Gloucestershire Waste Management, Need & Infrastructure Capacity Assessment 2022

Management Requirements for Commercial and Industrial Waste in Gloucestershire to 2041

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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
PPG	Planning Practice Guidance
RDF	Refuse Derived Fuel
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).
Landfill Directive	European Union requirements restricting the landfilling of biodegradable

	municipal waste and requiring pre-treatment of all waste to be landfilled and separate disposal of hazardous, and non-hazardous and inert wastes.
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:

The WMNICA consists of the following reports:

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 generating an arising baseline for Commercial and Industrial (C&I) waste 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.

Wastedataflow

Wastedataflow[1] (WDF) is a web-based data entry portal for local authorities to report on local authority waste management arrangements to central Government on a quarterly basis. The data input is used to report on national recycling and landfill diversion performance as well as local authority league tables on recycling rates etc following independent quality checking. While Councils normally report in financial years, as the EA WDI reports for calendar year the data for Gloucestershire covering the four quarters of 2021 has been accessed to ensure comparability between datasets.

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 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 waste management:

- *Make clear assumptions on how data were handled, as well as their impact (including on forecasting)*

1 http://www.wastedataflow.org/

- *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 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 Gloucestershire C&I Waste Baseline Arisings

2.1 Context

There is no requirement on businesses to submit records of waste produced and hence estimating quantities of Commercial and Industrial (C&I) waste arisings for a specific waste planning area such as Gloucestershire, with any degree of accuracy, is a challenge. Two different approaches can be taken to estimate a baseline for C&I waste as follows:

- 'Point of management' using data related to the management of C&I waste. This is primarily based on records of waste delivered to, and removed from, permitted waste facilities submitted by operators to the EA. The EA collates this data in its 'Waste Data Interrogator' (WDI) on an annual (calendar year) basis. This data is supplemented by data for wastes managed at permitted sites that don't report through the WDI. This data now forms the basis for the 'Reconcile' method used to estimate C&I waste arisings at national level[2].
- 'Point of production' using data based on the profile of businesses within an area and applying waste production factors (related to the different business profiles). This method was used in the national survey undertaken in 2009 that informed the previous approach to national estimates[3].

[2] DEFRA 2014, New Methodology to Estimate Waste Generation by the Commercial and Industrial Sector in England as amended by Commercial and Industrial Waste Arisings Methodology Revisions for England October 2018

[3] 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

3. Methodology

The methodology used to estimate an updated baseline C&I waste arisings value (to be used as a starting point for forecasting C&I waste arisings in Gloucestershire) is based on the national 'Reconcile' methodology, adapted to reflect local circumstances. This national methodology considers a number of datasets, in totality, to capture quantities of C&I waste that are managed rather than produced through:

(1) Permitted waste management facilities (reporting through EA WDI which since 2019 includes data for waste sent to Energy from Waste (EfW) plants);

(2) taking into account the proportion sent directly for export outside the UK.

Deductions are made to eliminate:

(3) Non-relevant waste streams such as Agricultural, Mining, Construction, Demolition & Excavation Waste (C, D & E), wastewater, and hazardous waste included in the datasets; and

(4) Local Authority Collected Waste (LACW) reported through WDF.

In summary the methodology applies the following calculation:

C & I waste arising = (Inputs to permitted facilities + inputs to energy from waste + exports) - (C, D & E waste + mining + agricultural + wastewater + hazardous waste + LACW)

For the purposes of estimating the baseline arisings for Gloucestershire C&I waste, the above method has been adapted to reflect a local approach including computations to avoid double counting of waste inputs to 'intermediate' facilities[4] within Gloucestershire as well as interrogation of anomalous values.

Terminology

While this report is concerned with the management of C&I waste arisings it should be noted that waste arising from businesses that is similar in nature and composition to household waste is included under the term 'municipal waste'. National analysis of waste composition studies indicates that a significant proportion of waste generated by businesses not collected by Local Authorities falls within this definition. Most recent estimates for England as a whole found that around 43% of the total C&I waste stream may be waste of a type that falls under the definition of municipal[5] and this may amount to 60% of the commercial waste stream. This means that national targets set for municipal waste encompass both LACW and a significant proportion of the C&I waste stream. LACW and C&I waste may be managed at the same facilities and hence consideration of management requirements have been combined in the subsequent assessment.

4 Intermediate facilities are those where waste does not meet its final fate. 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.

5 National Municipal Waste Composition, England 2017 WRAP January 2020.

3.1.1 Inputs to permitted facilities

Step 1: Waste Data Interrogator quantity of waste from Gloucestershire with deductions to eliminate non-C&I waste streams.

The starting point is to download all data relating to all types of waste identified as coming from Gloucestershire in the Environment Agency Waste Data Interrogator (WDI). This is displayed by management route in Table 1 below[6]. This shows that the total quantity of waste identified as coming from Gloucestershire managed through permitted sites reporting through the WDI for 2021 stood at just under 2 million tonnes.

Table 1: Waste Arising from Gloucestershire (tonnes)

Source WDI 2021

	Landfill	Metal Recycling Sites	Recovery to Land	Transfer	Treatment	Grand Total
Gloucestershire to Gloucestershire	338,708	51,346	298,915	413,971	437,892	**1,540,831**
Gloucestershire to elsewhere	36,174	34,349	14,683	44,620	288,481	**418,307**
Totals	**374,882**	**85,695**	**313,598**	**458,591**	**726,373**	**1,959,138**

Waste identified under waste codes considered to represent C, D & E Waste (Chapter 17 plus EWC 19 12 09 & 20 02 02) and therefore accounted for in the separate estimates of C, D & E waste[7] are deducted from this total. The quantities remaining after this deduction are displayed by management route in Table 2 below. This shows that the quantity of waste identified as arising from Gloucestershire is reduced by c1,007,500 tonnes to c951,500 tonnes.

Table 2: Waste Arising from Gloucestershire minus C, D & E Waste (tonnes)

Source: WDI 2021

	Landfill	Metal Recycling Sites	Recovery to Land	Transfer	Treatment	Grand Total
Gloucestershire to Gloucestershire	54,505	38,079	0	235,741	332,674	**660,999**
Gloucestershire to elsewhere	15,860	32,090	1,442	39,159	202,072	**290,623**
Totals	**70,365**	**70,170**	**1,442**	**274,900**	**534,746**	**951,622**

Waste identified under waste codes considered to represent agricultural (Chapter 02 01), mining (Chapter 01) and hazardous waste (all codes with *) are accounted for separately and so are also deducted. The quantities remaining after this deduction are displayed by management route in Table 3 which shows that the quantity of waste identified as arising from Gloucestershire is reduced by c96,000 tonnes to c855,500 tonnes.

[6] It should be noted that waste inputs to a number of other categories of facility are reported through the WDI since 2019, but for the sake of comparability these have been excluded from the above table. They are accounted for as appropriate at subsequent steps of the methodology.

[7] BPP Consulting C, D & E Waste Management Requirements in Gloucestershire in 2021.

Table 3: Waste Arising from Gloucestershire minus C, D & E Waste, agricultural, mining & hazardous waste

Source: WDI 2021

	Landfill	Metal Recycling Sites	Recovery to Land	Transfer	Treatment	Grand Total
Managed within Gloucestershire	44,592	24,887	0	234,752	287,033	**591,265**
Managed outside Gloucestershire	15,671	27,006	1,442	36,097	184,137	**264,352**
Totals	**60,263**	**51,893**	**1,442**	**270,849**	**471,170**	**855,617**

3.1.2 Accounting for Local Authority Collected Waste

While LACW is not distinguishable from C&I waste by reference to EWC Codes, it is possible to ascertain the quantities of LACW managed through specific sites by cross referencing data with that from WasteDataFlow (WDF). Cross checking between the sites identified and the category assigned where listed in the WDI enables attribution to specific routes, as follows:

Table 4: LACW Received at Facilities included in WDI Count for Waste Arising from Gloucestershire

Source: WDF 2021 Cross checked with WDI 2021

	Landfill	Metal Recycling Sites	Transfer	Treatment	Grand Total
Managed within Gloucestershire	10,888	0	66,110	42,313	**119,312**
Managed outside Gloucestershire	0	0	9,014	37,767	**46,781**
Totals	**10,888**	**0**	**75,124**	**80,081**	**166,093**

When values displayed in Table 4 are deducted from the values in Table 3 the remaining value is c689,500 tonnes as shown in total Table 5 below. This may be referred to as the 'gross C&I waste arising' value.

Table 5: Gross C&I Waste Arising from Gloucestershire

Source: Table 3 minus Table 4

	Landfill	Metal Recycling Sites	Recovery to Land	Transfer	Treatment	Grand Total
Managed within Gloucestershire	33,704	24,887	0	168,642	244,720	**471,953**
Managed outside Gloucestershire	15,671	27,006	1,442	27,083	146,370	**217,571**
Totals	**49,375**	**51,893**	**1,442**	**195,725**	**391,089**	**689,524**

Step 2: Deduct specific wastes accounted for separately (rather than complete streams)

Landfill leachate and sludges from waste water treatment plants are expressly excluded from the national Reconcile reporting method, as Defra considers counting wastes generated by waste management facilities from processes handling wastes generated elsewhere in the economy to be double counting under this overall waste stream. Based on this, the value for leachate and wastewater sludges from Gloucestershire managed at permitted facilities has also been deducted. This is calculated to be 154,131 tonnes of waste, of which 115,016 tonnes was managed at treatment sites within Gloucestershire.

Septic tank sludge has also been included in the deduction process at this stage on the basis that it will be managed through waste water treatment facilities rather than conventional waste management facilities. This is calculated to be 14,777 tonnes, of which 10,503 tonnes was managed at Gloucestershire waste water treatment sites.

Deducting these values gives a revised headline value of c520,500 tonnes as shown in Table 6.

Table 6: Gross C&I Waste Arising from Gloucestershire

Source: Table 5 minus Step 2 values

	Landfill	Metal Recycling Sites	Recovery to Land	Transfer	Treatment	Grand Total
Managed within Gloucestershire	33,704	24,887	0	168,642	119,201	**346,434**
Managed outside Gloucestershire	15,671	27,006	1,442	25,482	104,582	**174,183**
Totals	**49,375**	**51,893**	**1,442**	**194,124**	**223,783**	**520,617**

Step 3: Account for any double counting subtracting value for intermediate sites (inc. waste transfer stations).

Adjustments may be needed to address recording waste at intermediate sites to account for:

- Double counting - the same waste being recorded once as an input from Gloucestershire to an initial facility in Gloucestershire, and then again as an input from Gloucestershire to a further or 'next step' facility if it goes for onward management; and
- Loss of some waste - as a consequence of residues from the processing of waste arising at intermediate sites like MRFs where some outputs may be recoded from the original source of inputs i.e., the original source identity gets lost.

3a. Deduct movements of waste arising in Gloucestershire to transfer stations within Gloucestershire

The national methodology (the 'Reconcile' method) discounts inputs to all types of transfer facility recorded in the WDI on the basis that if the waste is only being transferred there is no processing of the waste hence there is in theory no loss of waste in the movement of waste into and out of the site and a risk of double counting the same tonnage of waste managed through the site at the 'next step' site. This is illustrated in Figure 1 below:

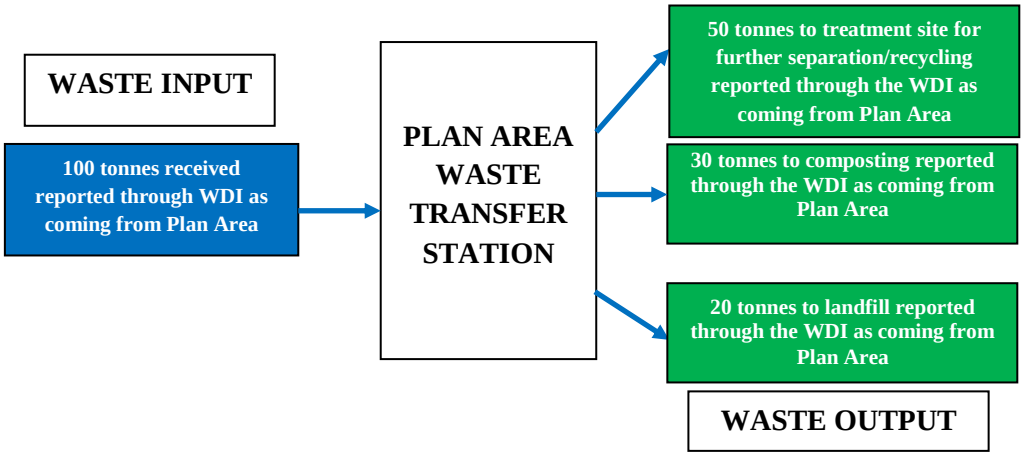

Figure 1: Schematic of Flows for Waste Transfer Stations Showing Double Counting of Wastes in WDI

However, relatively few sites classed as WTS under the Environment Agency permitting classification actually operate purely as WTS, i.e. sites at which waste is solely received and bulked up for onward management, and inputs to MRS may be managed through routes that do not report through the WDI, e.g. exported to steel works abroad or delivered directly to reprocessing sites in England. While the national method includes estimates for exports and movements to reprocessors, it is not possible to disaggregate this data down to Plan Area level. Therefore, the outputs to both WTS and MRS within Gloucestershire that received waste from Gloucestershire in 2021 have been further analysed to determine whether outputs do in fact go to destinations that would otherwise be captured in the WDI or not.

Firstly, the value of Plan area C&I waste managed at Plan area WTS and MRS are set to zero. Then the following steps are undertaken to identify any 'lost' tonnage:

1. The principal sites within the Plan Area classed as WTS and MRS receiving significant tonnages of C&I waste were identified.
2. Then the principal outputs of these sites were analysed by EWC code and destination WPA.
3. For each tonnage of output waste over 500 tonnes, the input data listed in the WDI by receiving WPA and EWC code was cross checked to confirm if a comparable or greater tonnage of that waste type was declared as being received in the destination WPA area.
4. Where a greater or comparable tonnage did not appear as an input to a specific WPA area, the difference between any input value and the Plan Area site output value was recorded on the basis that a shortfall in the WDI entry means the tonnage needs to be counted at the source

site i.e. WTS, otherwise it will be lost as a false deduction (unless it appears in another dataset e.g. incineration).

5. Where a greater or comparable tonnage did appear as an input, the WTS and MRS site input was taken as having been accounted at the 'next step' site and therefore was not counted, to avoid double counting of this waste.

Tables 7 and 8 presents the outcome of the analysis for each waste type (EWC) and named destination (WPA) in turn. Where the WPA is not codeable below regional level a review of entries for destination WPAs within the specific region has been conducted to identify possible destination. If no WPA within the region is named then it is assumed that none of the waste has been counted as an input to a site within that region. For waste identified as going outside the UK it is assumed that this travels directly from Gloucestershire and hence hasn't been counted at a 'next step' site and therefore, the whole value has been taken. The same applies for waste that has travelled to Wales because the WDI only relates to England.

Table 7: Destinations & Fates for Principal Outputs (500t or more) of sites classified as Waste Transfer Stations within the Plan Area identified as taking C&I waste

Source: WDI 2021

EWC code	Named Destination (WPA)	WDI Cross check shortfall (tonnes)
15 01 01 - paper and cardboard	Outside UK	7,914
15 01 02- plastic packaging	Outside UK	500
19 12 01 - paper and cardboard	Birmingham City	526
	London (WPA Not codeable)	613
	Norfolk	5,426
	Outside UK	2,766
19 12 02 - ferrous metal	Hampshire	780
	Southampton City	2,493
	Wales (WPA Not codeable)	4,251
19 12 07 - wood	Scotland	571
	Wales	923
	Wales (WPA Not codeable)	13,048
	West Midlands (WPA Not codeable)	1,096
	Worcestershire	1,561
20 01 01 - paper and cardboard	Outside UK	5,214
	Shropshire	3,133
	Wales (WPA Not codeable)	632
20 01 02 - glass	West Yorkshire	2,884
	Yorks & Humber (WPA Not codeable)	3,356
20 01 39 -plastic	Manchester	2,175
	Northamptonshire	614
	Outside UK	676
	West Midlands (WPA Not codeable)	707
20 03 01 - mixed municipal waste	Wales	763
Total shortfall between output and declared inputs		**62,624**

Table 8: Destinations & Fates for Principal Outputs (500t or more) of sites classified as Metal Recycling Sites within the Plan Area identified as taking C&I waste

EWC code	Named Destination (WPA)	WDI Cross check shortfall (tonnes)
16 01 17 - ferrous metal	South West (WPA Not Codeable)	553
19 12 02 - ferrous metal	Wales (WPA Not codeable)	595
20 01 40 - metals	Wales (WPA Not codeable)	1,458
	Warwickshire	628
	West Midlands (WPA Not codeable)	433
Total Shortfall between output and declared inputs		**3,666**

The above exercise indicates that some of the output waste from Plan Area WTS and MRS do not appear to be accounted for at 'next step' sites. Therefore, instead of completely disregarding the inputs to Plan Area MRS and WTS by zeroing the values displayed (on the basis that the tonnages are managed through 'next step' facilities reporting through WDI as per the national method), the shortfall tonnages derived from the above computation exercise, i.e. 62,624 tones for WTS & 3,666 tonnes for MRS have been inserted instead. This gives a revised gross C&I waste headline value of c393,500 tonnes as shown in Table 9 below.

Table 9: Gross C&I Waste Arising from Gloucestershire

Source: Table 6 minus step 3a values

	Landfill	Metal Recycling Sites	Recovery to Land	Transfer	Treatment	Grand Total
Managed within Gloucestershire	33,704	3,666	0	62,624	119,201	**219,195**
Managed outside Gloucestershire	15,671	27,006	1,442	25,482	104,582	**174,183**
Totals	**49,375**	**30,672**	**1,442**	**88,106**	**223,783**	**393,378**

3b. Deduct waste from intermediate facilities coded under 19 12 12 and 19 12 10

Outputs from facilities that treat waste prior to its final fate such as Material Recovery Facilities (MRF) and Mechanical Biological Treatment (MBT) plant, for example, was deducted from the national estimates. These are likely to be coded under EWC Chapter 19 (Wastes from Waste Management Facilities). For the purposes of applying this method to Gloucestershire, it is deducted for intermediate sites.

The principal wastes of concern are those coded as refuse derived fuel (RDF) under EWC code 19 12 10[8] and that from mechanical treatment coded under EWC 19 12 12. Analysis of the waste removals data in the WDI for intermediate sites within Gloucestershire indicates that the net output of these waste types in 2021 was 128,364 tonnes. The % inputs of C, D & E waste to intermediate sites within Gloucestershire was then applied to the net output of 19 12 12. The remainder was taken to represent C&I waste. This was then apportioned by the proportion of % inputs from Gloucestershire to intermediate sites within Gloucestershire. This is illustrated by Figure 2 below:

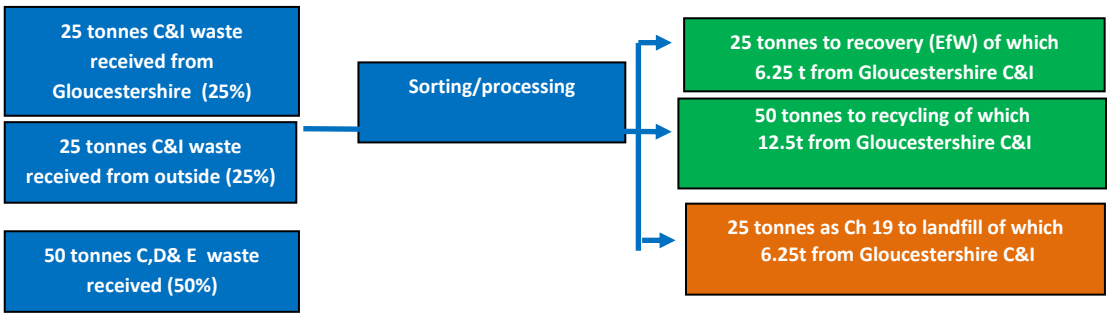

Figure 2: Schematic of Intermediate site outputs

The result of this calculation is 50,948 tonnes of 19 12 12 output attributed to C&I waste. This value is then deducted from the total arisings value split across transfer and treatment sites, bringing the total arising value to c342,500 tonnes as shown in Table 10.

Table 10: Gross C&I Waste Arising from Gloucestershire

	Landfill	Metal Recycling Sites	Recovery to Land	Transfer	Treatment	Grand Total
Managed within Gloucestershire	33,704	3,666	0	24,727	106,149	**168,247**
Managed outside Gloucestershire	15,671	27,006	1,442	25,482	104,582	**174,183**
Totals	**49,375**	**30,672**	**1,442**	**50,209**	**210,731**	**342,430**

[8] Note that there were no significant net output of 19 12 10 reported.

Step 4: Deduct incineration or pyrolysis of waste EWC sub chapter

Non-hazardous residues from the thermal treatment of waste (EWC code 19 01 02 + 19 01 12) needs to be deducted to avoid double counting of EfW capacity which is accounted for in Step 5. In the WDI 2021 this amounted to 28,856 tonnes which was managed at a split across MRS, WTS and treatment sites. This has been deducted from the total arisings value, bringing the total arising value to c313,500 tonnes as shown in Table 11.

Table 11: Gross C&I Waste Arising from Gloucestershire

	Landfill	Metal Recycling Sites	Recovery to Land	Transfer	Treatment	Grand Total
Managed within Gloucestershire	33,704	3,666	0	24,727	106,149	**168,247**
Managed outside Gloucestershire	15,671	26,784	1,442	8,155	93,275	**145,327**
Totals	**49,375**	**30,451**	**1,442**	**32,882**	**199,424**	**313,574**

3.1.3 Additions

Step 5: Add Inputs to Energy from Waste (EfW)

The WDI reports 166,094 tonnes of waste attributed to Gloucestershire was sent to principally 2 EfW plants in England (and hence reported in the WDI) as shown in Table 12 below:

Table 12: EfW facilities receiving >1,000t of Gloucestershire Waste

Source: WDI 2021

Facility WPA	Site Name	Tonnes
Gloucestershire	Javelin Park ERF	158,743
Bristol City	Severn Road Resource Recovery Facility	7,351
	Total	**166,094**

Other EfW plants receiving waste from Gloucestershire received small quantities totalling 420 tonnes.

Since the WDF and GCC reported 131,613 tonnes of Gloucestershire LACW went to EfW in 2021, that leaves 34,902 tonnes of C&I waste from Gloucestershire going to EfW to be added to the total arising value to arrive at an overall value of c348,500 tonnes as shown in Table 13.

Table 13: Gross C&I Waste Arising from Gloucestershire

	Landfill	Metal Recycling Sites	Recovery to Land	Transfer	Treatment	EfW	Grand Total
Managed within Gloucestershire	33,704	3,666	0	24,727	106,149	27,283	**195,530**
Managed outside Gloucestershire	15,671	26,784	1,442	8,155	93,275	7,618	**152,945**
Totals	**49,375**	**30,451**	**1,442**	**32,882**	**199,424**	**34,902**	**348,475**

This results in a total value for C&I waste production in Gloucestershire in 2021 of c348,500 tonnes.

3.2 Comparison to previous WNA value 2010

The estimated baseline value generated for C&I waste arising in Gloucestershire in 2021 is c348,500 tonnes. This compares with c375,000 tonnes in 2008. This indicates a growth rate of -7% over the 13-year period equating to c-0.5% p.a. A comparison between the management profile of Gloucestershire C&I waste in 2008 and 2021 is shown in Figure 3 below.

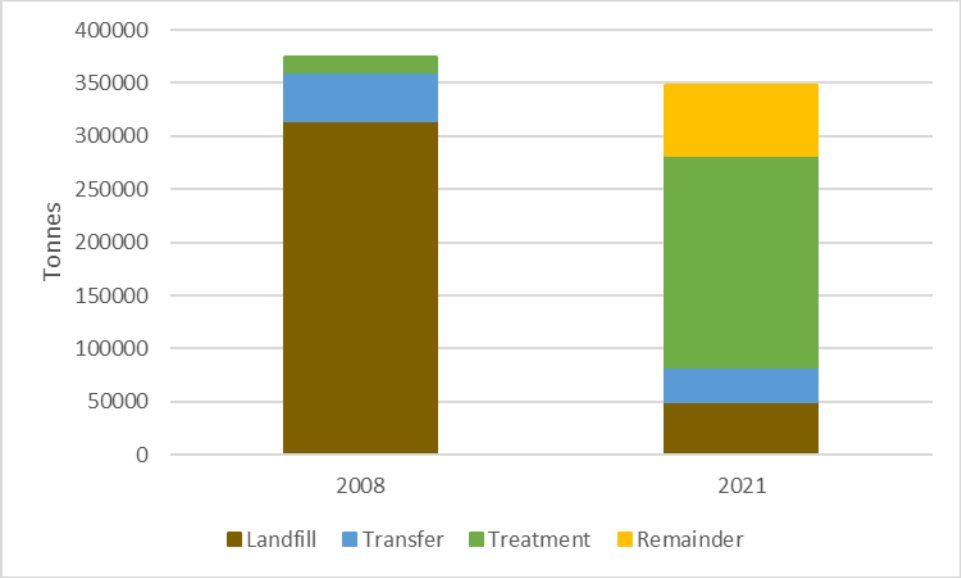

Figure 3: Management profile of Gloucestershire C&I waste in 2008 vs 2021

Figure 3 shows the significant shift in Gloucestershire C&I waste management from landfilling to treatment.

4. Forecasting Future C&I Waste Growth

The nPPG states when looking to forecast C&I waste:

> *"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*

Hence the nPPG anticipates the application of a positive growth rate.

4.1 Gloucestershire Waste Core Strategy (2012)

The approach taken in Gloucestershire's Waste Core Strategy (2012) was to apply a 0% growth rate for C&I waste, i.e., zero-growth for the Plan period with reliance being placed on forecasts and targets set out in the South West Regional Spatial Strategy (RSS). The RSS has since been abolished.

4.2 Updating the Plan Forecast

When updating a forecast the following are to be considered:

- the starting point i.e. baseline value;
- the growth rate to be applied.

4.3 DEFRA Analysis of Future C&I Waste Growth

Defra commissioned a Future Waste Arisings report in 2020[9] published in 2021. This includes the most current national growth forecast for the C&I waste stream in England. The method used to produce a forecasting model for C&I waste included development of a time-series forecast for gross value added (GVA) for the commercial sector and separately for the industrial sector, which was then used to generate C&I waste arisings forecasts. The forecasts also incorporate the impact of growth in the number of businesses nationally on C&I waste arisings by combining data on waste generated per business size and sector and adjusting the GVA to waste ratios using the growth in the number of businesses in each sector by size respectively. Two forecasting models were produced for England from 2019 to 2050: one for commercial waste arisings (refer to Figure 4) and the other for industrial waste arisings (refer to Figure 5). The resultant graphs are reproduced as Figures 4 and 5 respectively.

[9] 'Future Waste Arisings' DEFRA, April 2021.

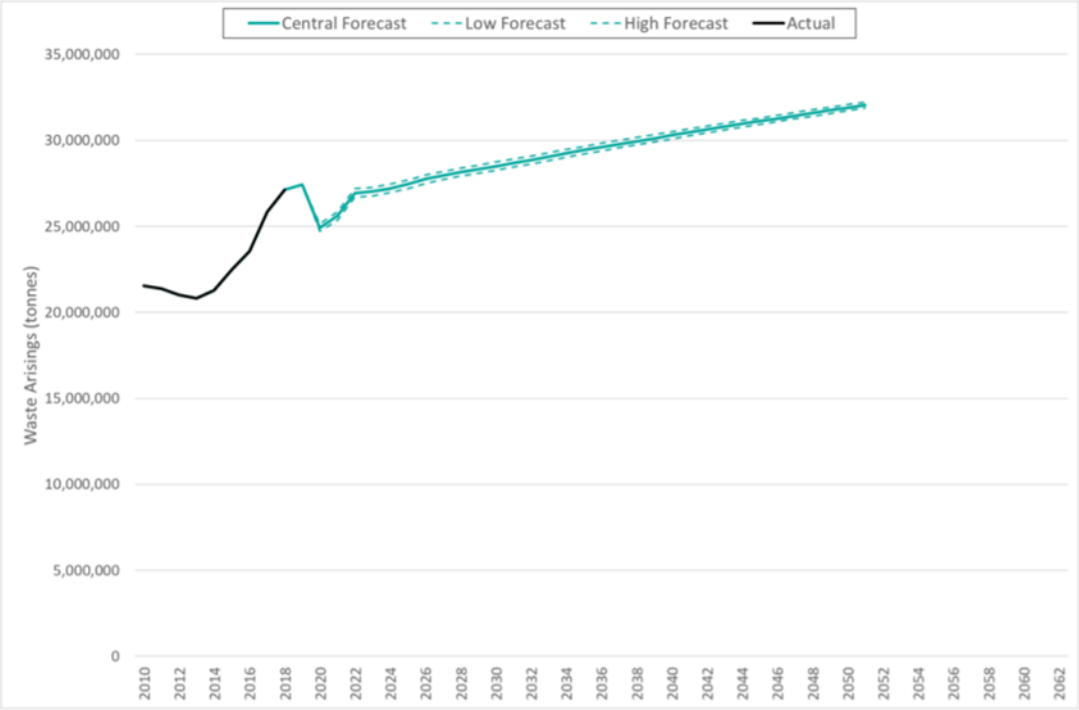

Figure 4: Commercial Waste Arisings Forecasts for England (2019-2050)

Source: Reproduced from Future Waste Arisings, produced for DEFRA (2021)

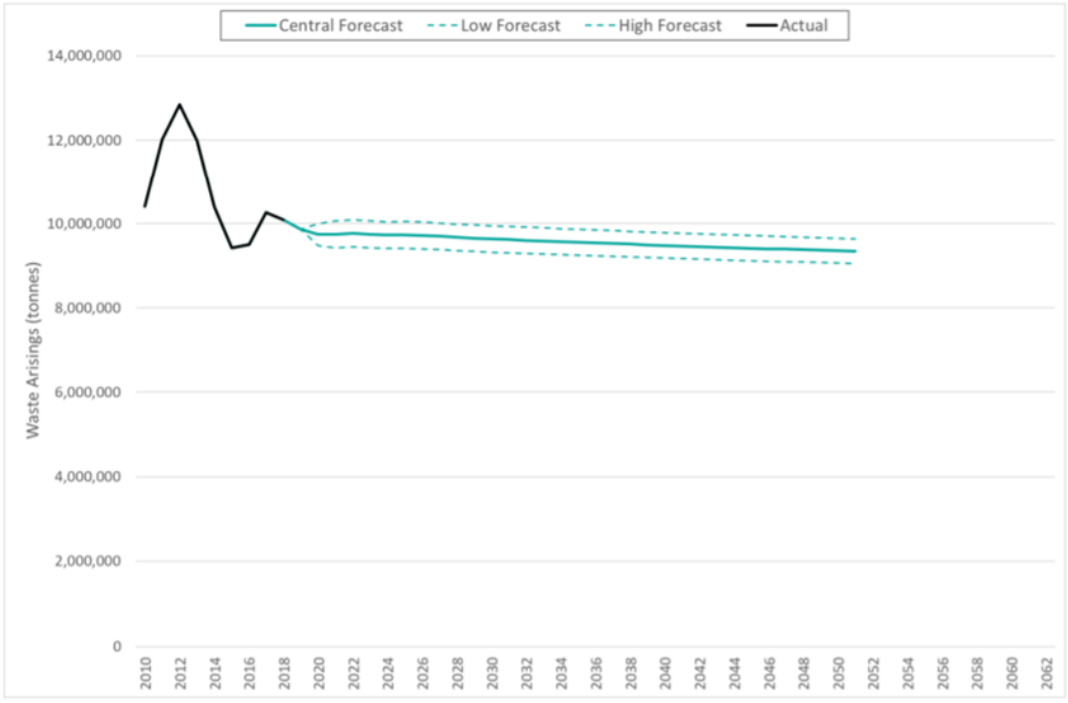

Figure 5: Industrial Waste Arisings Forecasts for England (2019-2050)

Source: Reproduced from Future Waste Arisings, produced for DEFRA (2021)

Figures 4 and 5 present central, low and high forecast waste arisings for the commercial and industrial sectors respectively. Commercial waste arisings are projected to increase steadily from 2022 to 2050, whilst industrial waste arisings are projected to increase slightly in 2019 to 2020 and then progressively fall from 2022 to 2050.

In order to assess how the national forecasts may be taken into account when forecasting Gloucestershire's C&I waste arisings, data points have been extracted for the 2022-2041 period, the period which this WMNICA covers. For the purpose of this exercise, the national central forecast values were used. See Appendix 1 for how the growth rates were ascertained using national central forecast values.

The average annual growth rate generated in the period 2022 to 2041 was +0.65% per annum for commercial waste and -0.15% per annum for industrial waste respectively. These can now be weighted according to the percentage contribution waste from commercial sources and that from industrial sources make to the overall baseline arising value for Gloucestershire.

The DEFRA commissioned Commercial and Industrial Waste Survey 2009[10] presents C&I waste arisings by business sector and WPA for the South West Region. Table 14 below summarises the tonnes split between business sectors classed as industrial and those classed as commercial in Gloucestershire.

Table 14: Tonnes by Business Sector for Gloucestershire (tonnes)

	Gloucestershire	
Industrial	303,000	57%
Commercial	225,000	43%
	528,000	

Table 14 shows that in Gloucestershire, more waste arose from industrial businesses at 57% as compared with commercial waste at 43%.

Therefore, a combined C&I waste growth rate has been calculated as follows:

- Industrial waste represents 57% of C&I arisings: 57% of -0.15% per annum = -0.09%
- Commercial waste represents 43% of C&I arisings: 43% of +0.65% per annum = 0.28%

$$\underline{-0.09 + 0.28 = 0.19\% \text{ per annum}}$$

Combining these growth rates generates an overall C&I waste growth rate of +0.19% per annum. This has been applied to the 2021 C&I baseline value to forecast arisings to 2041 as shown in Table 15.

[10] Commercial and Industrial Waste Survey 2009 Final Report (DEFRA., December 2010).

Table 15: Gloucestershire C&I waste forecast applying Growth Factor of +0.19% p.a. to 2021 baseline

	2021	2026	2031	2036	2041
Tonnes	*348,475*	352,470	355,834	359,230	362,658

Table 15 shows that applying the growth factor of +0.19% per annum to the 2021 baseline value, C&I waste arisings are expected to rise by c14,000 tonnes to c362,500 tonnes by the end of the Plan period.

5. Projected Management Requirements

Determination of how waste might be managed requires assessment of how the waste in the Plan area is currently managed and then projecting how any future Plan intends waste to be managed through exerting influence on the types of capacity developed during the Plan period.

5.1 Baseline Profile

The management profile presented in Table 16 below is based on the management data available through the WDI 2021. Since the WDI does not have an exclusive 'recycling' category it is not possible to establish how much of the waste managed goes on for recycling. Therefore, the principal known fates considered are those management types that would represent a final fate reported in the WDI as follows. That is:

- Composting and AD
- Landfill
- EfW and Recovery to Land (together combined as 'other' recovery)

5.1.1 Composting and AD

As shown in Table 16, in 2021, c61,500 tonnes of C&I waste was composted or sent to AD facilities (c39,500 tonnes to AD sites and c22,000 tonnes to composting sites).

5.1.2 Landfill

As shown in Table 16 below, in 2021, it was estimated that c49,700 tonnes of C&I waste arising in Gloucestershire was sent to landfill.

5.1.3 'Other' Recovery

As shown in Table 16, in 2021, c36,500 tonnes of C&I waste arising in Gloucestershire was recovered of which almost all went to EfW facilities (35,000 tonnes) and the remaining c1,500 tonnes was sent to a recovery to land site.

5.1.4 Recycling

The difference between the sum of the tonnages for the above categories and the baseline value has been taken to represent the tonnage that went on for recycling via permitted facilities. In 2021 this amounted to c201,000 tonnes as shown in Table 16 below. Given recycling and composting are at the same tier of the Waste Hierarchy, the values have been combined.

Table 16: Computed C&I Waste Management Profile

Route	Tonnes	%
Total Arisings	348,475	
Landfill	49,375	14%
'Other' Recovery	36,343	10%
Composting and AD	61,518	75%
Recycling & Reuse (remainder)	201,239	

6. Management Targets

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.

There are no express national government targets for the management of C&I waste alone. However, the EU Circular Economy Plan[11], to which the UK government has confirmed its commitment[12], includes the following targets for municipal waste:

- 55% recycling floor by 2025; and
- 60% recycling floor by 2030; and
- 65% recycling floor by 2035; plus
- 10% ceiling limit on landfilling by 2035.

Municipal waste is LACW plus waste of a similar nature. It has been estimated that up to 60% of commercial waste could fall within that definition[13]. Although this leaves a proportion of C&I waste outside this target, the Gloucestershire C&I waste management profile arrived at for 2021 in Table 16 indicates that a 75% combined recycling/composting rate is already being achieved for Gloucestershire's C&I waste[14]. Hence surpassing the 65% recycling target for municipal waste by 2035. Furthermore, given the recently adopted Environment Act target for a reduction of residual waste of 50% by 2042, with an interim target of 21% reduction by tonnage by January 2028 plus a stated desire to eliminate the landfilling of biodegradable municipal waste by 2028, going beyond the current recycling target is expected to be necessary[15]. Based on this, the targets for C&I waste in Table 17 below are proposed.

Table 17: Proposed Targets for C&I Waste Management in Gloucestershire

	Milestone Year				
	2021	**2026**	**2031**	**2036**	**2041**
Recycling/composting	75%	≥80%	≥80%	≥80%	≥80%
Other Recovery	10%	10%	14%	16%	18%
Remainder to Landfill	14%	≤10%	≤6%	≤4%	≤2%

[11] A new Circular Economy Action Plan, European Commission December 2015

[12] https://www.gov.uk/government/publications/circular-economy-package-policy-statement/circular-economy-package-policy-statement

[13] See footnote 6.

[14] This exceeds the recycling and composting target for 2020 set in the current adopted Gloucestershire Waste Core Strategy of 60%.

[15] A recycling rate of c72% has been mooted.

6.1 Projected Management Requirement for Gloucestershire C&I Waste

Applying the proposed target values in Table 17 to the C&I waste forecast as shown in Table 15 gives the management requirements displayed in Table 18 below.

Table 18: Proposed targets (floors & ceilings) for C&I Waste Management

	Milestone Year				Plan Period Peak/Cumulative Capacity Requirement
	2026	**2031**	**2036**	**2041**	
Recycling/Composting Target (Floor)	281,976	284,667	287,384	290,127	290,127
Remainder to Landfill Target (Ceiling)	35,247	21,350	14,369	7,253	428,791
Other Recovery inc Recovery to Land Remainder	35,247	49,817	53,884	65,278	65,278

Table 18 shows recycling and composting capacity for C&I waste will be needed to manage a peak of c290,000 tonnes by the end of the Plan period for the proposed target/floor to be met. The application of the proposed targets would mean a cumulative non-inert landfill requirement of c429,000 tonnes over the Plan period as shown in Table 19 below.

Table 19: Projected Residual C&I Waste Non Haz Landfill Requirement (tonnes)

Year	Tpa	Tonnes Cumulative
2023	43,724	43,724
2024	40,898	84,622
2025	38,073	122,695
2026	35,247	157,942
2027	32,468	190,409
2028	29,688	220,098
2029	26,909	247,006
2030	24,129	271,136
2031	21,350	292,486
2032	19,954	312,440
2033	18,558	330,998
2034	17,162	348,159
2035	15,765	363,924
2036	14,369	378,294
2037	12,946	391,240
2038	11,523	402,762
2039	10,100	412,862
2040	8,676	421,538
2041	7,253	**428,791**

Appendix 1: Data from National forecast and annual growth rates applied

Year	Commercial	Growth rate	Industrial	Growth rate
2022	26,913,043		9,754,386	
2024	27,173,913	0.48%	9,719,298	-0.18%
2026	27,695,652	0.96%	9,719,298	0.00%
2028	28,130,435	0.78%	9,684,211	-0.18%
2030	28,391,304	0.46%	9,649,123	-0.18%
2032	28,826,087	0.77%	9,614,035	-0.18%
2034	29,260,870	0.75%	9,578,947	-0.18%
2036	29,608,696	0.59%	9,543,860	-0.18%
2038	29,956,522	0.59%	9,508,772	-0.18%
2040	30,304,348	0.58%	9,473,684	-0.18%
2041	30,478,261	0.57%	9,456,140	-0.09%
Average growth rate p.a.		**+0.65%**		**-0.15%**