Gloucestershire Waste Management, Need & Infrastructure Capacity Assessment 2022

Management Requirements for Construction, Demolition & Excavation Waste in Gloucestershire to 2041

Report: Final Issue

Version: 2.0

Issued: June 2024

BPP Consulting Document Control

Project: Gloucestershire Waste Management, Need & Infrastructure Capacity Assessment 2022

Report: Management Requirements for Construction, Demolition & Excavation Waste in Gloucestershire to 2041

Version Description: Final Issue

Version No.: 2.0

Date: 14.06.2024

Version No.	Version Description	Author	Date	Reviewed	Date
1.0	Draft for Client review	Alan Potter (Partner)	21.11.2022	*Robin Drake (Client Reviewer)*	*10.01.2024*
1.1	Post Client Review	Ella Mills (Data Analyst)	11.01.2023	Alan Potter (Partner)	11.01.2023
2.0	Final Issue	Ella Mills (Data Analyst)	14.06.2024	Alan Potter (Partner)	14.06.2024

Table of Contents

Table of Tables

Table of Figures

Abbreviations

AD	Anaerobic Digestion
C & I	Commercial & Industrial Waste
C, D & E / CDEW	Construction, Demolition & Excavation Waste
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EEFM	East of England Forecasting Model
EfW	Energy from Waste
EWC	European Waste Catalogue
GVA	Gross Value Added
HWRCs	Household Waste Recycling Centres
LACW	Local Authority Collected Waste
MRS	Metal Recycling Site
MRF	Material Recycling Facility
NSIP	Nationally Significant Infrastructure Projects
PPG	Planning Practice Guidance
RDF	Refuse Derived Fuel
SWMP	Site Waste Management Plans
WDF	WasteDataFlow
WDI	Waste Data Interrogator
WMNICA	Waste Management Need and Infrastructure Capacity Assessment
WPA	Waste Planning Authority
WTS	Waste Transfer Station

Glossary of Terms

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 and metal.
Anaerobic Digestion	A process to manage organic matter including green waste and food waste broken down by bacteria in the absence of air, producing a gas (biogas) and nutrient rich solid or liquid (digestate). The biogas can be used to generate energy either in a furnace, gas engine, turbine or to power vehicles, and digestate can be applied to land as a fertiliser.
Bio waste	Waste that can break down over time due to natural biological action/processes, such as food, garden waste and paper.
Commercial Waste	Waste from factories or premises used for the purpose of trade or business, sport, recreation or entertainment.
Construction, Demolition & Excavation Waste	Waste arising from the building process comprising demolition and site clearance waste and builders' waste from the construction/demolition of buildings and infrastructure. Includes masonry, rubble and timber.
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 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.
European Waste Catalogue (EWC)	Comprehensive listing of wastes divided into 20 chapters, most of which are industry-based, although some are based on materials and processes. Each waste type is assigned a unique six-digit code. Otherwise referred to as List of Waste (LoW).
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 and hedge trimmings, from domestic and commercial sources suitable for composting.
Hazardous Waste Landfill	Sites where hazardous waste may be disposed by landfill. This can be a dedicated site or a single cell within a non-hazardous landfill, which has been specifically designed and designated for depositing hazardous waste.
Hazardous Waste	Waste requiring special management under the Hazardous Waste Regulations 2005 due to 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 characteristics of the waste.
Household Waste	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". along with waste from street sweepings, and public litter bins.
Incineration	The controlled combustion of waste. Energy may also be recovered in the form of heat (see Energy from Waste).

Industrial Waste	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).
Local Authority Collected Waste	Waste collected by or on behalf of a local authority. Includes household waste and business waste where collected by a local authority and non-municipal fractions such as construction and demolition waste delivered to HWRCs. LACW is the definition used in statistical publications, which previously referred to municipal waste.
Mass Balance	Method of assessing the quantity of waste that may be converted to recycled aggregate by comparing inputs and outputs for sites reporting through the WDI.
Materials Recycling Facility (MRF)	A facility for sorting recyclable materials from the incoming waste stream.
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 extracted from the ore. Management subject to control through EU Directive 2006/21/EC.
'Next step' Site	Some waste to intermediate sites may not undergo any processing, thus are reported as leaving the site leave under the same EWC and are accounted for again at the 'next step' site where it is to be managed.
Non-Hazardous Waste 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.
Recovery	Subjecting waste to processes that recover value including recycling, composting or thermal treatment to recover energy.
Recycling	The reprocessing of materials extracted from the waste stream either into the same product or a different one.
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 Waste Local Plan to which this study relates. In this case the county of Gloucestershire.
Waste Planning Authority	The authority responsible for planning for waste within a specific administrative area. In this case Gloucestershire County Council
Waste Transfer Station	A site to which waste is delivered for sorting or baling prior to transfer to another place for recycling, treatment or disposal.

1. Introduction

Gloucestershire County Council (GCC) has contracted BPP Consulting to produce the Gloucestershire Waste Management Need and Infrastructure Capacity Assessment (WMNICA) 2022. This is with the intention of informing a review of the Gloucestershire Waste Core Strategy (adopted November 2012), which is to be updated to cover a Plan period to 2041.

The WMNICA consists of the following documents:

1. Local Authority Collected Waste - Assessment of Management Requirements to 2041;
2. Commercial & Industrial Waste - Assessment of Management Requirements to 2041;
3. Construction, Demolition & Excavation Waste - Assessment of Management Requirements to 2041;
4. Hazardous Waste - Assessment of Management Requirements to 2041;
5. Scoping Review of Other Waste Streams;
6. Review of Strategic Waste Flows; and
7. An Overview Report.

This report is concerned with updating the Construction, Demolition and Excavation (C, D & E) waste baseline for 2021 and assessing its projected management requirements to 2041.

1.1. Principal Data Sources

The principal data sources used to generate this WMNICA are as follows:

Waste Data Interrogator

Operators of all sites permitted to manage waste submit quarterly returns on the quantities, types and origin of waste received and, where applicable, destination of waste removed at their sites. These returns are collated by the Environment Agency (EA) and are included in a national database known as the Waste Data Interrogator (WDI). This is released approximately nine months after the end of the calendar year to which the data relates. The 2021 WDI (version 3 released Jan 2023) consisting of data for the calendar year 2021 is the most current version available at the time of writing.

Hazardous Waste Interrogator

Producers and managers of hazardous waste must notify the EA (which, depends on which part of the UK) of movements of waste classed as hazardous. This data is collated and reported in the Hazardous Waste Data Interrogator (HWI). Data is currently reported down to receiving local area rather than by receiving site. The HWI 2021 was released in September 2022.

Recycled Aggregate Survey Results

GCC as Mineral Planning Authority produces an annual Local Aggregate Assessment (LAA) which includes undertaking an annual monitoring survey for recycled aggregates sold at fixed sites within Gloucestershire. This data has been referenced in the assessment of the quantity of Plan area C, D & E waste converted into recycled aggregate, alongside use of the WDI 2021.

Exemption Register

Some waste operations are exempt from needing an environmental permit, thus are not required to submit returns to the EA. However, the number of exemptions registered in a Plan area can be established through the Environment Agency held exempt register. Specific to C, D & E waste is the 'U1[1]' exemption which can then be used alongside an estimation of quantity of waste managed under different exemptions in the WRAP 2013 report[2].

[1] The U1 permitting exemption covers the use of limited tonnages of specified inert waste in construction.

[2] Waste Resources Action Programme (WRAP), 2013, *Review of the Factors Causing Waste Soil To Be Sent To Landfill; 2007 to 2011*

1.2. Advice on Data

The principal source of advice with respect to the use of data to inform production of a Plan evidence base is the national Planning Practice Guidance (PPG) available at https://www.gov.uk/guidance/waste. This states that:

"*Assessing waste management needs for Local Plan making is likely to involve:*

- *understanding waste arisings from within the planning authority area, including imports and exports*
- *identifying the waste management capacity gaps in total and by particular waste streams*
- *forecasting the waste arisings both at the end of the period that is being planned for and interim dates*
- *assessing the waste management capacity required to deal with forecast arisings at the interim dates and end of the plan period."*

Paragraph: 022 Reference ID: 28-022-20141016

It includes a section entitled "Using data to monitor and forecast waste needs", which articulates the following principles, should waste planning authorities adopt, when using data to plan for the management of waste arising in their respective administrative i.e. Plan area:

- *Make clear assumptions on how data were handled, as well as their impact (including on forecasting)*
- *Provide data to an appropriate level of significance, based on their explicit assumptions. In practice, data quoted to more than 2 or 3 significant figures will not be helpful and spurious accuracy stemming from precise figures should be avoided*
- *Plan for a range of each type of waste rather than a specific single figure."*

Paragraph: 036 Reference ID: 28-036-20141016 Revision date: 16 10 2014

1.3. Data Presentation

In order to respect the need to avoid "spurious accuracy", the following approach has been taken:

1. Where actual tonnage data has been accessed, this has been used in the computations.
2. Where data has been subject to computation, this has been included to 3 sf. Final values discussed in the text are rounded to the nearest 500.
3. Where percentages have been used to generate data, the percentages are presented as whole numbers, however the computations actually use the full value. This means that values presented may not always precisely correspond to the values computed when applying the percentage value presented in this report.
4. A threshold of >500 tonnes has been applied to certain computations.

2. Estimating C, D & E Waste Arisings Baseline

2.1. Introduction

This section of the report is concerned with estimating arisings of Construction, Demolition and Excavation (C, D & E) waste in Gloucestershire in 2021. From this, future arisings can be forecast for which appropriate targets can be proposed. The current C, D & E waste management capacity is then assessed, with a view to identifying potential future capacity needs for which the Waste Local Plan may need to provide.

2.2. Definitions and Context

The Gloucestershire Waste Core Strategy defines Construction and Demolition (C&D) waste as follows:

"Controlled waste arising from the construction, repair, maintenance and demolition of buildings and structures" (Glossary of Terms).

In the absence of a local definition of excavation waste, the following definition has been applied:

"Unwanted material resulting from excavation activities such as a reduced level dig and site preparation and levelling, and the excavation of foundations, basements, tunnels, and service trenches, typically consisting of soil and stones." [3]

Currently there is no requirement on businesses to submit records of waste produced and hence estimating quantities of C, D & E waste arisings for a specific Plan Area is a challenge. Two different approaches can be taken to estimate a baseline for C, D & E waste as follows:

- **'Point of production'** method which uses data based on the construction activity within an area and applying waste production factors (related to the different types of activity such as new build and refurbishment) derived from Site Waste Management Plans (SWMP). Construction activity statistics data is no longer produced at a sub-regional level and so it is not possible to reliably replicate this method.
- **'Point of management'** using data related to C, D & E waste managed. This relies on records of waste delivered to, and removed from, permitted waste management facilities. The EA collates this data submitted by operators in its WDI on an annual (calendar year) basis. This data is supplemented by data for wastes managed at unpermitted sites that don't report through the WDI, such as the EA's exemption register and recycled aggregate producers.

[3] Construction and Demolition Waste Management in United Kingdom, BIO by Deloitte (2015)

3. Methodology

The national methodology for estimating annual waste generation from the C, D & E Sectors for England, (the 'Point of Management' method), uses information from four key management routes:

(1) Waste managed at transfer and treatment facilities (reporting through the Agency WDI)

(2) Waste managed by landfill (reporting through the Agency WDI)

(3) Waste managed under exemptions (derived from an EA register and estimated tonnage managed)

(4) Waste recycled as aggregate (from a national estimate prepared by the Mineral Products Association)

In order to assess C, D & E waste arisings in Gloucestershire, the national methodology has been modified to reflect local circumstances, in particular the following modifications have been made:

- Values for Plan area waste classed as C, D & E waste managed through permitted sites in 2021 as reported in the WDI with steps taken to avoid possible double counting and capture wastes that may have been reclassified as a consequence of processing through intermediate sites.
- The population of exempt sites registered in Gloucestershire has been established through the EA held exempt register. Then the estimated value for the quantity of waste managed at the key exemption managing C, D & E waste ('U1') from a government funded study[4] was applied.
- The quantity of waste converted into recycled aggregate has been based on responses to an annual survey of recycled aggregate producers conducted by GCC as part of the production of the Gloucestershire LAA cross referenced to the WDI 2021 as per the method included in the recently released national guidance developed by Aggregate Working Parties in England for estimating recycled aggregate production[5], rather than from national estimates produced by the Mineral Products Association.

For the purposes of this exercise C, D & E waste has been taken to include the following categories of waste as per the List of Waste/European Waste Catalogue:

(1) Chapter 17 (Construction & Demolition Waste)

(2) 19 12 09 (minerals such as sand, stones)

(3) 20 02 02 (soil and stones).;

A check has also been undertaken for any waste classified under EWC 19 13 as this includes remediated soils which should be included in the C, D & E waste arisings total[6].

[4] See footnote 2

[5] *Recycled Aggregates Data: Guidance on Assessing Levels of Recycled Aggregates* (May 2022)

[6] Note no significant amount of waste of this type was reported as arising in Gloucestershire in the WDI 2021

3.1.1. Inputs to permitted waste management facilities

Step 1: Calculate the tonnage of C, D & E waste from Gloucestershire in the Environment Agency WDI sent to permitted sites.

The total amount of C, D & E waste from Gloucestershire managed at permitted sites (located within and beyond Gloucestershire) reporting through the WDI in 2021 was c1,010,000 tonnes. This comprised c880,000 tonnes managed within Gloucestershire, and c130,500 tonnes managed outside Gloucestershire. The breakdown and management routes are shown in Table 1 below.

Table 1: Management of C, D & E Waste from Gloucestershire through Permitted Sites (tonnes)

Source: WDI 2021

	Landfill			Recovery to Land	Metal Recycling Sites	Transfer	Treatment	Grand Total
	Haz	Non-Inert	Inert					
Managed within Gloucestershire	902	244,020	39,282	298,915	13,267	178,230	105,218	**879,832**
Managed outside Gloucestershire	1,889	6,815	14,303	13,242	2,258	5,461	86,409	**130,377**
Totals	**2,790**	**250,834**	**53,585**	**312,157**	**15,525**	**183,690**	**191,627**	**1,010,209**

Step 2: Deduct EWC codes relating to hazardous component of C, D & E waste

Requirements for management of hazardous waste arising in Gloucestershire are accounted for in a separate report[7]. Therefore, the hazardous component of the C, D & E waste stream is deducted to avoid double counting. A total of 24,903 tonnes was identified as hazardous waste which when deducted gives a revised total of c985,500 tonnes. The revised values are shown in Table 2.

Table 2: Management of non-hazardous C, D & E Waste from Gloucestershire through Permitted Sites (tonnes)

Source: WDI 2021

	Landfill[8]		Recovery to Land	Metal Recycling Sites	Transfer	Treatment	Grand Total
	Non-inert	Inert					
Managed within Gloucestershire	244,020	39,282	298,915	13,267	177,649	105,215	**878,347**
Managed outside Gloucestershire	5,417	13,986	13,242	2,258	5,263	66,793	**106,959**
Totals	**249,436**	**53,268**	**312,157**	**15,525**	**182,912**	**172,008**	**985,306**

Step 3: Quantify waste going to its final fate or leaving the plan area

[7] BPP Consulting Gloucestershire WMINCA Hazardous Waste Final Version v1.2 05.06.2024.

[8] A check of all inputs to Gloucs hazardous landfill revealed no non-haz/inert waste from anywhere was reported in the WDI 2021.

Step 3a. C, D & E waste from Gloucestershire managed at permanent deposit sites

As inputs to Landfill and Recovery to Land involve the permanent deposit of the waste, they are regarded as final points of management (or fate), so these values are taken as final as follows: 302,704 (combined landfill values in Table 2) + 312,157 (Recovery to Land value from Table 2) = 614,861 tonnes. Table 3 shows the Gloucestershire C, D & E baseline 2021 arising running total as a cumulative value.

Table 3: Non-hazardous (including inert) C, D & E waste from Gloucestershire – Step 3a (tonnes)

Component	Value	Cumulative Total
Permanent Deposit	614,861	**614,861**

Step 3b. C, D & E waste from Gloucestershire managed at intermediate sites outside Gloucestershire

As shown in Figure 1 overleaf, waste from Gloucestershire managed at intermediate sites outside Gloucestershire ceases to be identified as coming from Gloucestershire following receipt at the intermediate management facility ('next step' site).

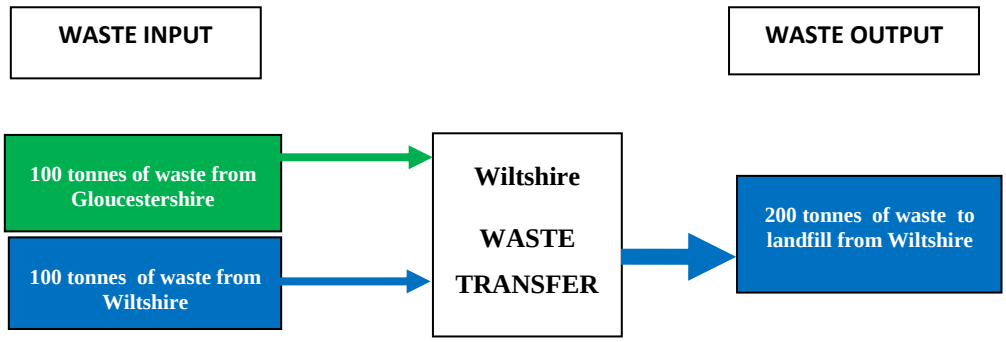

Figure 1: Schematic of how flows of Gloucestershire waste to sites outside Gloucestershire are reported in the WDI

Hence the tonnage managed at intermediate sites outside Gloucestershire is also taken to be a 'final value' as follows:

2,258 (out of Plan area MRS from Table 2) + 5,263 (out of Plan area transfer from Table 2) + 66,793 (out of Plan area treatment from Table 2) = 74,314 tonnes.

Table 4 shows the C, D & E waste baseline arising running total is now c689,000 tonnes.

Table 4: Table 3 plus Gloucestershire waste managed at intermediate sites outside of Gloucestershire (tonnes) – Step 3b

Component	Value	Cumulative Total
Permanent Deposit	614,861	614,861
Managed out of Gloucestershire	74,314	**689,175**

Step 4: Calculate the tonnage of C, D & E waste from Gloucestershire treated in Gloucestershire that may have been subject to reclassification

Having established the quantity of Gloucestershire C, D & E waste going to a final fate or leaving the county as c689,000 tonnes (Table 4), the quantity of inputs to intermediate sites within Gloucestershire which may be included in the arisings value also needs to be accounted for.

This value needs to be further interrogated to ensure that it does not:

1. Double count inputs to intermediate sites in Gloucestershire that subsequently get managed at a 'next step' site as Gloucestershire waste and hence over report arisings; nor,
2. misses C, D & E waste that may have been reclassified following processing through these sites and hence under-report arisings This is because waste leaving an intermediate site may be reclassified as a waste from a waste management process (the relevant waste chapter is 'Chapter 19') rather than Chapter 17. This is explained by the following example:

'Intermediate' Site 1 in Gloucestershire receives 100 tonnes of Gloucestershire C, D & E waste.

Following treatment e.g. sorting and some processing, the 100 tonnes gets split into:

- 25 tonnes of soil (classed as Chapter 17 waste) which goes for Recovery to Land at Site 2; The 25 tonnes of soil is therefore also recorded at the point of input to the Recovery to Land site as waste arising in Gloucestershire (regardless of whether Site 2 is within or outside Gloucestershire).
- 50 tonnes of recycled aggregate, sold directly for use as an aggregate; This is counted under the recycled aggregate value obtained via the annual local production survey for the Local Aggregates Assessment but not explicitly in the WDI as it ceases to be waste;
- 25 tonnes of waste classed as Chapter 19 waste due to the incoming waste having been processed and then reclassified as 'waste from waste management processes'.

This is illustrated in Figure 2 below:

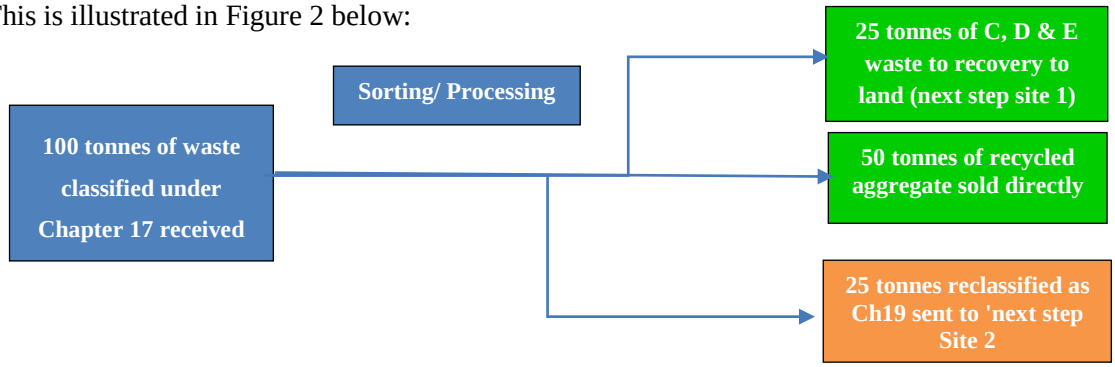

Figure 2: Schematic of intermediate site outputs to track Gloucestershire C, D & E waste fate

Therefore, that element of Chapter 19 waste that came from intermediate sites in Gloucestershire that may have originated from C, D & E waste from Gloucestershire needs to be estimated. This is done by identifying each intermediate site that received C, D & E waste from Gloucestershire that also reported Chapter 19 waste as an output.

The proportion of the Chapter 19 output that might be attributed to the input Gloucestershire C, D & E waste was determined as follows:

1) Did the site have a shortfall between the C, D & E waste received and removed?
2) Did the site have outputs classed under Chapter 19?
3) If yes then the percentage of total inputs attributed to Gloucestershire is applied to the outputs of Chapter 19 to give a Chapter 19 'makeup'.

NB: Where the Chapter 19 output is greater than the shortfall, only the shortfall value is used. Where the shortfall can't be made up this may be taken to indicate that tonnages of C, D & E waste have been converted into recycled aggregate which is not generally declared on the permit waste returns and hence reported in the WDI as it has ceased to be waste.

Applying this method to the Gloucestershire intermediate sites (MRS[9], WTS & waste treatment sites) identified as both receiving C, D & E waste from Gloucestershire and producing Chapter 19 waste in 2021 yields the following:

Q1: 9 intermediate waste sites within Gloucestershire were identified as having a shortfall between the inputs and outputs of C, D & E waste[10] of greater than 500 tonnes[11].

Q2: Of these sites, 3 had net outputs of waste classified as Chapter 19 of over 500 tonnes as shown in Table 5.

Q3: The percentage inputs from Gloucestershire has been applied to the Chapter 19 outputs to give a total Chapter 19 makeup of 23,083 tonnes to be added to the Gloucestershire C, D & E baseline 2021 arising running total as shown in Table 6.

[9] No shortfall over 500 tonnes between CDE inputs and outputs was found for any MRS sites.

[10] It is noted that the method does not capture the possibility of stock piling but given the complexity of the data it is the best attempt at estimating such arisings.

[11] 500 tonnes is taken to be a tonnage regarded as significant for the purposes of this exercise.

Table 5: Intermediate sites within Gloucestershire with a shortfall between CDE inputs <500t also reporting an output of waste under Ch 19

Facility Type	Site + Operator[12]	Shortfall <500t (tonnes)	Net Ch 19 produced (tonnes) *WDI 2021*	% C, D & E waste input from Gloucs	Ch 19 make up (tonnes) **(amber box in Fig 2)** (If net Ch 19>shortfall, then the shortfall value taken. If net Ch 19<shortfall then the net Ch 19 taken) % from PA*
Treatment	Allstone, Allstone Sands Gravels Aggregates Trading Co Ltd	15,222	3,984	100%	3,984
Transfer	Allstone House, Allstone Sands Gravels Aggregates Trading Co Ltd	16,920	9,706	100%	9,706
	Moreton Valence Waste Processing Centre, Smiths (Gloucester) Ltd	74,100	12,860	73%	9,393
				Total	**23,083**

Table 6: Table 4 plus Chapter 19 (Table 5) (tonnes) – Step 4

Component	Value	Cumulative Total
Permanent Deposit	614,861	614,861
Managed out of Gloucestershire	74,314	689,175
Gloucestershire intermediate site Ch 19	23,083	**712,258**

Step 5: Account for C, D & E waste converted into Recycled Aggregate

This section sets out the calculation to quantity C, D & E waste arising in Gloucestershire used to produce recycled aggregate using the method included in the recently released national guidance developed by Aggregate Working Parties in England[13] for estimating recycled aggregate production.

Each year GCC prepares a Local Aggregates Assessment[14] (LAA) which reports how much aggregate is produced and how this relates to the demand for aggregate. In order to establish the contribution made by recycled aggregate to the production of aggregate overall in Gloucestershire, GCC conducts an annual monitoring survey for recycled aggregates sold at fixed sites within Gloucestershire.

The value presented for combined sales of recycled and secondary aggregate production for 2021 in the latest LAA is 226,042 tonnes[15]. However, the LAA value for recycled aggregate production may not correspond directly to C, D & E waste arising in Gloucestershire for the following reasons:

- A proportion of the aggregates will have been produced from C, D & E waste arising from outside Gloucestershire resulting in over-reporting of arisings;

[12] All sites were also found to be producing recycled aggregate from C, D & E input which is accounted for in a later step.

[13] *Recycled Aggregates Data: Guidance on Assessing Levels of Recycled Aggregates* (May 2022)

[14] 10 th Local Aggregates Assessment for Gloucestershire (July 2022)

[15] Note that this is for fixed aggregate recycling facilities only.

- the method includes aggregates produced from secondary aggregates derived from non-C, D & E waste, resulting in over-reporting of arisings.

Therefore, the following steps have been undertaken to arrive at a value of recycled aggregate produced from Gloucestershire C, D & E waste.

The value arrived at in the 2021 LAA for recycled aggregate production has been adjusted for the % inputs attributed to Gloucestershire for those sites that also appear in the WDI. Where they did not appear, the value reported in the LAA survey has been taken in full. For 2021 this gave a revised total of 155,128 tonnes.

One site included in the listing of sites known to be producing recycled aggregate had not responded to the 2021 LAA survey. This site had responded to the previous year's survey and so the previous year's value was sense checked against the WDI 2021 value arrived at using the 'mass balance' method. For this site, the 'mass balance' value was taken to be more representative than the previous year's survey response. Hence the total amount of recycled aggregate produced was taken to be 12,023 tonnes.

Further to this, two sites appeared in the WDI 2021 'mass balance' exercise but were not included in the listing of fixed recycled aggregate production sites provided by GCC. Further inspection revealed that both sites have permission to process recycled aggregate and so the 'mass balance' value was taken. This amounted to a further 14,205 tonnes. When these values are added to the values obtained for the surveyed recycled aggregate production sites (adjusted for Gloucestershire inputs only), it gives a total of 181,356 tonnes. A summary of each site and the method applied is shown in Appendix 1.

This value has been included in the calculation of C, D & E waste arising running total in Table 7. This gives a Gloucestershire C, D & E baseline 2021 arising running total of c893,500 tonnes.

Table 7: Gloucestershire C, D & E waste after Step 5

Table 6 results plus Recycled Aggregates

Component	Value (tonnes)	Cumulative Total
Permanent Deposit	614,861	614,861
Out of Gloucestershire Intermediate	74,314	689,175
In Plan Area Intermediate Chapter 19	23,083	712,258
Recycled Aggregate	181,356	**893,613**

3.1.2. Gloucestershire C, D & E Waste managed at Exempt sites

Step 6: Estimate the quantity of C, D & E waste managed by exempt waste management activities in Gloucestershire.

The national Planning Practice Guidance (nPPG) advises that: "*..when forecasting construction and demolition waste arisings, the following may be relevant:*

- *the fact that a sizeable proportion of construction and demolition waste arisings are managed or re-used on-site, or exempt sites, so it is critical that some provision is made for unseen capacity in this way*." (emphasis added)

Paragraph: 033 Reference ID: 28-033-20141016

Regulations were introduced in 2011 which dramatically reduced the maximum quantities of waste that could be managed by activities for which exemptions, rather than environmental permits, could be relied upon, and so the quantity of C, D & E waste managed through exempt activities has reduced substantially. However, as a quantity of C, D, & E waste is still managed by exempt activities, it is still appropriate to give consideration to the contribution some activities may make to management of this stream, and hence to the calculation of arisings.

Exempt activities registered under Paragraph U1 (use of waste in construction) generally account for the management of the most significant quantities of C, D & E waste by exempt activities. A report produced for WRAP[16] estimated a mean value for the quantity of waste managed by an activity registered under U1 as 600 tonnes.

The following steps ensure that C, D & E waste managed by activities registered under Paragraph U1 is taken into account in the assessment of C, D & E waste arisings in Gloucestershire.

Table 8: Number of activities registered as exempt under paragraph U1 in Gloucestershire 2019 to 2021

	2019	2020	2021	Total	Average
Paragraph U1	95	66	43	204	68

Exemption registrations are valid for 3 years, and hence the total population of exempt activities identified in Table 8 above includes any site registered between January 2019 and December 2021. However, a survey of exempt activities undertaken by Surrey County Council indicated that those registered under paragraph U1 tend to be used on a 'one-off' basis. In theory, it is possible that all the activities registered between January 2019 and December 2021 were utilised in 2021 and so the total number could be used to estimate arisings, however this is considered unlikely and so instead the total number registered was divided by three to generate a mean value of 68 for the number of U1 exempt activities actually active in Gloucestershire in 2021.

From the mean number of exempt activities registered under Paragraph U1, and applying the WRAP value of 600 tonnes per exemption, it is estimated that the total quantity of C, D & E waste managed

[16] WRAP, 2013, *Review of the Factors Causing Waste Soil To Be Sent To Landfill*; 2007 to 2011

by such activities in Gloucestershire in 2021 was 40,800 tonnes. This results in a Gloucestershire C, D & E waste baseline arising running total of c934,500 tonnes in 2021 as shown in Table 9.

Table 9: Gloucestershire C, D & E waste after Step 6

Table 7 plus Exemptions

Component	Value (tonnes)	Cumulative Total
Permanent Deposit	614,861	614,861
Out of Gloucestershire Intermediate	74,314	689,175
In Plan Area Intermediate Chapter 19	23,083	712,258
Recycled Aggregate	181,356	893,613
Exemptions	40,800	**934,413**

Step 7: Account for tonnages not attributed below regional level

The WDI 2021 reports two sites located in the Plan area as having received inputs of C, D & E type waste not coded below regional level. A factor has been applied to the unattributed C, D & E waste based on the percentage of total C, D & E waste inputs already attributed to Gloucestershire received at each of these sites where available, outputs shown in Table 10.

Table 10: C, D & E Waste inputs (>500t) to Plan area sites not attributed below regional level

Site & Operator	Tonnes Received uncodeable below Regional Level	% of total C, D & E inputs actually from Gloucs	Derived Value (tonnes)	Notes
Canal Works, Bendall Metal Recycling Ltd	16,290	40%	6,595	
The Docks, European Metal Recycling	5,454	0%	5,454	Effectively coded inputs to another WPA and unattributed inputs to a different region. Uncodeable taken to be from Gloucs due to site location not being close to county boundary.
		Total	**12,049**	

This gives a total unattributed waste tonnage attributed to the Plan area of 12,049 tonnes. This value has been included in the Gloucestershire C, D & E baseline 2021 arising running total in Table 11. This results in a total value for C, D & E waste production in Gloucestershire in 2021 of c946,500 tonnes.

Table 11: Gloucestershire C, D & E waste after Step 7

Table 9 plus unattributed

Component	Value (tonnes)	Cumulative Total
Permanent Deposit	614,861	614,861
Out of Gloucestershire Intermediate	74,314	689,175
In Plan Area Intermediate Chapter 19	23,083	712,258
Recycled Aggregate	181,356	893,613
Exemptions	40,800	934,413
Unattributed	12,049	**946,463**

4. Forecasting Future C, D & E Waste Growth

The nPPG states when looking to forecast C, D & E waste:

> "*Waste planning authorities should start from the basis that net arisings of construction and demolition waste will remain constant over time as there is likely to be a reduced evidence base on which forward projections can be based for construction and demolition wastes."*

Hence the starting point for any assessment is that there will be no growth in arisings in the forecast period. This was the approach taken in Gloucestershire's Waste Core Strategy (2010) which assumed a zero-growth rate for the Plan period.

An assessment of house building and infrastructure set out in the Gloucestershire LAA 2020 indicates the following:

> *"There is little doubt from the scale and ambition of infrastructure projects over the coming years either across Gloucestershire or within its sphere of influence, there will be a demand placed on locally-sourced aggregate. However, there is no evidence to suggest the delivery of these projects warrants an alternative demand scenario for the county as is currently being envisaged and planned for."* [17]

An assessment of the impact of the Nationally Significant Infrastructure Projects (NSIP), on C, D & E waste arisings is presented in Table 12.

Table 12: Nationally Significant Infrastructure Projects

NSIP	Impact on C, D & E waste arisings RAG assessment	Notes
A417 Missing Link		Construction to take place 2023 – 2026. Could generate high volumes of excavation material. However, the preliminary appraisal for the project suggests that the proposed 'cut-and-fill' operation will overall generate a deficit and not a surplus of material, necessitating a requirement for imported fill rather than export excavation waste to landfill or recovery elsewhere.
M5 Junction 10 Improvements Scheme		Construction to take place 2024 – 2025

While C, D & E waste arisings will vary from year to year according to when the specific projects listed in Table 12 proceed and whether such projects are located on previously developed or greenfield land, it is considered that overall, a zero-growth rate is justified[18].

[17] It is noted that the 'demand scenario' is based on projecting forward the average of the last 10-years of aggregate sales to which evidence does not suggest that the level of development will change significantly.

[18] Previous WNA did not include text on any forecast so it has been assumed a zero growth rate was applied.

5. Profiling the Existing C, D & E Waste Management Methods

5.1. Backfilling of mineral workings

The WDI allocates tonnages to sites by permit category granted by the Environment Agency. Where a site involving the permanent deposit of waste to land has been determined by the Agency to not qualify for a recovery to land environmental permit under its guidance, it will be classed as a landfill. In that situation inputs to sites involving backfilling of mineral workings are classed against the landfill category in the WDI. However, given that activities such as backfilling of mineral workings are classed as recovery according to Government guidance on the waste hierarchy, and sites where this takes place may be classed as a landfill for permitting purposes, there can be a mismatch between the values shown as having gone to landfill and the waste hierarchy orientated targets that might be set out in the Waste Local Plan. Table 13 sets out how the datasets for those sites have been disaggregated to distinguish a disposal to landfill value and recovered value (assuming that all inert waste have actually been used in restoration or to meet operational needs and therefore do not represent disposals).

Table 13: Allocation of Quantities of reported C, D & E waste from Gloucestershire to Management Categories in 2021

Excluding 19 12 12 as it is addressed in Table 14

Non-Inert Landfill (Table 2)		Inert Landfill (Table 2)	Recovery to Land (Table 2)	Exemptions (Table 9)
Non-inert	Inert	53,268	312,157	40,800
3	246,741			
Disposed to Landfill	**Assumed to be Recovered**			

Table 13 shows that virtually all waste received at non-inert landfill was in fact inert material; mainly soils and stones classed under EWC 17 05 04. Given the relatively low gate fee charged for this material relative to non-inert waste, much of this is likely to be used as restoration material including backfilling of a mineral working so ought to be classed as recovery even though the receiving site has not qualified for a recovery environmental permit.

Table 14 presents the management profile arrived at using the 2021 baseline of c946,500 tonnes.

Table 14: C, D & E Waste Management Profile Actual Data 2021

Route	Purpose	Tonnes	% of

			known
Recycling & Reuse	Recycled Aggregate (Table 7)	181,356	19%
	Subtotal	**181,356**	
Recovery	Exemptions	40,800	69%
	Use of Waste/ Recovery to Land	312,157	
	Inert landfill + inert waste to non-inert landfill	300,009	
	Subtotal	**652,965**	
Non-Inert Landfill	Disposals to non-inert landfill	3	1%
	Chapter 19 outputs (40% to landfill)[19]	11,978	
	Subtotal	**11,981**	
Unknown	Treatment (remainder)	100,161	11%
	Total	**946,463**	

Table 14 gives the following management profile for C, D & E waste arising in Gloucestershire in 2021:

- 19% re-used and recycled;
- 69% recovered in some other way;
- 1% landfilled;
- 11% to treatment (unknown)

5.2. C, D & E Waste Composition

The principal distinction in the C, D & E waste stream in terms of management (and so targets) is between inert and non-inert materials, with a further possible distinction between hard and soft inert materials. By considering what type of material would be suitable for which component of the management profile shown in Table 14 above, it is possible to arrive at an indicative breakdown by material type shown in Table 15. This can inform the setting of appropriate targets as some types of material are only suited to particular types of management method. For example, only hard inert material can be converted into recycled aggregate, and generally material used in backfill will be soft materials such as soils and sub-soils.

[19] Taking the reported fate of 19 12 12 outputs to landfill from the sites listed in Table 5 and adjusting by the % inputs from Gloucs.

Table 15: C, D & E Waste Composition from Management Profile Actual Data 2021

Hierarchy Tier	Management Route	Inert		Non Inert/ Mixed
		Hard	Soft	
Recycling/Reuse	Recycled Aggregate	181,356	0	0
Other Recovery	Exemptions	0	40,800	0
	Use of Waste/ Recovery to Land	0	312,157	0
	Inert Landfill + inert waste to non-inert landfill	0	300,009	0
Disposal	Non-Inert Landfill	0	0	3
	Chapter 19 outputs	0	0	11,978
Unknown	Treatment	0	0	100,161
	Totals	**181,356**	**652,965**	**112,142**
	Breakdown	19%	69%	12%

In the absence of specific data, all waste going to 'Treatment' has been assumed to be non-inert. This gives an overall inert content of 88%, with 12% being non-inert.

6. Management Targets

The revised EU Waste Framework Directive set a minimum target of 70% by weight of non-hazardous Construction & Demolition waste prepared for re-use, recycling and other material recovery by 2020[20].

It should be noted that:

- while backfilling operations using waste to substitute other fill materials may be counted towards the target. i.e. backfilling of mineral workings may be classed as recovery.
- naturally occurring material categorised under EWC 17 05 04 (soil & stones) is excluded from the target. i.e. its use is unconstrained by targets.

The current profile arrived at for 2021 shown in Table 16 shows that an 88% recycling, reuse and other recovery rate is already being achieved in Gloucestershire. This suggests that at least 85% re-use, recycling and other recovery is achievable through the Plan period, if not more, thus a 'floor' of 85% is proposed to be set through to 2041, with a reducing 'ceiling' on landfilling to zero waste to landfill by 2041.

It is noted that the national target is to achieve a 70% construction and demolition (C & D) waste recycling and reuse rate. If the value is adjusted to exclude excavation waste, the recycling rate falls short of the target at 62%.

The remainder is shown to be managed through treatment that may for example reduce the quantity of stone present in trommel fines disposed to landfill (increasing the tonnage of inert material recovered as recycled aggregate). Hence treatment is an intermediate step between recovery and disposal to landfill.

Table 16: Proposed targets (floors & ceilings) for C, D & E Waste Management
Italicised values represent actuals

Component		*2021*	2026	2031	2036	2041
Inert	Recycled Aggregate Recovery to Land inc exemptions and inert landfill (floor)	*88%*	≥85%	≥85%	≥85%	≥85%
Non-inert	Treatment	*11%*	14%	14%	14%	14%
	Remainder to Landfill (ceiling)	*1%*	≤1%	≤1%	≤1%	0%

[20] The UK Government has committed to achieving targets set in the revised Waste Framework Directive even though the UK has now left the EU.

6.1. Projected Management Requirement for Gloucestershire's C, D & E Waste

Applying the management targets in Table 16 to the 2021 baseline value gives the predicted management requirement at each of the Plan Milestone years shown in Table 17.

Table 17: C, D & E Waste Targets Applied to Forecast at Plan Milestone years (tonnes)

Component		*2020*	2026	2031	2036	2041	Diff
Inert	Recycling/ Reuse/ Recovery	*834,321*	804,493	≥804,500	≥804,500	≥804,500	-
Non-inert	Treatment	*100,161*	133,000	133,000	133,000	133,000	+33,000
	Remainder to Landfill	*11,978*	≤10,000	≤10,000	≤10,000	0	-12,000

Table 17 shows management capacity for inert waste will need to remain at least at 804,500 tonnes over the Plan period for the proposed target/floor to be met, while the ability to treat at least c133,000 tonnes of non-inert waste will be required by the end of the Plan period to ensure that the ceiling of zero waste to landfill is met. If the residual component of the C, D & E waste stream goes to landfill in accordance with the targets/ceiling, this represents a cumulative non-hazardous landfill requirement of c155,500 tonnes to the end of the Plan period as shown in Table 18 below. This material is less suited to diversion to EfW due its less combustible nature, but is suited to pre-treatment to reduce its quantity over time.

Table 18: Projected Residual C, D & E Waste Non Haz Landfill Requirement (tonnes)

Year	Tpa	Tonnes Cumulative
2023	10,973	10,973
2024	10,513	21,486
2025	10,025	31,511
2026	9,537	41,048
2027	9,537	50,585
2028	9,537	60,122
2029	9,537	69,658
2030	9,537	79,195
2031	9,537	88,732
2032	9,537	98,269
2033	9,537	107,805
2034	9,537	117,342
2035	9,537	126,879
2036	9,537	136,416
2037	7,629	144,045
2038	5,722	149,767
2039	3,815	153,582
2040	1,907	155,489
2041	0	155,489

Appendix 1: Summary of Recycled Aggregate Production Estimates (tonnes)

Site	Response to LAA 2021	Response to previous years LAA[21]	% inputs from Gloucs	Recycled Aggregate attributed to Gloucs C, D & E waste	WDI 2021 Mass Balance	Preferred Value
Site A	9,000	NA	29%	2,610	-	2,610
Site B	1,228	NA	-	1,288	-	1,288
Site C	30,000	NA	83%	24,900	-	24,900
Site D	15,200	NA	100%	15,200	11,238	15,200
Site E	16,772	NA	79%	13,250	7,500	13,250
Site F	77,183	NA	73%	56,344	47,263	56,344
Site G	3,789	NA	99%	3,751	5,374	3,751
Site H	37,845	NA	100%	37,845	809	37,845
Site I	Nil return	15,500	49%	7,595	12,023	12,023
Site J	Not listed	-	100%		11,929	11,929
Site K	Not listed	-	100%		2,276	2,276
					Total	**181,356**

[21] NA mean pre 2021 survey responses were not considered as 2021 survey result is preferred.