012. In brief: Waste arising from any factory and from any premises occupied by an industry (excluding mines and quarries).
Landfill (including land raising)	The permanent disposal of waste to land, by the filling of voids or similar features, or the construction of landforms above ground level (land-raising).
Landfill Directive	European Union requirements restricting the landfilling of biodegradable municipal waste and requiring pre treatment of all waste destined to be landfilled and separate disposal of hazardous, and non hazardous and inert wastes.
Leachate (associated with landfill)	Effluent arising from the breaking down of degradable waste in landfill when liquid (normally rainwater) is introduced. Normally carries pollutants from decomposing waste requiring special collection and treatment.
(The) Lincolnshire MWLP 2016	The adopted Lincolnshire Minerals & Waste Local Plan (adopted June 2016)
Local Authority Collected Waste	Waste collected by, or on behalf of, local authorities. LACW includes waste produced by householders both collected from their homes (collected household waste), and deposited at Household Waste Recycling Centres (HWRCs), plus municipal parks and gardens waste and waste resulting from the clearance of fly-tipped material and street sweepings, litter and trade waste collected by or on behalf of councils. Referred to as municipal waste prior to 2010.
Materials Recycling Facility (MRF)	A facility for sorting recyclable materials from the incoming waste stream.

Term	Definition
Mining Waste	Waste from extractive operations (i.e. waste from extraction and processing of mineral resources) including materials that must be removed to gain access to mineral resources, such as topsoil, overburden and waste rock, as well as tailings remaining after minerals have been largely extracted from the ore. Management subject to control through the EU Directive 2006/21/EC.
Non Hazardous Landfill	A landfill permitted to accept non-inert (biodegradable) wastes e.g. municipal and commercial and industrial waste and other non-hazardous (including inert) wastes. May only accept hazardous waste if a special cell is constructed.
Other Recovery	Processes such as energy from waste that recover value from waste other than recycling or composting. Situated below recycling and composting in the waste hierachy, but above disposal.
Recovery	Subjecting waste to processes that recover value including recycling, composting or thermal treatment to recover energy.
Term	Definition
Recycling	Extracting materials from the waste stream for reprocessing into products (the same e.g. glass bottles or a different one e.g. aggregate).
Refuse Derived Fuel	A fuel produced to a contract specification by processing the combustible fraction of waste.
Residual Waste	Waste remaining after materials for re-use, recycling and composting/organic waste treatment e.g. anaerobic digestion have been removed.
The Plan Area	The area subject to the Local Plan to which this study relates; in this case Lincolnshire.
Waste Planning Authority (WPA)	The local authority responsible for waste planning and development control. In the case of Lincolnshire this is Lincolnshire County Council.
Waste Transfer Station	A site to which waste is delivered for bulking prior to transfer to another place for further processing or disposal.

1 Introduction

1.1 BPP Consulting LLP has been commissioned by Lincolnshire County Council to produce a 'Waste Needs Assessment' (WNA) for Lincolnshire to inform the updating of the adopted Lincolnshire Minerals & Waste Local Plan. This work is being carried out in the context of the National Planning Policy for Waste (NPPW) and the waste chapter of the Planning Practice Guidance (PPG) which expects that:
"Planned provision of new capacity and its spatial distribution should be based on robust analysis of best available data and information*….." emphasis added)*[1]

1.2 This WNA (known as the 'Lincolnshire Waste Needs Assessment 2021') consists of an overall main summary report and five waste stream specific supporting reports, namely:
1. Local Authority Collected Waste
2. Commercial and Industrial Waste
3. Construction, Demolition and Excavation Waste
4. Hazardous Waste and
5. 'Other' Waste

1.3 This report is concerned with estimating future management requirements for Commercial and Industrial (C&I) Waste in Lincolnshire to 2045. The Lincolnshire MWLP 2016 defines C&I waste as follows:

"*These wastes are collected, managed and disposed by private waste companies serving businesses of all sizes across all industry sectors. A large proportion of Commercial waste is a mix of plastics, paper, card, glass and food waste collected from offices, shops, food outlets, etc. as well as waste metals equipment, vehicles, machinery and smaller quantities of chemicals, timber and other waste. The Industrial part of the stream comprises a similar range of materials but in different proportions, with larger quantities of chemicals, metals, textiles, and a variety of processing and packaging wastes, but with mixed office wastes also.*"

1.4. While this definition addresses the nature of wastes from this stream, it does not clearly define the origin. Given the lack of a precise definition the following working definition has been adopted for the purpose of this report and the Lincolnshire Waste Needs Assessment 2021 which is considered to encompass the range of waste covered by the national Reconcile Methodology applied by Defra[2]:

[1] DEFRA. 2014. National Planning Policy for Waste.

[2] The Defra 'National Reconcile Methodology' is a method devised by Defra to enable the UK Government to report waste arisings to the European Commission when the UK was a member of the European Union. C&I waste is defined under the Defra national Reconcile Methodology as waste arising from "..a specific collection of economic activities described by the

- Commercial waste is *"Waste arising from premises which are used wholly or mainly for trade, business, sport, recreation or entertainment, excluding local authority collected and industrial waste."*
- Industrial waste is *"Waste arising from any factory and from any premises occupied by an industry excluding mines and quarries ."*

The hazardous component of each waste stream is accounted for in the separate report on hazardous waste and so has been excluded from consideration. Waste arising from construction, demolition or excavation activity is also accounted for separately due to its unique characteristics and management requirements.

1.5. The national Planning Practice Guidance chapter on waste states that: "Planned provision of new capacity and its spatial distribution should be based on robust analysis of best available data." (emphasis added) (Para 035). Therefore, this exercise involves a robust analysis of the "best available data" relating to C&I waste production and management.

1.6. The Waste Needs Assessment 2021 provides the evidence base that will support the review of the effectiveness of waste planning policy contained in the Lincolnshire MWLP 2016 and, in particular, identifies whether any projected shortfalls in waste management capacity might arise that may require the identification and allocation of suitable land that could accommodate such capacity.

1.7. The methodology for identifying future shortfalls in C&I waste management capacity involves the following:

1. Estimating baseline C&I waste arisings;
2. assessing management methods, including routes and targets;
3. forecasting arisings for the period to 2045; and,
4. assessing existing capacity available to manage C&I waste in accordance with Plan objectives and targets and, in doing so, identifying any projected capacity gaps.

1.8. As there are similarities between management requirements for C&I waste and that of LACW, this report only covers items 1-3 above, with the combined emerging requirements for the management of non-hazardous waste arising in both streams addressed in the overview report. The approach taken and the results of the analysis are described in detail in the following sections.

statistical classification of economic activities in the European Community (NACE). Namely: C, D, E36, E37 & E39 (excluding sewage sludge) and G-U (excluding G46.7.7)" See link for details https://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=NACE_REV2&StrLanguageCode=EN&IntPcKey=&StrLayoutCode=&IntCurrentPage=1

2 Estimating C&I Waste Baseline Arisings

Context

2.1 There is no requirement on businesses or waste management companies servicing them to make records of the waste produced publically available. Hence estimating quantities of Commercial and Industrial waste arisings for a specific Plan area, with any degree of accuracy, is a challenge. Two different methods have been devised to estimate a baseline for C&I waste production at a national level as follows:

- 'Point of management'.

  The 'point of management' method uses data related to the management of C&I waste. This approach forms the basis for the Defra 'Reconcile' method used to estimate C&I waste arisings at a national level[3]. This is primarily based on records submitted by operators of permitted waste management facilities to the Environment Agency (EA) of waste delivered to, and removed from, their sites. The EA collates this data in a database known as the 'Waste Data Interrogator' (WDI) on an annual (calendar year) basis. In the past this data is supplemented by data for wastes managed at permitted sites that don't report through the WDI such as incinerators (aka energy from waste plants). However the most recent version of the WDI includes data for all such facilities.

- 'Point of production'

  The 'point of production' method applies waste production factors for different business sectors generated through surveys to the profile of businesses within an area .This method was used in the Defra national survey undertaken in 2009 on which the previous approach to generating national estimates was based[4].

The Lincolnshire WNA Update 2017 applied the 'point of production' method to arrive at a baseline estimate for 2015/16. The approach involved applying Lincolnshire business profile data for March 2016 to arisings data generated in 2009 for the Defra national producer survey. This method generated a baseline estimate value for 2015/16 of around 805,300 tonnes which included around 60,000 tonnes of waste classed as hazardous. Given hazardous waste is addressed in a separate stream report, the previous baseline value for non hazardous C&I waste can be taken as c750,000 tonnes in 2015/16.

[3] *DEFRA 2014, New Methodology to Estimate Waste Generation by the Commercial and Industrial Sector in England* as updated by *Commercial and Industrial Waste Arisings Methodology Revisions for England Defra October 2018* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/873328/Commercial_and_Industrial_Waste_Arisings_Methodology_Revisions_Oct_2018_contact_details_update_v0.2.pdf

[4] *Commercial and Industrial Waste Survey 2009: Final Report*, Defra May 2011, Available: http://archive.defra.gov.uk/evidence/statistics/environment/waste/documents/commercial-industrialwaste101216.pdf

Chosen Methodology

2.2 The methodology chosen to estimate an updated baseline C&I waste arisings value (to be used as a starting point for forecasting C&I waste arisings in Lincolnshire) is based on the national 'Reconcile' methodology, adapted to reflect local circumstances i.e. a 'point of management' method.

2.3 This methodology relies primarily on the data reported through the WDI to estimate quantities of commercial and industrial waste that were actually managed at waste management facilities, rather than simply produced. Data for waste identified as arising from Lincolnshire managed at permitted waste management facilities reported in the latest Environment Agency Waste Data Interrogator dataset (for the calendar year 2019) has been used.

2.4 In order to avoid double counting, deductions are made to eliminate the following:

1. Waste streams included in the dataset but covered elsewhere in the Waste Needs Assessment (WNA) such as Agricultural, Mining, Construction, Demolition and Excavation Waste (C, D & E), wastewater and hazardous waste
2. Local Authority Collected Waste (LACW) managed through WDI reporting facilities but also reported through a separate central database known as WasteDataFlow[5]

2.5 The method also includes a calculation to avoid double counting of waste inputs to 'intermediate' facilities[6] within Lincolnshire.

2.6 The national Reconcile method has been updated such that it now omits waste managed at waste management sites exempt from the need for an Environmental Permit on the basis that materials managed through these sites will emerge at a permitted site at some point in the management chain[7]. To be consistent with the national method, separate consideration of this category of sites has been omitted from the methodology applied in this report.

[5] http://www.wastedataflow.org/

[6] Intermediate facilities are those which do not provide the final fate of waste. That is waste received leaves for onward management at other facilities elsewhere either having been subjected to some form of treatment or just simply bulked up e.g. transfer stations

[7] Commercial and Industrial Waste Arisings Methodology Revisions for England October 2018 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/873328/Commercial_and_Industrial_Waste_Arisings_Methodology_Revisions_Oct_2018_contact_details_update_v0.2.pdf

Detailed C&I Waste Baseline Arisings Calculation

Inputs to permitted waste management facilities

Step 1: Collect data relating to C&I waste and LACW arising in Lincolnshire from the Environment Agency Waste Data Interrogator.

2.7 Because C&I waste and LACW is not distinguishable by EWC code the starting point is to determine the quantity of C&I/LACW waste arising in Lincolnshire. This is achieved by identifying all waste attributed to Lincolnshire in the WDI and then deducting C, D & E waste, hazardous waste, and mining and agricultural waste components as each of these streams are addressed in separate assessment exercises reported separately as part of the Waste Needs Assessment. This outcome of this process is shown in Table 1 below reporting by the principle methods by which the waste is managed and distinguishing between waste managed within Lincolnshire and waste arising in Lincolnshire but managed beyond Lincolnshire. The total quantity of C&I/LACW waste arising from Lincolnshire managed through permitted sites reporting through the WDI for 2019 was c2.5 million tonnes.[8]

Table 1: Combined values for C&I waste and LACW arising in Lincolnshire managed at permitted facilities reporting through the WDI (tonnes)
Source WDI 2019

Waste arising in Lincolnshire	Landfill	Recovery to land	Transfer	Treatment	Metal recycling sites	Combustion	Incineration	Grand total
Waste managed at Lincolnshire sites	66,936	1,749	569,547	344,354	77,134	216	180,103	1,240,039
Waste managed at sites outside Lincolnshire	47,972	0	199,191	909,771	42,851	1,316	63,472	1,264,573
Totals	114,908	1,749	768,738	1,254,125	119,986	1,532	243,575	2,504,613

[8] To avoid double counting inputs to sites categorised as processing, storage and mobile plant have been omitted from this count as on examination they appear to be managing wastes of a type that will have already been managed at a permitted facility.

Step 2: Make deductions for Local Authority Collected Waste

2.8 As Local Authority Collected Waste (LACW) is not distinguishable from Commercial and Industrial Waste by reference to EWC Codes, it is necessary to cross reference the data in Table 1 with data from Wastedataflow (WDF), the online reporting portal used by waste collection and disposal authorities to record LACW managed in their areas. This allows the quantities of LACW managed through specific sites to be ascertained. Cross referencing between the sites identified in WDF and the category assigned, where that site is listed in the WDI, enables attribution to specific routes, as shown in Table 2 below.

Table 2: Local Authority Collected Waste Received at Facilities included in WDI for Waste Arising from Lincolnshire (tonnes).
Source: WasteDataFlow 2019 & WDI 2019

	Landfill	Transfer	Treatment	Metal Recycling Sites	Incineration	Grand Total
LACW arising in Lincolnshire managed at Lincolnshire sites	11,608	169,547	128,911	2,977	166,084	479,127
LACW arising in Lincolnshire managed at sites outside Lincolnshire	0	0	20,887	0[9]	0	20,887
Totals	11,608	169,547	149,798	2,977	166,084	500,014

2.9 When values displayed in Table 2 are deducted from the values in Table 1 the total remaining value is just over 2 million tonnes as shown in Table 3 below. This may be referred to as the 'gross C&I waste arising' value.

[9] Bulk of metals handled by Sims in Newport Wales. Given the WDI only reports receipts in England, this value has been discounted.

Table 3: Gross C&I Waste Arising from Lincolnshire (tonnes) .
Source: Table 1 minus Table 2.

Waste arising in Lincolnshire	Landfill	Recovery to land	Transfer	Treatment	Metal recycling sites	Combustion	Incineration	Grand Total
Waste managed at Lincolnshire sites	55,328	1,749	400,001	215,443	74,157	216	14,019	760,913
Waste managed at sites outside Lincolnshire	47,972	0	199,191	888,884	42,851	1,316	63,472	1,243,686
Totals	103,300	1,749	599,192	1,104,327	117,009	1,532	77,491	2,004,599

Step 3: Make deduction for specific wastes accounted for separately

2.10 Landfill leachate is expressly excluded from the national 'Reconcile' reporting method, as Defra considers counting wastes generated by the waste management facilities from processes handling wastes generated elsewhere in the economy to be double counting under this overall waste stream[10]. Based on this, the value for leachate from Lincolnshire managed at permitted facilities has also been deducted. This is calculated to be 26,243 tonnes of waste, with 9,851 tonnes treated in Lincolnshire and 16,391 tonnes treated at sites outside Lincolnshire.

2.11 In addition, wastewater treatment sludge has been deducted as that is considered separately in the WNA report on 'Other' waste. This represents a total of 402,352 tonnes of waste arising in Lincolnshire, of which 42,476 tonnes was treated in Lincolnshire and 359,876 tonnes treated or combusted outside.

Table 4 shows that deducting these values gives a revised headline value of just over 1.5 million tonnes.

[10] See footnote 1 of DEFRA Waste Data Overview, May 2011.

Table 4: Gross C&I Waste Arising from Lincolnshire (tonnes)
Source: Table 3 minus Step 3 values

Waste arising in Lincolnshire	Landfill	Recovery to land	Transfer	Treatment	Metal recycling sites	Combustion	Incineration	Grand total
Waste managed at Lincolnshire sites	55,328	1,749	400,001	163,116	74,157	216	14,019	708,586
Waste managed at sites outside Lincolnshire	47,972	0	199,191	512,617	42,851	1,316	63,472	867,419
Totals	103,300	1,749	599,192	675,733	117,009	1,532	77,491	1,576,005

Step 4: Make adjustments to account for intermediate sites (inc. waste transfer stations)

2.12 Adjustments are needed to address waste reported as being managed at intermediate sites for the following reasons:

1. To avoid double counting. Double counting occurs when the same waste is recorded once as an input from Lincolnshire to an initial facility located in Lincolnshire, and then recorded again as an input from Lincolnshire to a further facility (if it is transferred from the initial facility for onward management) and;
2. Some waste may be 'lost' as a consequence of residues from the processing of waste arising at Lincolnshire intermediate sites (e.g. MRFs). This particularly applies to processing residues from waste management facilities coded under EWC 19-12-12, because this code may also capture residues from the processing of the C,D & E waste stream. Given this output will be recorded as coming from Lincolnshire at the 'next step' site, there is a need to distinguish between the source waste stream to properly attribute these tonnages.

Step 4a: Deduct movements of waste arising in The Plan area to transfer stations within The Plan area:

2.13 The national 'Reconcile' method discounts inputs to all types of transfer facility recorded in the WDI covering:

- Non-Hazardous Waste Transfer
- Hazardous Waste Transfer
- Clinical Waste Transfer, and
- Inert Waste Transfer

Applying this approach to the Plan area means that all C&I waste inputs to sites operating as transfer facilities within the Plan area would be deducted. This is on the basis that if the waste is only being transferred there is no processing of the waste to turn it into a product which would then not be reported through the WDI. Hence there is no loss of waste in the movement of waste into and out of the site and so it may be assumed that all the output waste is accounted for at an onward destination either outside the Plan area or at a final management facility within the Plan area[11]. Hence inputs to these sites should not be counted if double counting is to be avoided. This is illustrated in Figure 1 below:

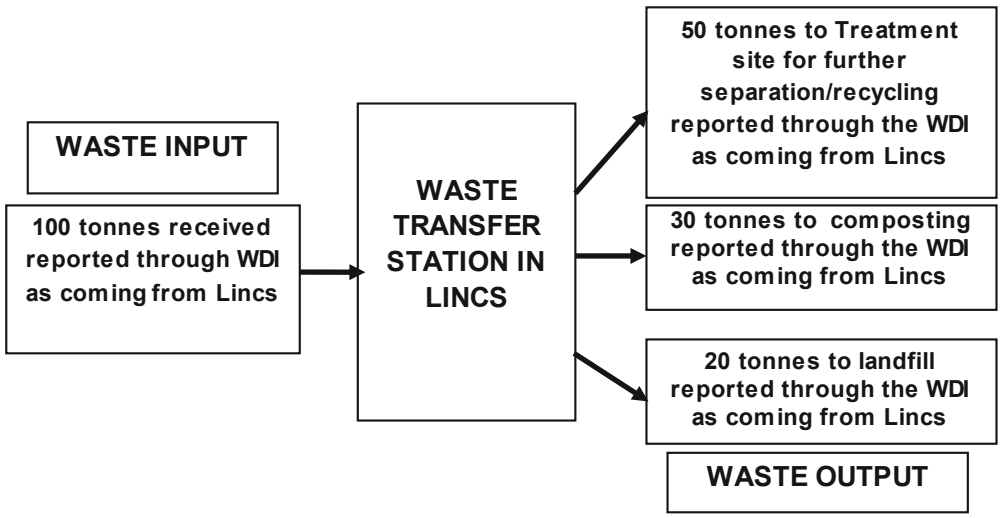

Figure 1: Schematic of Flows for Waste Transfer Stations Showing Double Counting of Wastes in WDI

Figure 1 shows example inputs and outputs for a Waste Transfer Station in Lincolnshire:

- Waste Inputs = 100 tonnes of waste from Lincolnshire
- Waste Outputs = 50 tonnes to recycling + 30 tonnes to composting + 20 tonnes to landfill.

In the above example if all the waste reported as arising in Lincolnshire was counted this would suggest 200 tonnes of waste exists, 100 tonnes in and 100 tonnes out, whereas in reality only 100 tonnes exists.

2.14 The same principle applies to Metal Recycling Sites, where waste input will be transferred on to facilities that convert material to scrap suitable for use in steel works at home or aboard

2.15 Therefore, the value for inputs to metal recycling sites and transfer of waste within the Plan Area has been reduced to zero giving a revised gross C&I

[11] If it goes to another intermediate site within the Plan area the same approach applies.

waste headline value of just over 1.1 million tonnes after deductions to avoid double counting due to waste being managed in Transfer Stations. It should be noted this net zero approach has not been applied to movements to out of county MRS or WTS as there is no risk of double counting. The results are shown in Table 5 below.

Table 5: Gross C&I Waste Arising from the Plan Area (tonnes)
Source: Table 4 minus the Plan area WTS & MRS Step 4a

Waste arising in Lincolnshire	Landfill	Recovery to land	Transfer	Treatment	Metal recycling sites	Combustion	Incineration	Grand total
Waste managed at Lincolnshire sites	55,328	1,749	0	163,116	0	216	14,019	234,428
Waste managed at sites outside Lincolnshire	47,972	0	199,191	512,617	42,851	1,316	63,472	867,419
Totals	103,300	1,749	199,191	675,733	42,851	1,532	77,491	1,101,847

Step 4b Deduct inputs of C&I waste to Treatment sites whose outputs are managed at 'next step' permitted sites to avoid double counting

2.16 There are also a number of intermediate sites classed as 'Transfer/Treatment' under the Treatment Category of the EA WDI which also need to be assessed to ensure reporting of waste movements to these sites does not result in double counting (as illustrated in Figure 2 below). These sites may receive both C, D & E waste as well as C&I waste and they may be classed as 'treatment' sites solely because of the processes applied to treat C, D & E waste, while the mixed C&I waste is simply transferred – albeit perhaps some minor manual processing removing key recyclable components. This adds a further layer of complexity to the computation as illustrated in Figure 2 below:

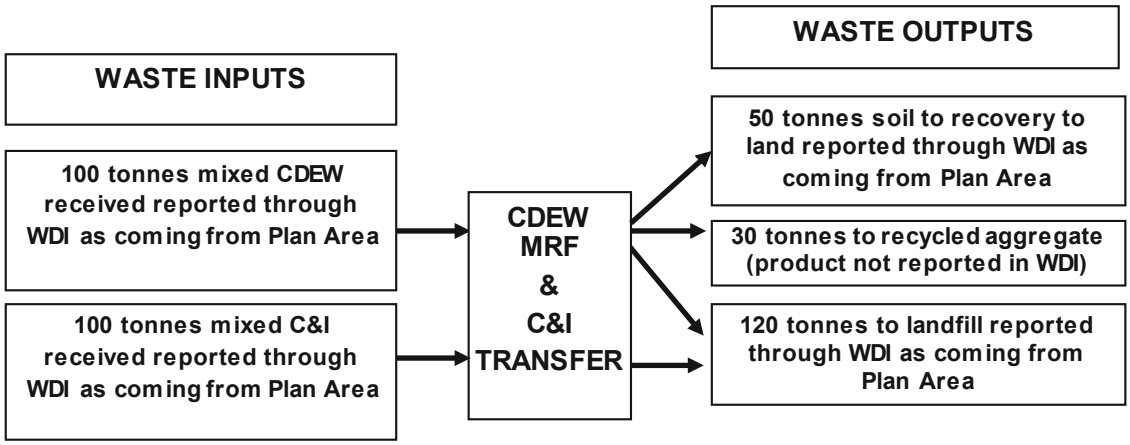

Figure 2: Schematic of Flows for Sites operating CDEW Treatment & C&I Waste Transfer Showing Potential Double Counting of Wastes in WDI

Figure 2 shows example inputs and outputs for sites operating CDEW Treatment and C&I Waste Transfer:

- Waste Inputs = 100 tonnes mixed CDEW + 100 tonnes mixed C&I.
- Waste Outputs = 50 tonnes soil to recovery to land (reported on WDI) + 30 tonnes recycled aggregate (not reported on WDI) + 120 tonnes to landfill (reported on WDI).

2.17 As some of these sites may receive both CDEW, LACW and C&I waste, the LACW and CDEW input element has been deducted. The actual inputs of 'remaining waste' (i.e. that waste remaining after the deductions) to these sites in the Plan Area in 2019 is shown in Table 6 below.

Table 6: Sites classified as Treatment sites within the Plan Area receiving 500t or more of 'Remaining' Waste from the Plan area, after deductions.
Source: WDI 2019 & WDF 2019

Facility Type	Site Name	Total (tonnes)
Biological Treatment/ Organic Waste Treatment	Hemswell Cliff Biogas AD Facility	6,803
Composting	Land Network South Elkington	1,102
Composting	Material Change Decoy Farm	4,286
Composting	Greenaway Green Waste Services, Long Acres	1,683
Composting	New Earth Solutions (West), Honeypot Lane	11,178
Composting	**Composting Total**	**18,250**
Material Recycling Facility	Biffa, Lincoln Central Depot	1,689
Material Recycling Facility	New Earth Solutions (West), Barkston, Copper Hill	27,547
Material Recycling Facility	**MRF Total**	**29,236**

Facility Type	Site Name	Total (tonnes)
Physical Treatment	Bulldog Remoulds	3,256
Physical Treatment	Luxus Ltd, Belvoir Way	503
Physical Treatment	Spalding Pallets Ltd	1,597
Physical Treatment	**Physical Treatment Total**	**5,356**
Physical-Chemical Treatment	Alpheus Environmental, Canwick Treatment Centre	60,336
Physical-Chemical Treatment	Anglian Water, Canwick Sludge Treatment Centre	16,783
Physical-Chemical Treatment	**Physical-Chemical Treatment Total**	**77,118**
Waste Transfer/Treatment	Waste Away Solutions, Sleaford	646
Waste Transfer/Treatment	Bullimores Sand & Gravel, Bourne WTS	10,237
Waste Transfer/Treatment	P M K Recycling, Baston Fen	5,645
Waste Transfer/ Treatment	**Waste Transfer/ Treatment Total**	**15,882**

2.18 For the sake of clarity, the entry in Table 5 for Treatment in the Plan Area (line 2 column 5) has been subdivided to reflect the different types of facility that fall under the 'Treatment' category as follows:

- Biological treatment/ Organic Waste Treatment
- Composting
- MRFs
- Physical Treatment
- Physical Chemical Treatment; and
- Waste Transfer/Treatment

Based on the analysis in Table 6, the breakdown between different facility types can be established and this is shown in Table 7 below.

Table 7: 'Remaining' Waste Arising from the Plan Area managed at Treatment Facilities (showing different types of treatment in the Plan Area).
Source: Table 5 and Table 6

	Final fate: biological treatment /organic waste treatment	Final fate: composting	Intermediate treatment: material recycling facility	Intermediate treatment: physical treatment	Intermediate treatment: physical chemical treatment	Intermediate treatment: transfer/ treatment	Sub total
Plan area to plan area	6,803	18,250	29,236	5,356	77,118	15,882	152,645 [12]

To determine the quantity of C&I waste from the Plan Area actually managed at each type of facility requires consideration of inputs and outputs to each as described below:

2.18.1.1 Biological treatment sites/Organic Waste Treatment sites

Examination of inputs and outputs of waste at the anaerobic digestion plant in the Plan Area identified as taking 'remaining waste' from the Plan Area is shown in Table 8 below. The removals of waste are at reduced levels to the input of waste which is to be expected given that the waste inputs are being converted to digestate and biogas. The digestate may be reported as being managed at other waste management facilities which presents a risk of double counting through the WDI. Therefore, a deduction is made to account for these residues and the calculation of this is shown in Table 8 below.

Table 8: Inputs and Outputs of Waste at Organic Waste Treatment Site in the Plan Area receiving 'remaining' waste from the Plan Area.
Source: WDI 2019.

Site Name	Total Input (tonnes) a	Of which non LACW/Agric from Within the Plan Area (Table 6) b	% of Input c=b/a	Total Outputs (tonnes) d	Output attributable to the Plan Area C&I input e=d x c	Net Plan Area C&I managed (tonnes) b-e
Hemswell Cliff Biogas AD Facility	99,930	6,803	7%	22,474	1,530	5,273

[12] This value is less than that shown in row 2, column 5 of table 5 (163,116) because this exercise focusses on sites receiving 500 tonnes or more.

Table 8 shows that:

1. 93% of waste inputs to Hemswell are either from outside the Plan Area or from waste streams accounted for elsewhere i.e. LACW and Agricultural. To avoid double counting the output, it is ‘pro rata'd’ (to account for the fact that only 7% of inputs are eligible to be accounted for as C&I waste). Therefore 1,530 tonnes (22,474 x7%) was deducted from the eligible Plan Area input value to avoid double counting when it is managed at the 'next step site'. This leaves a value of 5,273 tonnes of 'remaining waste' that arose in Lincolnshire to be counted as having been managed at this facility .

Therefore, the total quantity of C&I waste managed by the Plan area Biological and Organic Waste Treatment sites is adjusted to 5,273 tonnes.

2.18.1.2 Composting sites

Examination of inputs and outputs of waste at the four composting sites in the Plan Area identified as taking 'remaining waste' from the Plan Area is shown in Table 9 below. In most cases the removals of waste are at substantially reduced levels to the inputs of waste which is to be expected given that the waste inputs are being converted to compost which is considered to be a product not a waste and so is not required to be recorded and reported through the WDI. The waste residue from composting may go to landfill so presents a risk of double counting through the WDI and so a deduction is made to account for these residues and the calculation of this is shown in Table 9 below.

Table 9: Inputs and Outputs of Waste at Composting Sites in the Plan Area receiving 'remaining' waste from the Plan Area.
Source: WDI 2019

Site Name	Total Input (tonnes) a	Of which non LACW/Agric from Within the Plan Area (Table 6) b	% of Input c=b/a	Total Outputs (tonnes) d	Output attributable to the Plan Area C&I input e=d x c	Net Plan Area C&I managed (tonnes) b-e
Land Network South Elkington	13,114	1,102	8%	13	1	1,101
Material Change Decoy Farm	37,690	4,286	11%	12,879	1,417	2,869
Greenaway Green Waste Services, Long Acres	7,205	1,683	23%	20	5	1,678
New Earth Solutions (West), Honeypot Lane	24,986	11,178	45%	6,015	2,707	8,471
Total	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**14,119**

Therefore, the total quantity of waste for the Plan Area composting sites to be adjusted to 14,119 tonnes. It should be noted that due to absence of an EWC code for green waste arising from construction and demolition work (Chapter 17), an element of the input recorded might actually be attributable to the C, D & E waste stream from site clearance work for example. However, as it is not possible to distinguish between sources, the whole tonnage has been taken to arise from C&I waste sources such as landscape gardeners.

2.18.2 **Intermediate Treatment Sites**

Unlike organic waste treatment sites, which provide a final fate for input waste by converting a significant proportion of inputs to a product, intermediate treatment sites produce output waste materials that go on for further management at 'next step' sites. Therefore, a different computation is undertaken to establish the balance between recorded C&I inputs and outputs in order to obtain a net C&I arisings value.

2.18.2.1 Plan Area Sites classed as Material Recycling Facilities (MRFs)

Examination of inputs and outputs at the two sites classed as Material Recycling Facilities in the Plan Area reported as taking significant quantities (taken as over 500 tonnes) of 'remaining' waste from the Plan Area is shown in Table 10.

Table 10: Total Inputs & Outputs of Waste at Plan Area MRFs receiving 'remaining' waste from the Plan Area during 2019

Source: WDI 2019

Site Name	Input Total (tonnes)	Output Total (tonnes)	Inputs minus Outputs (diff)	Qualifying input (as in Table 6)
Biffa, Lincoln Central Depot	1,689	1,689	0	1,689
New Earth Solutions (West), Barkston, Copper Hill	41,737	41,654	84	27,547

The final step is to assess the fate and destination of outputs to determine if it is likely the outputs of the site will be counted within the permitted system elsewhere. However, before doing so it is necessary to pro-rata the outputs attributable to the Plan Area waste inputs as a proportion that these inputs represent of the total input to the site minus the CDEW and hazardous input element.

Table 11: % Inputs to Plan Area MRF represented by 'remaining' waste from the Plan Area

Source: WDI 2019

Site Name	Total Input after deductions	Plan Area contribution (Table 10)	% Plan Area contribution of total input
Biffa, Lincoln Central Depot	1,689	1,689	100%
New Earth Solutions (West), Barkston, Copper Hill	41,737	27,547	66%

Table 12 presents the fates of outputs from the sites with outputs pro-rata'd to reflect % of Plan Area inputs for each fate.

Table 12: Fate and Destination of non CDEW & non Hazardous Outputs from Plan Area MRFs (500t plus) Source : WDI 2019

Site	Source	Fate: Incin	Fate: Landfill	Fate: Recovery	Fate: Transfer
Biffa, Lincoln Central Depot	Total	1,283	24	28	354
Biffa, Lincoln Central Depot	From the Plan Area (x% in Table 11)	1,283	24	28	354
New Earth Solutions (West), Barkston	Total	0	0	0	41,654
New Earth Solutions (West), Barkston	From the Plan Area (x% in Table 11)	0	0	0	27,491
Total	**Total from the Plan Area**	**1,283**	**24**	**28**	**27,845**

The following rules have been applied:

1. Where an output is going to recovery it is assumed that this input will not be recorded at the 'next step site' as this is likely to be a reprocessing site which does not report through the WDI and hence the value has been retained to count toward the baseline value.
2. Where an output is going for management through any other route it has been assumed that this input will be recorded at the 'next step site' hence the value has not been counted in the calculation of the baseline value.

As the output value exceeds the value presented in Table 10 the original Plan Area input value for Plan Area MRF has been deducted entirely.

2.18.2.2 Plan Area Sites classed as Physical Treatment sites

Examination of inputs and outputs of remaining waste for the 3 sites classed as Physical Treatment sites in the Plan Area reported as taking 500 tonnes or more of C&I waste from the Plan Area is shown in Table 13.

Table 13: Inputs & Outputs of Plan Area Physical Treatment site receiving 500t or more of 'remaining' waste from the Plan Area (Table 6)
Source : WDI 2019

Site Name	Input Total	Output Total	Diff	Qualifying input (as in Table 6)
Bulldog Remoulds	3,256	530	-2,726	3,256
Luxus Ltd, Belvoir Way	8,604	1,779	-6,825	503
Spalding Pallets Ltd	9,368	9,934	+566	1,597

Table 13 shows the following:

1. Bulldog Remoulds is principally a tyre recycling facility. It is assumed that the tyres received are converted into product or reused. It reported sending only 530 tonnes of waste plastics out and this value has been deducted from the input value to get a revised total of 2,726 tonnes.
2. The Luxus site only received a small tonnage of its total input from Lincolnshire, being predominately separately collected plastics from municipal or similar sources. Therefore only 503 tonnes is counted.
3. The Spalding Pallets site reported sending more waste out in 2019 than it received. This site exclusively received wooden packaging and appears to be a site where wood pallets are processed into biomass for energy recovery. It is probable that wood chip is stockpiled during low demand periods which may straddle calendar years. It is assumed that outputs will be reported at the 'next step site' incineration facility in the WDI and therefore the input value has been deducted.

The revised Physical Treatment tonnage is 3,229 tonnes (2,726+503).

2.18.2.3 Plan Area Sites classed as Physical Chemical Treatment sites

Examination of inputs and outputs of waste at the two physical-chemical treatment sites in the Plan area taking 'remaining waste' arising in the Plan Area shows the following:

Table 14: Inputs & Outputs of Plan Area Physical Chemical Treatment sites receiving 'remaining' waste from the Plan Area (Table 6)
Source : WDI 2019

Site Name	Input Total	Output Total	Diff	Qualifying input (as in Table 6)
Alpheus Environmental, Canwick Treatment Centre	69,563	129	-69,464	60,336
Anglian Water, Canwick Sludge Treatment Centre	129,936	38,188	-91,748	16,783

The minimal removals of waste from the Alpheus is to be expected given that the waste input is subjected to treatment which may involve its breakdown as well as dealing primarily with liquid waste which means that the bulk of the treatment output will be discharged as a liquid under a consent to either sewer or a watercourse rather than physically removed. Discharges of treated liquid waste are not reported as outputs through the WDI and so no deduction has been made to adjust for the prospect of double counting of waste managed at this type of facility. Therefore the remaining waste value remains the same at 60,336 tonnes.

In the case of the Anglian Water WWTW there can be a risk of double counting of inputs and outputs to other facilities. The primary destinations of the solid waste output (sludge) is either recovery (19,402t) or further treatment (13,710t). Recovery is taken to be synonymous with application to land which is not reported through the WDI and so this value is retained, while the tonnage going for further treatment has been deducted. Given that recovery to land represents 59% of the output, the remaining waste value counted towards the overall arisings value has been reduced accordingly to 6,881 tonnes.

The combined input value for remaining waste managed at Lincolnshire physical-chemical treatment facilities counted towards the overall arisings value is 67,217t.

2.18.2.4 Plan Area Sites classed as Transfer/ Treatment sites

Examination of inputs and outputs of remaining waste for the three sites classed as Transfer/ Treatment sites in the Plan Area reported as taking significant quantities (plus 500 tonnes) of 'remaining' waste from the Plan area is shown in Table 16.

Table 15: Inputs & Outputs of Plan Area Transfer/ Treatment sites receiving 'remaining' waste from the Plan Area (Table 8)
Source : WDI 2019

Site Name	Input Total	Output Total	Diff	Qualifying input (as in Table 6)
Waste Away Solutions, Sleaford	1,542	1,542	0	646
Bullimores Sand & Gravel, Bourne WTS	11,786	12,053	+267	10,237
P M K Recycling, Baston Fen	43,235	43,745	+510	5,645

Detailed consideration of the input/output data reveals the following:

1. The outputs from Waste Away Solutions WTS either go to landfill or transfer, both destinations that would report as a 'next step' site, so the input is disregarded.
2. The Bourne WTS predominately receives waste classified under EWC 19 12 12, and converts it to either mixtures of hard construction waste or soils. Both of these outputs are classed as C, D & E waste so the input is disregarded as it is taken to arise from the C, D & E waste stream.
3. Inputs of qualifying waste to PMK Recycling from the Plan Area only represents 13% of inputs, with inputs predominately coming from Worcestershire (20,624t) and Cambridgeshire (11,313t). Outputs predominately travel outside the UK as paper and card (31,362t) and plastic/rubber (4,524t). It is assumed that this is not counted at a 'next step' site, so the proportion of output sent aboard that might be attributable to the Plan Area has been calculated as follows: Qualifying inputs =13% of total inputs, 13% of outputs sent abroad = 4,665 tonnes.

The combined effect of all the adjustments for Plan Area Treatment sites (Step 4b) is shown in Table 16.

Table 16: **Management Routes of 'remaining' waste arising from the Plan Area minus double counting adjustments with Treatment type distinction in Plan Area.**

Source: Table 9 minus Step 4b values

	Final Fate: Biological Treatment	Final Fate: Composting	Intermediate Treatment: Material Recycling Facility	Intermediate Treatment: Physical Treatment	Intermediate Treatment: Physical Chemical Treatment	Intermediate Treatment: Transfer/ treatment	Sub Total
Original Values (Table 7)	6,803	18,250	29,236	5,356	77,118	15,882	152,645
Adjusted for double counting deductions	5,273	14,119	0	3,229	67,217	4,665	94,503

The revised value for 'remaining' waste arising in the Plan area that is managed at Treatment sites (94,503 t) has been substituted in the overall assessment of C&I arisings in Table 17 below, giving a revised total arising of just over 1 million tonnes.

Table 17: Gross C&I Waste Arising from the Plan Area (tonnes)

Source: Table 5 minus the Plan area WTS Step 4b

	Landfill	Recovery to Land	Transfer	Treatment	Metal Recycling Sites	Combustion	Incineration	Grand Total
Waste arising in Lincolnshire managed at Lincolnshire sites	55,328	1,749	0	94,503	0	216	14,019	165,815
Waste arising in Lincolnshire managed at sites outside Lincolnshire	47,972	0	199,191	512,617	42,851	1,316	63,472	867,419
Totals	103,300	1,749	199,191	607,120	42,851	1,532	77,491	1,033,234

2.19 The following additional stages are needed to account for waste that may arise from Lincolnshire that aren't recorded as such due to their reporting in the WDI.

Additions

Step 5: Accounting for waste recorded to regional level source only.

2.20 The WDI 2019 reports inputs of 10,602 tonnes of C&I type waste going to six Lincolnshire sites as having only been coded down to regional level. Virtually all the tonnage went to a single site, Hemswell Cliff AD facility. Given inputs to this site have already been counted, this tonnage has been disregarded on the basis that if a site reports having received a significant tonnage from the Plan Area already, it indicates effective recording of waste from Lincolnshire and therefore it is less likely that the unattributed tonnage arose in Lincolnshire and the amount is ignored.

Step 6 Check for anomalous values

2.21 The value indicated for out of Plan Area Treatment of 512,617 tonnes, represents nearly 50% of total arisings value. This value has been interrogated further to ensure the values are not anomalous. This interrogation has revealed the following:

- 185,620 tonnes of unprocessed slag (EWC 10 02 02) reported as being processed at the Scunthorpe Aggregate Processing site in Scunthorpe, North Lincolnshire. Further investigation shows this plant serves the Scunthorpe steelworks, which is actually located out of the Plan Area in North Lincolnshire. Therefore this tonnage has been misattributed to Lincolnshire and may be disregarded, reducing the overall arisings value to 847,614 tonnes.[13]

2.22 The value indicated for out of Plan Area Transfer of 199,191 tonnes represents nearly 25% of the revised total arisings value. This value has been interrogated further and this has revealed the following:

[13] It is recommended that North Lincolnshire Council and the Environment Agency be informed of this error of attribution.

- 124,511 tonnes of the waste was received at facilities located in either North East Lincolnshire (58,031 t) or North Lincolnshire (66,479 t), which lie within the ceremonial county of Lincolnshire.. Further investigation shows that the majority of inputs to these areas went to four sites. The inputs to each of these sites has been checked to confirm the recording practices adopted. The outcome of this is as follows:
    - Inputs to four out of the five sites are not recorded below the level of Lincolnshire. This indicates that a total tonnage of 122,976 tonnes of waste may be misattributed solely to the Plan Area.
    - Of the four sites identified, inputs from Lincolnshire are the sole or predominant recorded input for three of the sites. These sites accounted for 118,458 tonnes. These sites have been investigated further, with the outcome shown below.
    - Gilbey Road Transfer Station located in Grimsby NE Lincs operated by Biffa Waste Services receiving predominately mixed municipal waste (c30,000t). This primarily serves the Grimsby area, Biffa having a depot at Lincoln serving Lincolnshire. Therefore, the tonnage reported through the WDI is taken to be attributed to Lincolnshire in error and has been excluded.
    - Bell Waste Control located in Scunthorpe N Lincs, operated by Ellgia Limited receiving predominately mixed municipal waste (c47,000t). While this site has a catchment that may encompass parts of the Plan Area, given its proximity to Scunthorpe it is assumed that majority of the input actually arose from the locality and therefore the tonnage reported through the WDI is taken to be attributed to Lincolnshire in error and has been excluded.
    - Elsham Lagoons located at Dodds Farm, Elsham operated by Whites Recycling Limited receiving predominately liquid waste produced by the food and drinks industries in the locality (c11,000t), While this site may be receiving waste from Lincolnshire itself given the uncertainty of its origin and the fact that it is only acting as a holding point for the application of this waste to agricultural land, it has been discounted on the basis that this waste will not require provision of capacity for management through the Waste Local Plan.

2.23 Interrogation of the value indicated for combustion of 1,532 tonnes, reveals that 1,250 tonnes relates to waste water treatment sludge which is counted as a separate waste stream. This reduces the combustion value to 282 tonnes.

2.24 As a result of the above exercise, the final baseline value arrived at is reduced to 727,907 tonnes.

Final C&I waste baseline arisings estimate and management profile

2.25 The outcome of this process is the baseline value of 728,000 tonnes of C&I waste was generated in Lincolnshire in 2019 with the profile displayed in Table 18 below. This is the value proposed for use for forward planning purposes. It should be noted that while Table 18 shows that the quantity of waste arising in Lincolnshire managed outside through treatment is substantially greater than that managed within, this only represents a single year snapshot. The critical factor is whether there is sufficient capacity within Lincolnshire to manage that amount were it to require it.

Table 18: Gross C&I Waste Arising from the Plan Area (tonnes)
Source: Table 17 minus the Plan Area anomaly Step 6

	Landfill	Recovery to Land	Transfer	Treatment	Metal Recycling Sites	Combustion	Incineration	Grand Total
Waste arising in Lincolnshire managed at Lincolnshire sites	55,328	1,749	0	94,503	0	216	14,019	165,815
Waste arising in Lincolnshire managed at sites outside Lincolnshire	47,972	0	80,733	326,997	42,851	67	63,472	562,092
Totals	103,300	1,749	80,733	421,500	42,851	283	77,491	727,907

Comparison with State of Lincolnshire WNA Update 2017 baseline estimate

2.26 The Lincolnshire WNA Update 2017 baseline estimate value for 2015/16 of around 750,000 tonnes was based on an assessment of the Lincolnshire business profile applying the 'point of production' method using data generated for England in 2009. The value arrived at for 2019 is marginally less than that value. This may be explained by the change in methodology, and that it would be expected for the point of production method to generate a higher value than a 'point of management' method, all things being equal. This is because some waste managed onsite or through a producer's own logistics would not be reported through the WDI. For example supermarket packaging is often transported by reverse logistics to sites that may operate under an exemption rather than a permit. This means that the values obtained are not directly comparable, but that the managed value obtained suggests that overall production has risen since 2015 to some degree.

3 Assessment of C&I Waste Management Capacity Requirement for Lincolnshire

3.1 Having established a baseline value for C&I waste arising in Lincolnshire, future management capacity requirements can be determined by:

1. Forecasting how much waste may be produced in future, and,
2. Establishing different management capacity requirements taking account of current management methods and objectives for future waste management e.g. proportion to be recycled during the plan period.

The section that follows addresses both of the above matters in turn.

National Planning Practice Guidance

3.2 With respect to forecasting C&I waste arisings national Planning Practice Guidance states the following:

"Waste planning authorities can prepare growth profiles, similar to municipal waste, to forecast future commercial and industrial waste arisings. In doing so, however, they should:

- set out clear assumptions on which they make their forecast, and if necessary forecast on the basis of different assumptions to provide a range of waste to be managed
- be clear on rate of growth in arisings being assumed. Waste planning authorities should assume a certain level of growth in waste arisings unless there is clear evidence to demonstrate otherwise."

Paragraph: 032 Reference ID: 28-032-20141016 Revision date: 16 10 2014

3.3 Hence PPG anticipates the application of a positive growth rate .

Lincolnshire WNA Update 2017

3.4 The Lincolnshire WNA Update 2017 took the following approach in relation to growth in C&I waste arisings:

" *Growth in C I waste arisings was assumed proportional to growth in commercial and industrial employment by sector and size band 6. Since there is no up-to-date data on forecasts in Lincolnshire, the factors used in the previous WNA were applied. It was therefore assumed that employment across the commercial and industry sectors would increase by 11% over the plan period i.e. 0.55% per annum , which was used to forecast C I waste growth, with the base year as 2015.* "

3.5 This approach is consistent with the national Planning Practice Guidance advice and the fact that this stream is indicated as having grown nationally since 2015. In addition a suppressed growth rate of 0.275% (simply 50% of the employment forecast) was also modelled along with a zero growth rate. The high growth forecast was preferred.

3.6 However given:

- the stated commitment of the Government to adoption of policy measures aimed at achieving a more circular economy in which waste is prevented and reused; and
- the forthcoming adoption of a 'Waste Prevention Programme for England'; and
- the probable long term effects of the Covid pandemic shifting working patterns from remote office to home and its impact on the local economy;

It is considered that application of the lower growth forecast presented in the WNA Update of 2017 is more realistic. Therefore a growth rate of 0.275% has been modeled. The results for the forecast milestone years are shown in Table 19 below.

Table 19: C&I Waste Forecast applying suppressed Growth Factor to Updated Baseline (rounded)

	2020	2025	2030	2035	2040	2045
Forecast Arisings	730,000	740,000	750,000	760,500	771,000	782,000

3.7 Table 19 shows that predicted arisings may increase by around 54,000 tonnes by the end of the forecast period.

4 C&I Waste Targets

4.1 Determination of how C&I waste might be managed first requires assessment of how C&I waste in Lincolnshire is currently managed and then projecting Lincolnshire Council's objectives for its future management taking account of national Government policy and expectations.

Baseline Profile

4.2 To set realistic targets it is first necessary to estimate the current management profile as this indicates the starting position on which future targets can be based. The management profile presented in Table 18, based on the management data available through the WDI has been used as a starting point along with data presented in Table 6.

4.3 However since waste identified as undergoing treatment or transfer may go on for recycling. landfill or energy recovery so the principal management types considered are those that would represent a final fate. That is:

- landfill and energy recovery/combustion
- composting, anaerobic digestion and landspreading.
- liquid waste treated

The difference between the sum of the above and the baseline value has been taken to represent the tonnage that went on for recycling from permitted facilities.

Landfill/ Energy Recovery

4.4 As shown in Table 18, just over 100,000 tonnes of C&I waste arising in Lincolnshire was sent to landfill. In addition, an estimated 77,700 tonnes was sent to energy recovery and combustion as biomass.

Composting & land spreading

4.5 According to Table 6, 18,250 tonnes of C&I waste attributed to Lincolnshire was managed at permitted composting facilities. When this is added to the 6,803 tonnes of biodegradable waste that went to anaerobic digestion and 1,749 tonnes that went to recovery to land that gives a total of c25,000 tonnes.

Treatment to sewer

4.6 A significant tonnage of waste is liquid which requires treatment and is not suitable for recycling. Table 6 shows that 77,119 tonnes of liquid waste of C&I origin from Lincolnshire was managed at two sites in Lincolnshire. In addition 75,040 tonnes of aqueous liquid waste was managed at the Scunthorpe Sewage Treatment plant located in North Lincolnshire. This waste will undergo treatment with the majority being discharged to sewer.

4.7 Bringing the actual data into a management profile while holding the baseline value at the updated level, and assuming that all waste managed through out of county WTS ultimately ends up being recycled/reused gives the values shown in Table 20 below.

Table 20: Computed C&I Waste Management Profile (order inverted) ("remainder" computed)
Source: Table 6 &18

Route	Tonnes	%
Total Arisings	**730,000**	**100%**
Landfill	103,300	14%
Other Recovery (EfW/biomass)	77,700	11%
Composting	25,000	3%
Treatment to sewer	152,100	21%
Recycling and Reuse (remainder)	370,000	51%

4.8 Table 20 shows that the recycled/ reused/ composting rate stands at 54%, while Other Recovery (EfW and Combustion as biomass) stands at 11% and landfill stands at 14%. This compares with values reported in the Updated WNA 2017 for 2015/16 of 47% recycling/composting, 14% land recovery, 2% energy recovery and 17% landfill, suggesting that while recycling/composting has increased by 7%, some tonnage formerly managed through landfill has now switched to Other Recovery. It should be noted that the WNA Update 2017 baseline profile does not add up to 100%.

Waste Management Targets

4.9 Having established an existing management profile, the next step is to consider what management profile may be desirable and achievable and therefore what waste management targets ought to be set in the Plan to achieve that management profile.

4.10 The WNA Update 2017 considered targets for 2020 and 2031. The 2031 targets are displayed in Table 21 below.

Table 21: Targets for C&I Waste Management for Lincolnshire for 2031 (Update WNA 2017)

Stream Component	Management Route	Scenario: Baselline[14]	Scenario: Med Recycled	Scenario: Max Recycled
Commercial	Recycling/composting	54%	60%	65%
Commercial	Other Recovery	2%	35%	25%
Commercial	Remainder to Landfill	24%	5%	10%
Industrial	Recycling/composting	42%	60%	65%
Industrial	Recovery to Land	25%	11%	11%
Industrial	Other Recovery	2%	24%	15%
Industrial	Remainder to Landfill	11%	5%	9%

4.11 Given this update is not disaggregating between components of the stream, the rates set out in Table 21 have been converted into a composite rate applying the breakdown in arisings presented in the 2017 WNA update. This gives composite values presented in Table 22 below.

Table 22: Composite Targets for C&I Waste Management for Lincolnshire for 2031 (Update WNA 2017)

Management Route	Scenario: Baselline[15]	Scenario: Med Recycled	Scenario: Max Recycled
Recycling/composting	47%	60%	65%
Land Recovery	14%	6%	6%
Other Recovery	2%	29%	19%
Remainder to Landfill	17%	5%	9%
Other	20%	0%	0%

[14] Values do not add to 100%
[15] Values do not add to 100% hence addition of 'Other' category.

Circular Economy Package

4.12 There are no national government targets for the management of C&I waste. However the recently adopted EU Circular Economy package, to which the UK government has confirmed its commitment[16], includes the following targets for municipal waste:

- 55% recycled by 2025; 60% recycled by 2030 and 65% recycled by 2035; and
- 10% limit of landfilling by 2035.

Given that municipal waste includes LACW and waste of a similar nature and it has been estimated that up to 60% of commercial waste could fall within that definition, the targets would apply to a significant proportion of C&I waste arising in Lincolnshire. The WNA 2017 Update determined the commercial component of the waste stream to be 43%. So this suggests the following tonnage may be affected by 2035:

- 760,500 x 43%=327,000 tonnes commercial waste component.
- 327,000 tonnes x 60% = 196,200 tonnes commercial waste classed as municipal.
- 196,200 tonnes x 65% = 127,500 tonnes commercial municipal waste to be recycled by 2035 equating to 17% of total predicted C&I waste arisings. and;
- no more than 19,600 tonnes commercial municipal waste sent to landfill by 2035. This equates to 2.6% of total predicted C&I waste arisings.

4.13 Given the current management profile shown in Table 20 and the composite targets presented in Table 22 for 2031 and taking the targets in the circular economy package into account Table 23 below sets out the proposed targets. It should be noted that these targets do not mirror those proposed for LACW due to the differing composition of C&I waste.

[16] Circular Economy Package policy statement Defra 30 July 2020
https://www.gov.uk/government/publications/circular-economy-package-policy-statement/circular-economy-package-policy-statement

Table 23: Proposed Targets for C&I Waste Management for Lincolnshire in Milestone Years

(2020 and all Treatment to Sewer values from Table 20)

Route	2020	2025	2030	2035	2040	2045
Recycling/composting	54%	60%	65%	70%	75%	75%
Other Recovery	11%	7%	5%	4%	2.5%	2.5%
Remainder to Landfill	14%	12%	10%	5%	2.5%	2.5%
Treatment to sewer aka land recovery [17]	21%	21%	21%	21%	21%	21%

4.14 The proposed targets have been arrived at as follows:

- Recycling: Circular Economy targets brought forward by five years reflecting ambition of WNA Update 2017, reaching a ceiling of 75% by 2040;
- Other Recovery: Falling on the basis that focus should be on moving waste to recycling/composting which sits further up the waste hierarchy , then taking the remainder after recycling target and landfill diversion trajectory is met.
- Landfill: Working back to give a steady year on year decline to achieve the 2035 target of 10% for the municipal component of the stream, bottoming out at 2.5% in 2040 onwards. Early years reflects the relatively ready availability of non-inert landfill capacity in Lincolnshire.
- Treatment: remains constant throughout the plan period on the basis of the nature of the waste. If some of the liquids managed through that route can be diverted to land, this would not have any implication on capacity requirement and plan provision.

[17] Taken to be synonymous as both relate to the management of liquids or sludges. .

5 Projected Waste Management Requirements

5.1 Applying the management targets presented in Table 23 to the preferred forecast gives the following management requirements for the forecast milestone years.

Table 24: C&I Waste Management Requirements Derived by Applying Targets to Updated Forecast at Milestone years (tonnes) (rounded)

	2025	2030	2035	2040	2045	Peak Requirement Difference / Cumulative Requirement (tonnes)
Recycling/organic t'ment	444,000	487,650	532,423	578,340	586,336	586,336
Other Recovery	51,800	37,512	30,424	19,278	19,545	51,800
Remainder to Landfill	88,800	75,023	38,030	19,278	19,545	1.48M
Treatment to sewer aka land recovery[18]	155,400	150,046	159,727	154,224	156,356	159,727

5.2 Table 24 indicates the following peak capacity requirement for the Plan period:

- 586,400 tpa of recycling/organic treatment; and
- 51,800 tpa Other Recovery

In addition a cumulative capacity requirement c1.48Mt of non inert landfill capacity.

5.3 Comparing the peak management requirement presented in Table 24 with the 2019 profile in Table 20 gives a management difference for the forecast period:

- an increase of 190,000 tpa of waste managed through recycling/organic treatment by 2045; and
- a fall of 26,000 tpa from 2019 for waste managed through Other Recovery in 2025 reducing to 20,000tpa 2040 onwards

[18] Taken to pick up difference between forecast total and other management routes due to rounding of % values.

Provision for recycling/composting

5.4 Provision for recycling can be taken to mean provision of waste management facility capacity to sort materials through a Materials Recycling Facility (MRF). However where materials are separated at source the facility requirement may essentially constitute a transfer station where source separated materials (e.g. paper, plastic) are stored and bulked up in bays prior to onward bulk delivery to a reprocessor. Given the general uneven distribution of reprocessors such as glass melt works, or paper mills around the country the key is for bulking points to be available locally to maximise transport efficiencies. It should also be noted that local provision of MRFs has declined with concentration of capacity at more cost effective sub-regional facilities due to greater technological complexity of sorting associated with achieving a higher quality recyclate. Hence it may not be necessary for additional provision to be made for such capacity within Lincolnshire. Rather a need for additional recycling capacity may be met by existing waste transfer facilities in Lincolnshire that offer bulking capacity for onward management at reprocessing site located outside Lincolnshire.

5.5 In contrast to this, organic waste treatment does require specific facilities. Hence additional consideration has been given to what the management capacity requirement might be. The C&I waste stream has been assessed to contain up to 13% organic waste[19]. Given that the Government committed to introduce separate food waste collections for households and businesses by 2023 in the Resources and Waste Strategy, it can be assumed that all biowaste within the C&I stream would be effectively captured for separate treatment by 2023/4. This then yields the management capacity requirements for the recycling/composting component shown in Table 25.

Table 25: Management Requirement with Separate Biowaste Collection at Milestone Years (tonnes) (rounded)

2020 entries are actuals for 2019

	2020	2025	2030	2035	2040	2045
Organic Treatment	25,000	96,200	97,500	98,900	100,250	101,500
Recycling	370,000	347,800	390,000	433,500	478,000	484,700
Total (Table 24)	395,000	444,000	487,500	532,400	578,250	586,200

[19] *Commercial and Industrial Waste Survey 2009: Final Report*, Defra May 2011,

5.6 Table 25 shows the peak organic waste treatment capacity requirement would be 101,000tpa at the end of the forecast period with an initial peak of c96,000 in 2025.

Conclusion

5.7 The combined effect of the capacity adjustments on the projected management requirements for C&I waste forecast to arise in Lincolnshire is presented in Table 26 below.

Table 26: Residual Waste Capacity Requirement for C&I Waste at Plan Milestone years (tonnes) (rounded)

	2025	**2030**	**2035**	**2040**	**2045**	**Peak Requirement Difference / Cumulative Requirement (tonnes)**
Organic Treatment	96,200	97,500	98,900	100,250	101,500	101,500
Recycling	347,800	390,000	433,500	478,000	484,700	484,700
Other Recovery	51,800	37,512	30,424	19,278	19,545	51,800
Remainder to Landfill	88,800	75,023	38,030	19,278	19,545	1.48M
Liquid Treatment	155,400	150,046	159,727	154,224	156,356	159,727

5.8 The landfill requirement of just under a million and half tonnes over the forecast period 2020-2045 arises as shown in Table 27 below.

Table 27: Predicted Non Inert Waste Landfill Requirement for C&I Waste over forecast period (tonnes) (rounded)

Year	Tpa	Tonnes Cumulative
2020	103,300	103,300
2021	100,883	204,183
2022	98,466	302,649
2023	96,050	398,699
2024	93,633	492,332
2025	88,800	581,132
2026	86,045	667,177
2027	83,289	750,466
2028	80,534	831,000
2029	77,778	908,778
2030	75,023	983,801
2031	67,625	1,051,426
2032	60,226	1,111,652
2033	52,827	1,164,479
2034	45,429	1,209,908
2035	38,030	1,247,938
2036	34,280	1,282,218
2037	30,529	1,312,747
2038	26,779	1,339,526
2039	23,028	1,362,554
2040	19,278	1,381,832
2041	19,331	1,401,164
2042	19,385	1,420,548
2043	19,438	1,439,986
2044	19,491	1,459,477
2045	19,545	1,479,022