North East of England Commercial and Industrial Waste Survey 2010

For the North East Sustainable Resources Board

March 2011

Report Produced for:
The North East Sustainable Resources Board,
c/o Centre for Process Innovation Ltd,
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Final Report

Executive Summary

Background

In 2010, Defra commissioned a survey of commercial and industrial waste arisings at national (England) level. This survey collected data from 4,074 businesses, plus data from pollution, prevention and control returns (PPC) and other sources, and was designed to produce estimates of arisings at a national level, and subsequently at regional level. This survey included the collection of data from 276 businesses in the North East region. By applying sector averages from other regions in England, this survey could provide estimates for waste arisings in the North East region, however the volume of local surveys was insufficient to provide detail at an acceptable level of confidence, or to provide data at a sub-regional or Waste Planning Authority level. Therefore, a further survey was commissioned by The North East Sustainable Resources Board (NESRB) to fill this data gap, and provide arisings estimates for the North East region to acceptable confidence limits, at both regional and sub-regional level.

For this reason Urban Mines, in partnership with Gardiner & Theobald, delivered a compatible survey of a further 1,036 businesses in the North East in a statistically valid manner, between October and December 2010, from a total relevant business population of 26,620. Businesses in 12 sector groupings were surveyed, excluding agriculture, mining, quarrying and construction, covering employee numbers from 5 to 250+. Of these around 1/3rd was delivered by telephone (for small businesses with simple waste profiles) and 2/3rd by structured face to face survey interview. All of the data collected was thoroughly quality checked using a variety of methods. The survey focussed on waste arisings for financial year 2009-10.

For final grossing and analysis, the data obtained from this survey was combined with the relevant 276 records from the National Survey. The results given in this report are therefore based upon the raw data from these two surveys.

Arisings Estimates

Total arisings estimates for the region were calculated including estimates of arisings generated by micro (1-4 employee) businesses. The total arisings for financial year 2009-10 were 2,176,587 tonnes, broken down by sector grouping and company sizeband as reported in the following table:

Sector Group	Company Size (Number of employees)							
	1-4	5-9	10-19	20-49	50-99	100-249	250+	Total
Food, drink and tobacco	182	535	1,867	16,198	13,887	72,274	29,725	**134,668**
Textiles/wood/paper/publishing	5,399	4,287	12,937	3,361	8,907	56,963	107,261	**199,115**
Power & utilities	1,235	1,922	1,891	13,237	11,912	137,194	3,996	**171,388**
Chemical/non-metallic minerals manufacturing	2,417	3,138	1,845	115,444	24,319	163,036	28,476	**338,675**
Metal manufacturing	1,606	1,394	9,704	22,272	7,703	27,187	137,319	**207,185**
Machinery and equipment (other manufacturing)	2,287	2,355	4,822	14,048	14,072	24,821	42,661	**105,066**
Retail and wholesale	39,604	47,549	65,971	53,598	38,328	31,708	47,066	**323,823**
Hotels and catering	12,852	24,581	34,421	35,390	22,512	3,701	622	**134,080**
Public administration and social work	4,952	9,746	11,345	34,166	18,543	32,821	24,562	**136,134**
Education	664	821	6,241	19,360	12,746	43,112	11,671	**94,616**
Transport and storage	3,370	2,004	7,339	4,973	9,816	42,041	16,881	**86,423**
Other services	45,039	31,120	41,273	45,842	32,687	22,046	27,408	**245,414**
Total	**119,606**	**129,453**	**199,656**	**377,889**	**215,432**	**656,905**	**477,646**	**2,176,587**

Breaking down this total arising by sub-region, 893,421 tonnes was estimated to arise in Tyne & Wear, 680,853 tonnes in the Tees Valley, 389,197 tonnes in County Durham and 213,117 tonnes in Northumberland.

Estimates by Sector

The sectors which produced most waste were chemical manufacturing (338,675 tonnes) and retail & wholesale (323,823 tonnes). The breakdown of arisings by sector groupings is shown in the chart below:

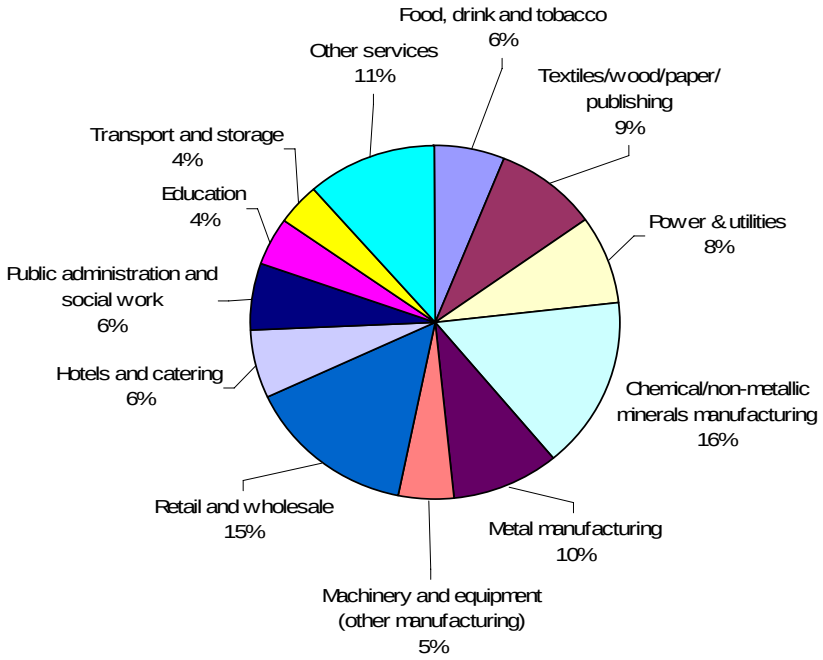

Figure 1: Estimated C&I Waste Arisings Estimates by Sector

Estimates by Waste Type

The most common waste type arising was mixed wastes (705,889 tonnes). This tends to be the residual waste left after segregation for recycling or other treatment method, and mostly goes to landfill. The next most common was non-metallic wastes (439,890 tonnes), which includes key recyclates such as paper, card, plastics, metals, textiles, glass. The majority of these waste streams were recycled. Reflecting the volume of waste from chemical manufacturers, chemical wastes made up 431,363 tonnes of total arisings, consisting of solvents, acids, alkalines and other similar materials.

Data was collected for waste arisings based on the Substance Oriented Classification (SOC) system. Arisings by SOC group are summarised as below:

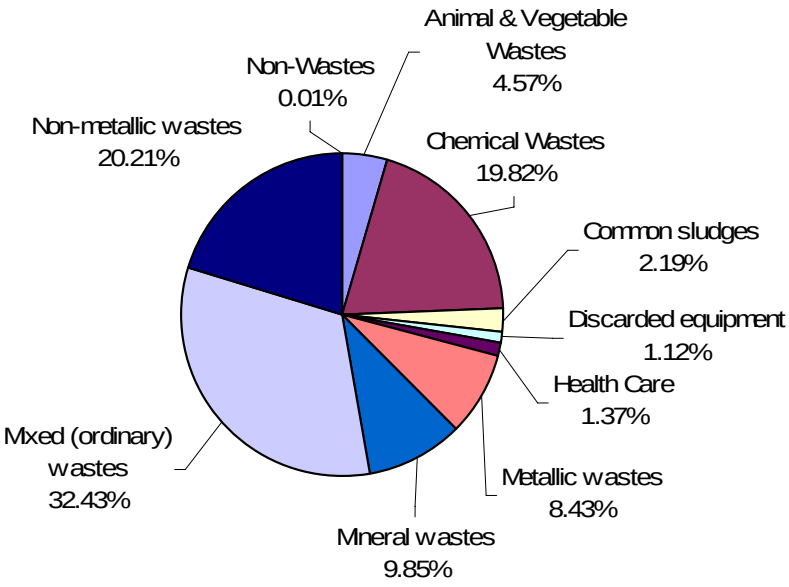

Figure 2: Estimated C&I Waste Arisings by Material Type

Estimates by Waste Management Method

Landfill accounted for 723,085 tonnes of wastes arising, with 778,680 tonnes going for recycling. Resource reuse methods such as recycling, reuse, composting and landspreading accounted for 1,059,568 tonnes of the waste arising in the region, with an additional 178,288 tonnes going for energy recovery or thermal treatment.

Estimate arisings by waste management method are summarised in Figure 3.

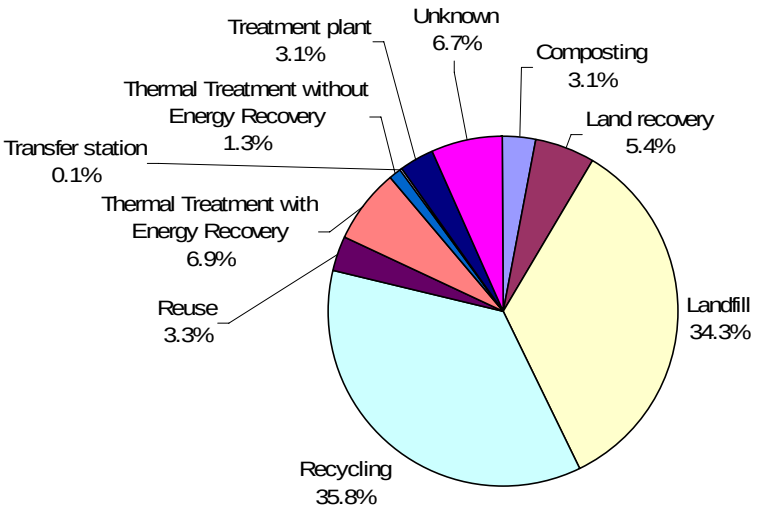

Figure 3: Estimated C&I Waste Arisings by Waste Management Type

Destination of Waste

Using only the data from the Urban Mines survey, as this has the North East focus which the national survey does not, 82.7% of the waste arisings are processed within the North East region, with only 7.1% going outside (balance is "don't know"s). Of waste destinations within the region, the most common destinations are Tyne & Wear and County Durham.

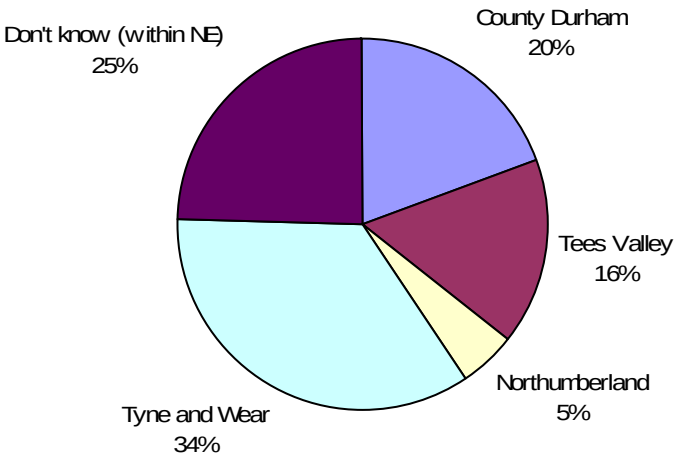

Figure 4: Waste Destinations - within the North East

Opportunity to Recycle Landfilled Wastes

Grossed data suggests that of the 723,085 tonnes landfilled in the region, 61,178 tonnes is readily recyclable, whilst an additional 416,921 tonnes could be recycled if segregation or separation of materials could be carried out. The high volume of "don't know"s from the National Survey data suggests that these figures could indeed be significantly larger.

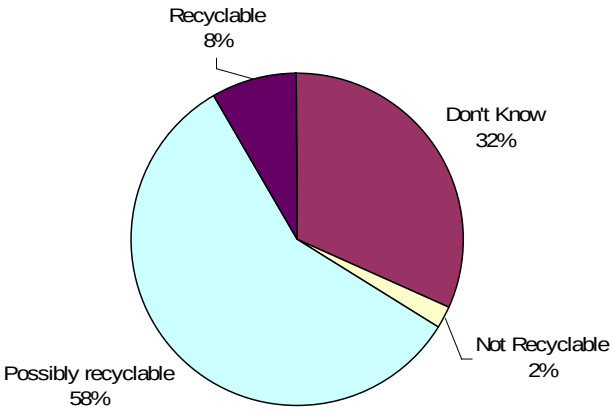

Figure 5: Recycling Potential of Landfilled Waste

Opportunity to Energy Recover Landfilled Wastes

Similarly, all wastes were assessed for their potential to be energy recovered. Separating out those wastes currently landfilled, the results suggested that 324,185 tonnes of landfilled waste could be directly energy recovered, and 124,678 tonnes potentially energy recovered, if pre-treatment facilities were available. Again, the high level of "don't know"s from the National Survey data suggests that these figures could be even higher.

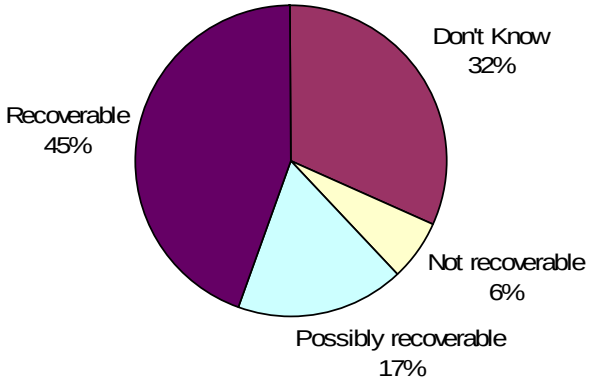

Figure 6: Recovery Potential of Landfilled Waste

EXECUTIVE SUMMARY

The results contained in this report, plus the raw data supplied on CD-ROM, should prove invaluable to waste planners and policy developers in the region in scoping the use of the region's waste resources in the future.

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QUALITY ASSURANCE

Report Title:	North East of England Commercial and Industrial Waste Survey 2010
Authors:	Peter Scholes, Esther Areikin
Date:	March 2011 (draft) 7th April 2011 (final)
File Reference:	T:\Consultancy\NE C&I Survey 2010\FINAL REPORT\FINAL REPORT\NE Survey 2010 Final Report.doc
Prepared For:	The North East Sustainable Resources Board
Contact(s):	Chris Hayward, Environmental Technologies Manager
Reference:	
Report Status:	Final Report
Copyright:	Urban Mines © 2011

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Quality Review	**Date**	07th April, 2011

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CONTENTS

CONTENTS

Table of Figures:

CONTENTS

REPORT

1 Introduction

The North East Sustainable Resources Board (NESRB) commissioned this survey to obtain data on commercial and industrial (C&I) waste arisings and management in 2009-10 from businesses in North East England (the region is referred to as North East in the rest of the report). The study was funded in partnership with RENEW, One North East, Association of North East Councils (ANEC), Government Office North East (GO-NE), the Environment Agency and Tees Valley Unlimited.

The NESRB, in partnership with the above mentioned organisations in the North East region, has a pressing requirement to enhance the evidence base on C&I waste arisings and management in order to:

- inform policy making on reducing the amount of waste produced by businesses, increasing the proportion reused or recycled and reducing the residual waste going to landfill
- inform PPS10 sub-regional planning requirements in relation to waste management and land-use planning issues
- establish realistic and meaningful baselines for use in performance monitoring and assessing the impact of the North East Resource Management Plan on C&I waste arisings and management
- aid regional business opportunity analysis and development by providing geographic information on potential for further recovery of materials, helping to de-risk future waste infrastructure investment
- gain better understanding of waste movements both within, into and out of the region
- enhance and complement existing North East waste data projects i.e. GIS Waste Mapping Tool (Renew) and Environment Agency's Waste Flows Modelling project
- enable comparisons over time

This arisings data is not available currently via the routine regulatory returns from permitted waste facilities.

1.1 Aims and objectives

The main aim of this study was to determine how much C&I waste was produced in the North East in the financial year 2009-10, broken down by broad business sectors and material types into sub-regions and/or Waste Planning Authorities (i.e. Northumberland, Tyne-Wear, Durham and Tees Valley), and to identify current management methods for each waste stream.

The objectives of the study were therefore:

- Development of a robust statistical structure and sampling methodology to provide a sample matrix upon which the survey delivery was based. The sample on which the survey was based was taken from the summary data on the population of C&I "local units" in the North East from the Office for National Statistics (ONS).
- Development of dependable and robust processes and software to provide the basic tools for use during the survey and data collection.
- Effective recruitment of companies to take part in the survey in a way that ensured cancellations were minimised.
- Effective and efficient delivery of the surveys on site and by telephone for smaller companies by experienced and well trained personnel.
- Timely review of data outliers and ongoing data cleaning throughout the survey period to enable immediate follow up if required.
- A thorough final review of the data collected against previous surveys and other available data sources (e.g. deposits data).
- Gross up the survey data taking into account quality assurance issues and filling gaps where there were gaps in the survey data.
- Analyse the grossed up data to enable interpretation of results and produce a final report for the survey.

Based on the survey data and other data obtained from other sources to fill any gaps within the survey data, the following are the outputs of the study:

- the total tonnage of waste produced by C&I businesses, tabulated and split by sector grouping (i.e. the 12 business sectors described in Appendix 3), company size (i.e. 7 company size bands as shown in Appendix 2), waste material type (as shown in Appendix 4) and management method.

- the potential for further recycling/recovery of different waste types currently heading to landfill, by waste type and generating sector.

- final destinations of waste streams, in terms of movements to facilities within and outside regional boundaries.

1.2 Study area

The 'study area' was the North East region, with waste data from businesses provided at a sub-regional level for:

- Northumberland i.e. Northumberland County Council area
- Tyne & Wear i.e. Gateshead, Newcastle, North Tyneside, South Tyneside, Sunderland Council Areas
- Durham i.e. Durham County Council area
- Tees Valley i.e. Darlington, Hartlepool, Middlesbrough, Redcar & Cleveland and Stockton-on-Tees Council areas.

The business sectors included in the survey are comparable with the English National C&I survey delivered in 2010. As in previous surveys, the sectors not included are agriculture, mining & quarrying and construction.

1.3 Previous surveys

This survey was undertaken to supplement data gathered for the North East region for the recent National C&I survey undertaken by Jacobs Engineering UK Ltd on behalf of Defra[1].

Prior to the recent national survey, two national C&I surveys have been undertaken, by the Environment Agency, reporting on financial years 1998/99 and 2002/03. Whilst these surveys achieved a precision of +/- 5% at a 90% confidence level for total commercial and industrial waste, users were advised to treat the information provided as the best estimate from a range and should not, for example, read too much into small differences between sectors or detailed comparisons with results from the previous (1998-9) survey. The 2002/3 survey showed a 13% reduction in the total C&I waste for the 4 year period (a fall of 23% in industrial wastes and a slight increase in commercial wastes of 3%) at the national level. However, the survey had insufficient detail and the categorisation used did not readily translate into the type and scale of new waste management facilities which may be needed.

Prior to 1998, patchy, incompatible waste planning authority level surveys were undertaken before the decision was made to proceed with a national survey.

There has not been a survey of arisings from businesses in the region since this date.

1.4 Project management

Throughout the development and delivery stages, the project was managed and mentored on behalf of the funders via a Steering Group consisting of the following representatives:

- Chris Hayward, RENEW (Project Manager)
- Andrew Smith, Government Office North East
- Ray Waters and Phil Jones, One North East

[1] Jacobs Engineering UK Ltd, National Commercial and Industrial Waste Survey 2009, December 2010

- Joanne Cooper, Environment Agency
- Andrew Craig, Tees Valley Unlimited

plus representatives of the deliverers, Urban Mines Ltd and Gardiner and Theobald LLP. This group met regularly to review progress and approve key project aspects such as methodology, and received weekly email progress reports.

2 Survey methodology and delivery

2.1 Introduction

The survey was delivered by a consortium of consultancies with the following roles:

Gardiner & Theobald	Project director, survey team manager, delivery of face to face and telephone surveys via 5 strong survey team and client liaison
Urban Mines Ltd	Operations director - project delivery management, methodology development, statistics, training, survey management & data collection software, data cleanup and grossing
Ainsworth & Parkinson	Booking of appointments for face to face and telephone surveys

The survey methodology was based upon a standard stratified random sampling approach. Companies were selected throughout the North East region, based upon a developed survey sample matrix of company sector against employee size band, to give a representative sample from which regional estimates could be determined. This sample matrix was developed from company population data provided by the Office for National Statistics (ONS).

Companies (as "local units") were identified at random and recruited by telephone to fill this sample matrix. Data was collected via a laptop based structured survey questionnaire, delivered during a face to face interview with a company representative, followed by a tour of the company's site to identify any wastes missed by the interviewee. Small companies (i.e. employee size bands 5-9 and a few of the 10-19), with simple waste profiles and particularly office based businesses, were surveyed by telephone (i.e. approximately 1/3rd of total sample size). The collated data was transferred to a central server by email within 2 days of collection, where quality checks were carried out and any identified outliers or errors checked and addressed with the surveyors.

Once the survey was complete, the data was thoroughly quality checked before grossing to provide regional and sub-regional estimates.

This section of the report describes these key steps in delivery of this survey in more detail, supported by additional detail provided in a number of appendices.

2.2 Questionnaire development

The survey questionnaire was developed ensuring:

- Its design met the data collection requirements of the survey
- Its structure was comparable with that of the previous surveys and the 2010 English National Survey to allow for comparisons, trend identification and evaluation, and also combination of other data to improve confidence levels
- It could be effectively and efficiently delivered via both face to face interviews and telephone surveying

The structure agreed with the Steering Group is presented in Appendix 1. It allows data collection for individual waste streams, by waste type, waste nature (hazardous or non-hazardous), annual quantity, waste management method used for that particular waste stream (fate), and where that method was carried out (destination).

The questionnaire also allowed the recording of the source of the recorded waste quantity data (i.e. from written records or estimated/calculated) and whether the given waste stream could be recycled or energy recovered, against a defined set of criteria.

The questionnaire used Substance Orientated Classification (SOC) groups and sub-groups for describing individual waste stream types, as shown in Appendix 4.

The structure was translated into relevant screens in the data collection software EVSurvey. The software included routines to calculate tonnages where direct written records were not available. These calculations used in-built data such as standard container types (detailed in Appendix 5) to estimate volumes, conversion factors to translate volumes into weights (as Appendix 6) and standard waste item weights (as in Appendix 7) for individual items. Note that the data structure used for the survey retains all this calculation data, so that should conversion factors need revision, new weight data can be calculated from the originally collected raw data.

For the purpose of this survey the waste recorded is for all waste produced on site that is outgoing or disposed of (but not recycled or reused) on site. This includes hazardous waste and Environment Agency classified non-wastes i.e. blast furnace slag or virgin timber. It does not include liquid wastes disposed of down a pipe but does include liquid waste tankered off-site.

2.3 Data sample preparation

The recruitment of businesses for this survey was based upon the sample matrix developed using "local unit" business data from the Office for National Statistics (ONS). The aim of delivering the survey was to produce waste arisings data from a range of business types (sectors) and sizes (employee numbers) in a statistically valid manner (i.e. matching as close as possible the distribution described in the sample matrix) from which grossed up regional and sub-regional totals could be produced. The development of this sample matrix is explained in detail in Appendix 2.

The businesses to survey were selected and recruited at random based upon the sample matrix. To do this, business contact data was secured from LBM Direct Marketing Services, based upon a random selection of businesses in proportion to their relevance in the sample matrix, to drive the telephone recruitment process.

Data security

Steps were taken to ensure the integrity and confidentiality of the business and personal details provided by LBM. Both the tele-bookers and surveyors accessed the business contact data they needed via an internet link into a restricted area of one of the Urban Mines servers. Neither group had access to the data provided by LBM and a single copy of the dataset was retained on the server with access only by the Urban Mines data manager. Each business in the dataset was issued a unique code which allowed identification of waste stream records and their positioning in the sample matrix for grossing up. Only Urban Mines held a copy of the unique code to business name table for data checking, and this, along with the original dataset, was deleted on completion of the project. Urban Mines is registered under the Data Protection Act to handle personal data.

2.4 Tele-booking process

Tele-operators from Ainsworth and Parkinson were trained on the developed conversational call script for this survey. All staff were made familiar with Urban Mines' proprietary call management system, EVCall, which they used remotely, working from their own offices, connected to the Urban Mines servers.

The surveyors were based mainly around Newcastle. Urban Mines' proprietary software "EVCall" presented the tele-operators with businesses selected at random, cycling through the sample matrix "bricks" to ensure a reasonable spread of bricks within each sub-region. Bricks were closed off once the brick target, plus an overbooking margin to take care of cancellations, had been achieved.

Each company called was asked whether they had already taken part in the English National Survey, and if so rejected at that stage to guard against double counting. Once a business had agreed to participate in the survey, the tele-operator made an appointment. EVCall offered the operator a selection of dates and time slots, presenting the nearest surveyor at the top of each list. Clustering visits geographically allowed us to maximise the number of visits and telephone calls per day for each individual surveyor. Each business being surveyed was sent a confirmation email and an information pack on the day the booking was made. The surveyors retrieved their booked appointments diary by logging onto the Urban Mines server.

2.5 Checking business data

To ensure that the information provided by LBM was correct operators checked the Standard Industrial Classification (SIC) (business type) code and number of employees, and business address details as each booking was made. This data was also checked directly with the company representative during the survey interview. This additional

checking was carried out as this data is critical to placing the company concerned in the sample matrix, and therefore to the error checking and data grossing process.

2.6 Survey visit & telephone surveys

The chosen surveyor visited in person each business with whom they had an appointment booked and also undertook telephone surveys for companies that were to be surveyed by telephone. The surveys consisted of an initial discussion to reiterate the reason for the survey and also to "break the ice". Following this, the survey was completed using Urban Mines' proprietary survey software "EVSurvey" on the surveyor's laptop.

Surveyors tried to collect as much data as possible from written records, such as waste collection or disposal invoices, transfer or consignment notes and internal electronic records. If necessary, the surveyor would prompt the business contact by suggesting the types of records which might be available.

An innovation, included in the data collection software for this survey, was the ability to check collected data against averages and ranges expected for companies of a similar size and sector, using data from previous surveys. This check was carried out at the end of the survey process so as to not influence the data collected. This gave the opportunity to spot significant outliers or data errors during the survey interview, and to re-test collected data with the company representative. This, coupled with built-in routines to trap data entry errors, produced significantly less outliers and data errors in this survey compared to previous surveys.

For surveys undertaken on site, after completion of the interview stage, the surveyor asked to be taken on a brief tour of the business' facilities, to check the data already collected and to identify any waste streams which the business representative may have overlooked. In a significant number of cases, additional waste streams were identified this way.

2.7 Data collation

After a series of visit and telephone surveys, the surveyors used the export function in EVSurvey software to export completed datasets and email these to Urban Mines. Surveyors were asked to do this within 2 days of data collection so that any errors could be checked promptly. On arrival the data was checked and appended to the main survey database. To ensure data security, the only business specific identification data exported and associated with the individual waste stream data was the unique code. This proved to be an effective and reliable process.

2.8 Field trials

The survey bookings and survey visits were "road tested" before the full survey was started. This consisted of selecting a sub-set of businesses at random, and then testing:

- the call flow script and EVCall software use
- confirmation paperwork
- survey methodology plus software

- data entry and collation

A total of 8 businesses were booked and visited for these trials, by surveyors from Urban Mines and Gardiner & Theobald. These trials also identified minor problems and were used as part of the training process for the surveyors.

2.9 Surveyor and tele-booker training

Day sessions were held with tele-bookers from Ainsworth & Parkinson and three day sessions with the survey team from Gardiner & Theobald (plus those providing cover during periods of absence) to introduce the survey and give specific software and survey methodology training. Particularly for the surveyors, training included explanation of the process of recording data, for handling and selecting waste types and weight conversions, and for interpreting responses. Guidance was also given for answering the "recyclable" and "recoverable" and other questions on the survey questionnaire, and real examples in the form of case studies were reviewed. Survey packs were also provided to surveyors, including a detailed user guide, which re-emphasised all the areas covered during training, and provided a reference during survey visits. During the same session, all required software was installed on the surveyors' laptops.

A review session one week into the survey was carried out with the surveyors, which tackled problems and issues encountered during the first week of the survey.

2.10 Monitoring performance

Throughout the survey, the project and data managers at Urban Mines monitored call statistics, brick completion and business cancellation rates via remote access to a set of Excel pivot tables linked live to EVCall.

During the initial booking phase, and whenever the booking strategy was changed, Ainsworth and Parkinson and Urban Mines staff monitored the tele-bookers' performance and that of the call script, by monitoring calls directly on site.

As the surveyors picked up details of future bookings from their diaries in EVCall, they also registered the outcome for previous visits. When data from visits was received this too was registered by EVCall.

As well as handling booking and business data, the EVCall call software package also produced a number of performance indicators allowing project managers at Urban Mines to monitor:

- success rate per individual tele-booker i.e. surveys booked per hour
- cancellation rates (i.e. % cancelled surveys compared to the number booked)
- survey visit calls per day per surveyor, and "no show" rate
- distance travelled by the surveyor per day
- delivered visits and data, and % completing of each brick in the sample matrix

At certain periods throughout the survey, both tele-bookers and surveyors were directly monitored to check performance and correct any problems. For the tele-bookers, adherence to script was checked by listening into calls, and changes made if appropriate.

Concurrently, Urban Mines also carried out a telephone "mini-survey" of a sub-set of businesses that had been visited and surveyed by telephone by the surveyors, as a further check of performance to ascertain what the business representative thought of the experience from booking to the survey delivery. A number of businesses were called at random for each surveyor. This was not intended to be a statistically valid survey of responses, it was just another check that the surveys were progressing satisfactorily and that the businesses involved were happy with how they were treated. No significant problems were highlighted by these calls, and 100% of those called responded "Yes" to "If contacted, would you be happy to take part in another similar survey in the future?".

2.11 Checking for outliers

All data received was reviewed electronically to identify any outliers, i.e. those data points that lay outside of the expected range. Once identified, these were further checked, re-confirmed and changed if necessary, by the surveyor. These checks were meant to pick up any errors in data entry or calculation as well as incorrect classifications.

STATA, a statistical package, was used to check and identify outliers. Outliers were considered as any points with values that lay more than three standard deviations (±3) away from the mean, using the mean (r) as the scalar. From the example below, points such as 15523001, 11626002, 11626005, 11626001, 15537002, 16015002, 10515009, 16044009,11115012,1530002, 10641014, 10641007 and 10903002 were considered as possible outliers in the data.

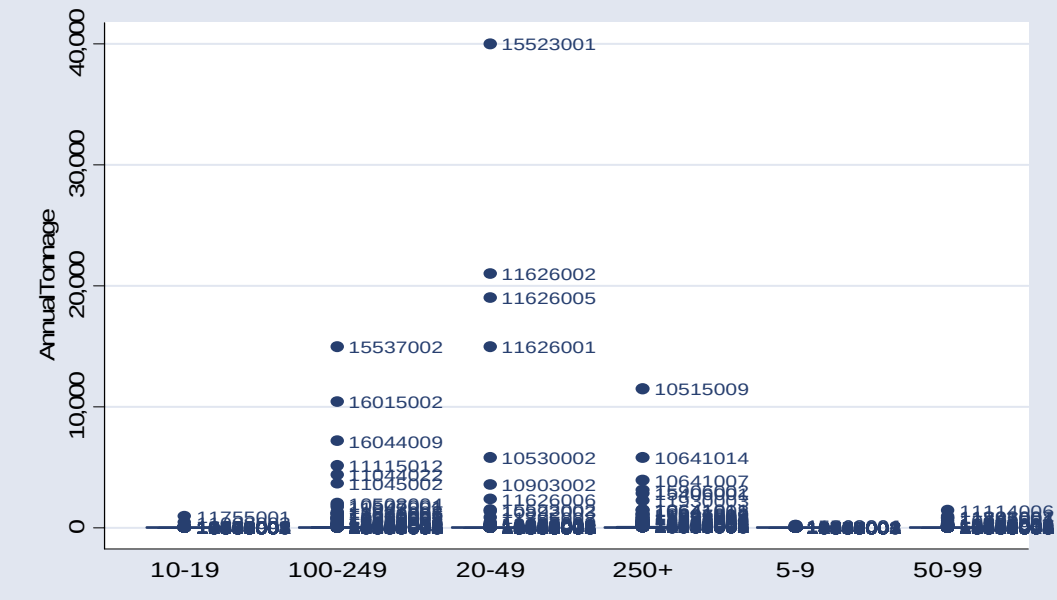

Figure 7: Example of an outlier check using STATA

2.12 Survey completion – data cleanup and grossing

On completion of the survey, the final survey data was collated and final outlier checks run so that residual data could be checked with the surveyors. Over 5,000 separate waste stream lines of data were collected.

The aggregated dataset was then grossed for the first time using the methodology described in Appendix 8. Grossing the data by individual waste stream line allowed the secondary checking of data via sensitivity analysis i.e. all waste streams were identified which had a significant impact once grossed on the estimated waste totals (regionally or by waste type, waste management method, sector, etc).

All highlighted data was checked by Urban Mines directly with the company from which the data was originally collected. All data with more than a 0.5% impact on the final grossed estimates was checked in this way. This is how we aimed to maximise the confidence in the final data and correct any inconsistencies.

In parallel, the company sector and size data was comprehensively checked, in particular where the LBM data did not agree with that recorded, or was changed by the telephone operator and/or the surveyor.

After extensive checking, final amendments were made and the resultant dataset used for grossing to give regional and sub-regional waste arisings estimates, again using the methodology described in Appendix 8.

Two additional data sources were used to augment the grossed survey data:

1. Supermarkets – we have found from previous experience that it is common that managers of large retail stores, including supermarkets, do not know the amount of waste their stores produce as all waste and recyclate is taken away by the same trucks that deliver new produce. Therefore, to fill data gaps with particularly large retail stores, data obtained directly from 4 major supermarket chains was used.

2. Survey data from the England C&I survey undertaken by Jacobs on behalf of Defra. Waste data from 276 companies surveyed for the North East region was incorporated into our survey data and grossed to give the total waste estimate for the region.

How this data was incorporated into the final dataset is explained in detail in Appendix 8.

3 Survey results and analysis

The following tables present the grossed up data estimates for commercial and industrial waste arisings in the North East region for the financial year 2009/2010.

What was surveyed

- 1,036 industrial and commercial business sites
- Businesses across the size range (in terms of number of employees) from those with 5 employees to >250 employees
- All wastes produced on site i.e. outgoing wastes and waste disposed of (but not recycled or re-used) on site, for financial year 2009-10
- Hazardous and non-hazardous wastes
- "Non-Wastes" such as blast furnace slag and virgin timber
- The waste management method used to dispose of, recycle or recover the waste, and where that process was carried out
- The potential for the waste to be recycled or energy recovered

What was NOT surveyed

- Businesses involved in agriculture, mining & quarrying and construction
- Businesses involved in waste management and recycling (to avoid potential double counting)
- Waste recycled or re-used on the same site it was produced
- Waste sent to waste water or effluent treatment on-site or off-site via a pipe
- Micro-companies (i.e. 1-4 employees)

Company sector

A full description of sector groups used is given in Appendix 3. These can be summarised as:

Sector	Description	C or I*
Food, drink and tobacco	Food, drink and tobacco manufacturers	I
Textiles/wood/ paper/publishing	Includes manufacturers of textiles, wearing apparel, luggage, handbags and footwear; also wood and wood products, pulp, paper and paper products, publishing and printing	I
Power & Utilities	Production of gas, electricity, oil and water	I
Chemical/non-metallic minerals manufacturing	Manufacture of chemicals and chemical products, cleaning products, manmade fibres, rubber and plastic products, and non-metallic mineral products	I
Metal manufacturing	Manufacture of basic metals and fabricated metal products	I
Machinery & equipment (other manufacturing)	Manufacturing of machinery and equipment, of computers, electrical and communication equipment, including medical and optical instruments. Also manufacturers of motor vehicles, and of furniture and other manufacturing	I

Sector	Description	C or I*
Retail & wholesale	Retail and wholesale including of motor vehicles and fuel	C
Hotels & Catering	Accommodation, food and beverage services	C
Public Administration and Social Work	Public administration, defence, health services, residential care, social work	C
Education	Schools, colleges and universities	C
Transport and Storage	Land, water, air transport, warehousing, postal and courier services	C
Other services	Includes communications, travel agents, finance, estate agents, IT related activities, and other business	C

* C=Commercial, I=Industrial sector

Figure 8: Summary of sector descriptions

Waste type

The SOC nomenclature is used for waste classification and is explained in detail in Appendix 4. This can be summarised as:

Waste Group	Included Wastes
Chemical Wastes	Solvents, acids/alkalis, used oil, catalysts, wastes from chemical preparation, residues and sludges
Healthcare	Healthcare wastes
Metallic Wastes	Metallic wastes
Non-Metallic Wastes	Glass, paper & card, rubber, plastic, wood, textiles
Discarded equipment	End of life vehicles (ELV) , batteries, waste electronics (WEEE) other discarded equipment
Animal & Vegetable Wastes	Food, manure, other animal and vegetable wastes
Mixed (ordinary) wastes	Household, undifferentiated wastes and sorting residues
Common Sludges	Sludges (common) and dredgings
Mineral Wastes	Combustion residues, contaminated soils, solidified mineral wastes, other mineral wastes
Non-Wastes	Those materials recently declassified as wastes ie. Blast furnace slag or virgin timber

Figure 9: Summary waste classification descriptions

Survey locations

The companies surveyed were located around the region, in approximate reflection of the distribution of companies throughout the region. The spread of companies surveyed is shown in the map in Figure 10.

Figure 10: Location of surveyed companies

Waste arisings estimates

The estimates of waste arisings (in tonnes) regionally and sub-regionally are summarised in the following figures. The reported results are based on data from:

1. Urban Mines North East survey with a sample size of 1,036 companies
2. Defra National survey data with a sample size of 276 companies for the North East
3. Empty cell from both surveys, Power and Utilities 50-99, estimated using averages of adjoining cells
4. Micro companies (1-4 employees) estimated using averages from survey results for 5-9 employees size band

3.1 North East Region

Sector Group	Company Size (Number of employees)							
	1-4	5-9	10-19	20-49	50-99	100-249	250+	Total
Food, drink and tobacco	182	535	1,867	16,198	13,887	72,274	29,725	**134,668**
Textiles/wood/paper/publishing	5,399	4,287	12,937	3,361	8,907	56,963	107,261	**199,115**
Power & utilities	1,235	1,922	1,891	13,237	11,912	137,194	3,996	**171,388**
Chemical/non-metallic minerals manufacturing	2,417	3,138	1,845	115,444	24,319	163,036	28,476	**338,675**
Metal manufacturing	1,606	1,394	9,704	22,272	7,703	27,187	137,319	**207,185**
Machinery and equipment (other manufacturing)	2,287	2,355	4,822	14,048	14,072	24,821	42,661	**105,066**
Retail and wholesale	39,604	47,549	65,971	53,598	38,328	31,708	47,066	**323,823**
Hotels and catering	12,852	24,581	34,421	35,390	22,512	3,701	622	**134,080**
Public administration and social work	4,952	9,746	11,345	34,166	18,543	32,821	24,562	**136,134**
Education	664	821	6,241	19,360	12,746	43,112	11,671	**94,616**
Transport and storage	3,370	2,004	7,339	4,973	9,816	42,041	16,881	**86,423**
Other services	45,039	31,120	41,273	45,842	32,687	22,046	27,408	**245,414**
Total	**119,606**	**129,453**	**199,656**	**377,889**	**215,432**	**656,905**	**477,646**	**2,176,587**

Figure 11: Estimate of North East C&I waste arisings, by sector and employee size band (in tonnes)

Sector Group	Waste Type										
	Animal & Vegetable Wastes	Chemical Wastes	Common sludges	Discarded equipment	Health Care	Metallic wastes	Mineral wastes	Mixed (ordinary) wastes	Non-metallic wastes	Non-Wastes	Total
Food, drink and tobacco	67,834	3,487	10,692	1,690	7	552	3,115	32,909	14,383	0	**134,668**
Textiles/wood/paper/publishing	318	87,864	429	66	22	2,631	807	25,966	81,012	0	**199,115**
Power & utilities	1	100,783	15,110	340	0	40	32,448	22,005	661	0	**171,388**
Chemical/non-metallic minerals manufacturing	12,670	196,598	20,338	346	590	7,861	19,537	55,205	25,528	2	**338,675**
Metal manufacturing	53	11,848	0	394	16	75,445	98,655	15,506	5,269	0	**207,185**
Machinery and equipment (other manufacturing)	580	7,243	0	858	27	47,516	3,466	26,713	18,664	0	**105,066**
Retail and wholesale	5,124	7,192	0	3,884	328	7,493	27,356	134,304	138,144	0	**323,823**
Hotels and catering	2,865	2,878	85	672	236	573	0	73,470	53,302	0	**134,080**
Public administration and social work	846	936	814	2,449	22,114	1,380	4,697	87,706	15,192	0	**136,134**
Education	2,542	109	1	2,000	3,067	211	528	73,045	13,113	0	**94,616**
Transport and storage	1,312	3,983	132	1,486	131	30,879	260	31,928	16,082	230	**86,423**
Other services	5,302	8,443	0	10,190	3,371	8,804	23,631	127,132	58,542	0	**245,414**
Total	**99,446**	**431,363**	**47,601**	**24,375**	**29,910**	**183,382**	**214,500**	**705,889**	**439,890**	**232**	**2,176,587**

Figure 12: Estimate of North East C&I waste arisings, by sector and waste type (in tonnes)

Sector Group	Waste Management (Fate)										
	Composting	Land recovery	Landfill	Recycling	Reuse	Thermal Treatment with Energy Recovery	Thermal Treatment without Energy Recovery	Transfer station	Treatment plant	Unknown	Total
Food, drink and tobacco	33,554	134	27,057	23,312	34,303	925	221		13,201	1,961	**134,668**
Textiles/wood/paper/publishing	104	86,349	18,232	81,060	11,240	212	149	119	514	1,135	**199,115**
Power & utilities	1	11,604	28,989	29,517	493	100,700	33		51	2	**171,388**
Chemical/non-metallic minerals manufacturing	29,141	19,460	122,377	42,949	6,217	32,231	4,647	1,140	39,876	40,638	**338,675**
Metal manufacturing			95,324	78,963	5,126	10,682	83	175	1,274	15,558	**207,185**
Machinery and equipment (other manufacturing)	418		20,077	66,972	4,479	2,611	555	625	2,095	7,236	**105,066**
Retail and wholesale	18		113,538	166,183	2,762	495	1,659	220	3,368	35,580	**323,823**
Hotels and catering	1,706		59,626	58,259	2,666	17	315	4	383	11,103	**134,080**
Public administration and social work	209		66,491	40,212	639	1,072	14,858	1	1,579	11,073	**136,134**
Education	428		55,558	33,412	680	30	2,754	168	654	932	**94,616**
Transport and storage	1,277		17,645	64,514	395	0	88	48	1,094	1,362	**86,423**
Other services	1,693	7	120,951	93,326	3,006	960	2,991		2,419	20,061	**245,414**
Total	**68,548**	**117,554**	**745,864**	**778,680**	**72,008**	**149,935**	**28,353**	**2,499**	**66,508**	**146,639**	**2,176,587**

Figure 13: Estimate of North East C&I waste arisings, by sector and waste management method (in tonnes)

Waste Type	Waste Management (Fate)										
	Composting	Land recovery	Landfill	Recycling	Reuse	Thermal Treatment with Energy Recovery	Thermal Treatment without Energy Recovery	Transfer station	Treatment plant	Unknown	Total
Animal & Vegetable Wastes	16,416	134	9,201	21,691	32,990	505	609	0	14,276	3,623	**99,446**
Chemical Wastes	18,035	86,467	86,174	21,206	2,674	140,546	6,862	471	44,518	24,409	**431,363**
Common sludges	11,311	30,946	4,956	0	0	80	0	0	175	132	**47,601**
Discarded equipment	0	0	1,477	18,934	1,493	0	58	1	1,020	1,392	**24,375**
Health Care	0	0	2,242	354	0	1,074	19,817	0	1,726	4,696	**29,910**
Metallic wastes	0	0	17	164,583	4,471	0	14	0	250	14,047	**183,382**
Mineral wastes	0	11,681	112,264	44,323	10,146	5,480	100	0	2,748	27,757	**214,500**
Mixed (ordinary) wastes	270	11,098	501,121	120,093	0	1,137	702	1,311	1,168	68,989	**705,889**
Non-metallic wastes	824	7	5,632	408,957	20,234	1,113	189	716	625	1,592	**439,890**
Non-Wastes	0	0	0	230	0	0	0	0	0	2	**232**
Total	**46,856**	**140,332**	**723,085**	**800,372**	**72,008**	**149,935**	**28,353**	**2,499**	**66,508**	**146,639**	**2,176,587**

Figure 14: Estimate of North East C&I waste arisings, by waste type and waste management method (in tonnes)

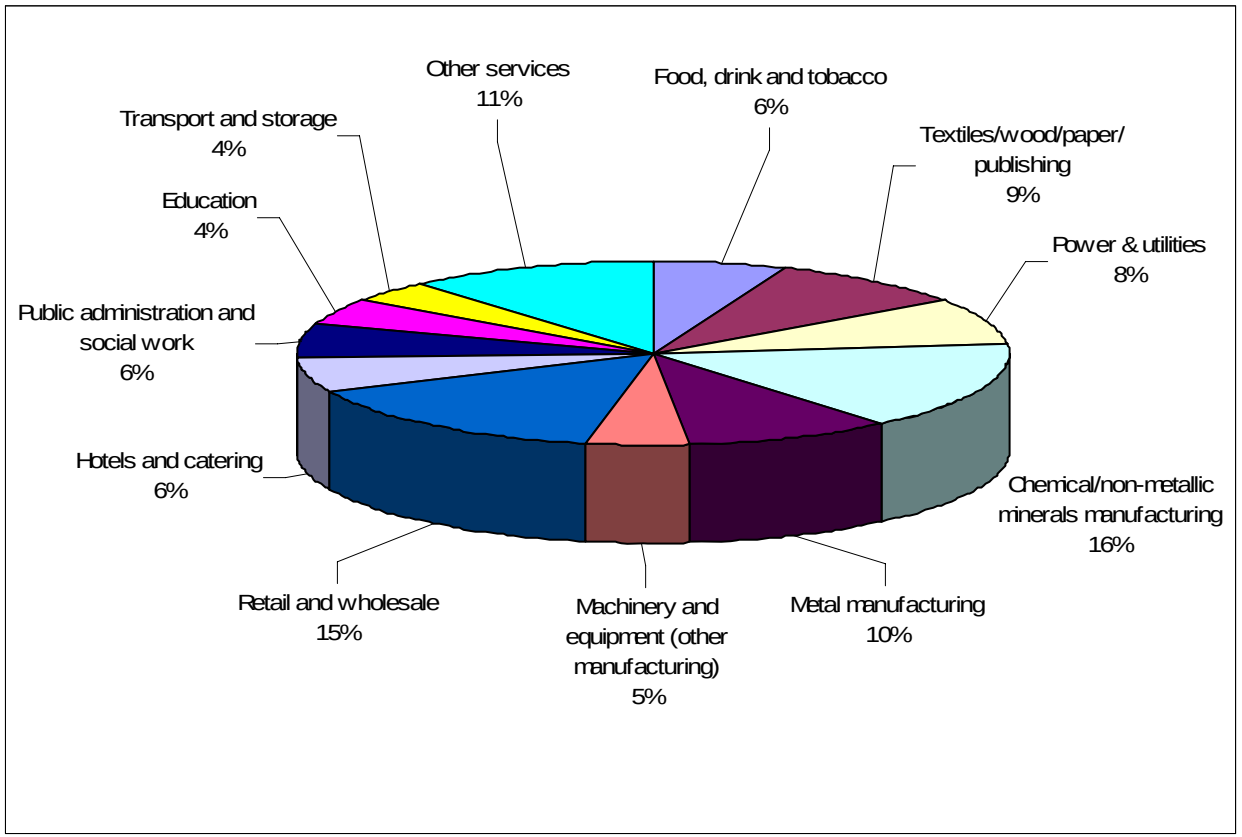

Figure 15: North East C&I waste arisings, by sector (% of total)

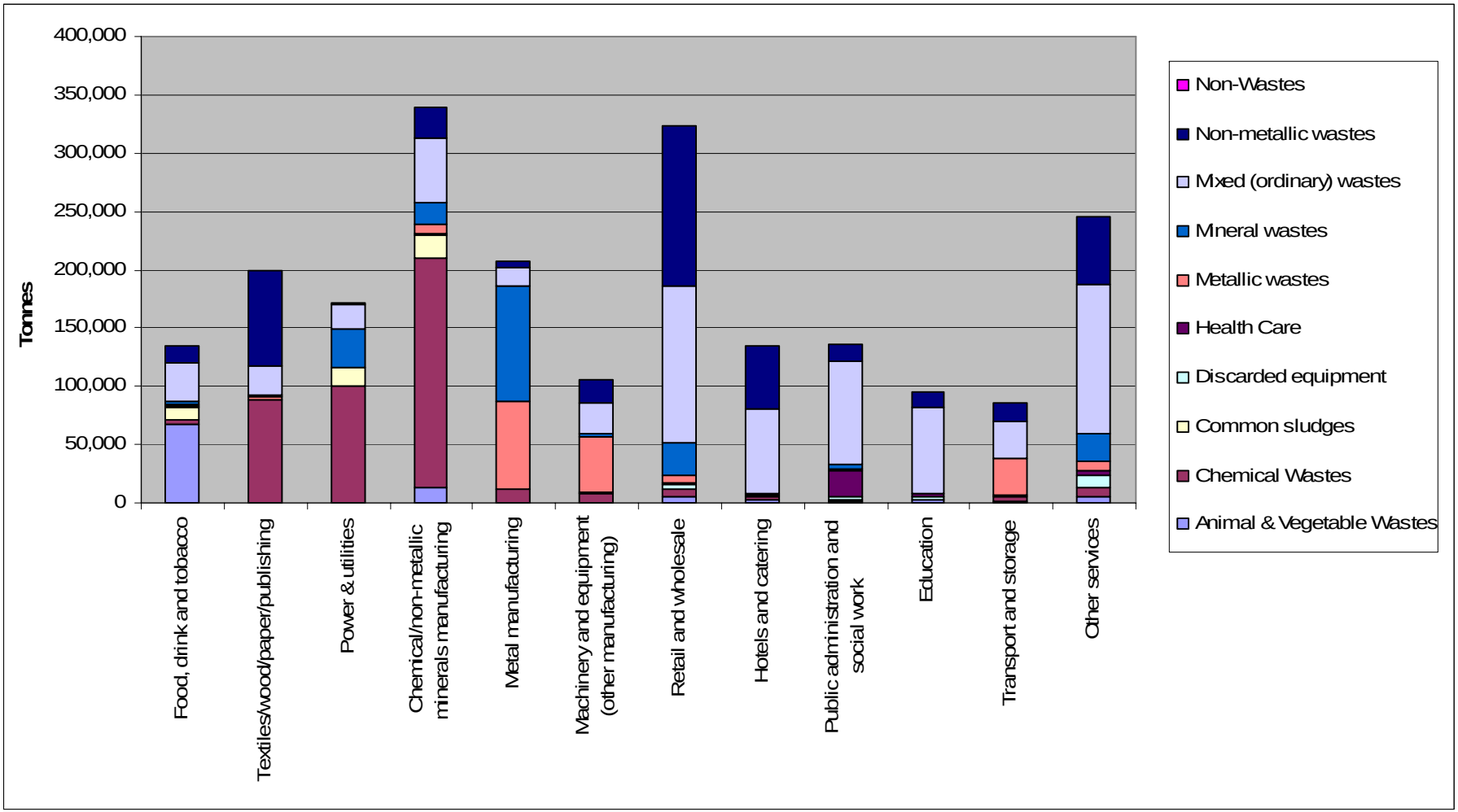

Figure 16: North East C&I waste arisings, by sector and waste type (stacked bar chart)

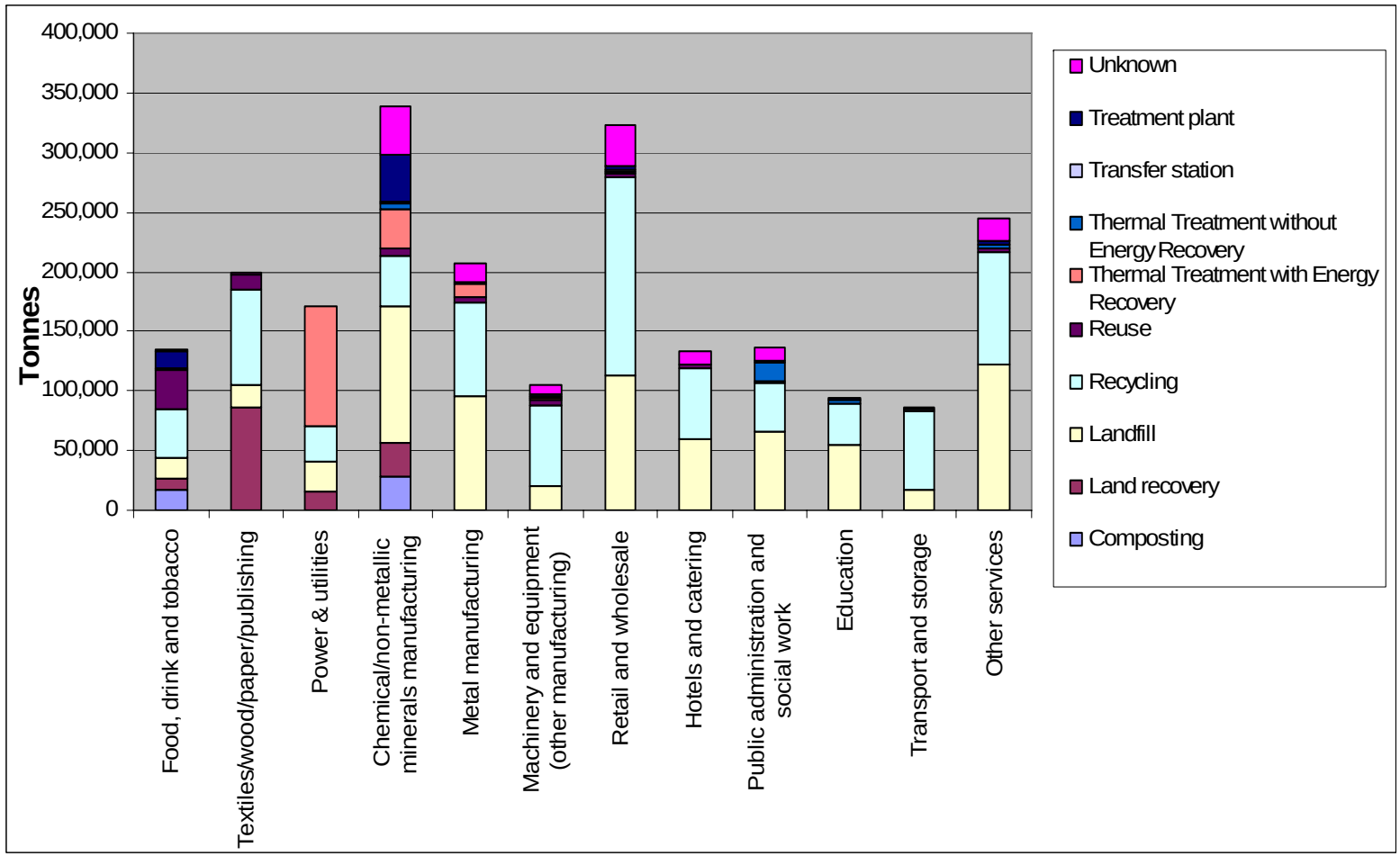

Figure 17: North East C&I waste arisings, by sector and waste management method (stacked bar chart)

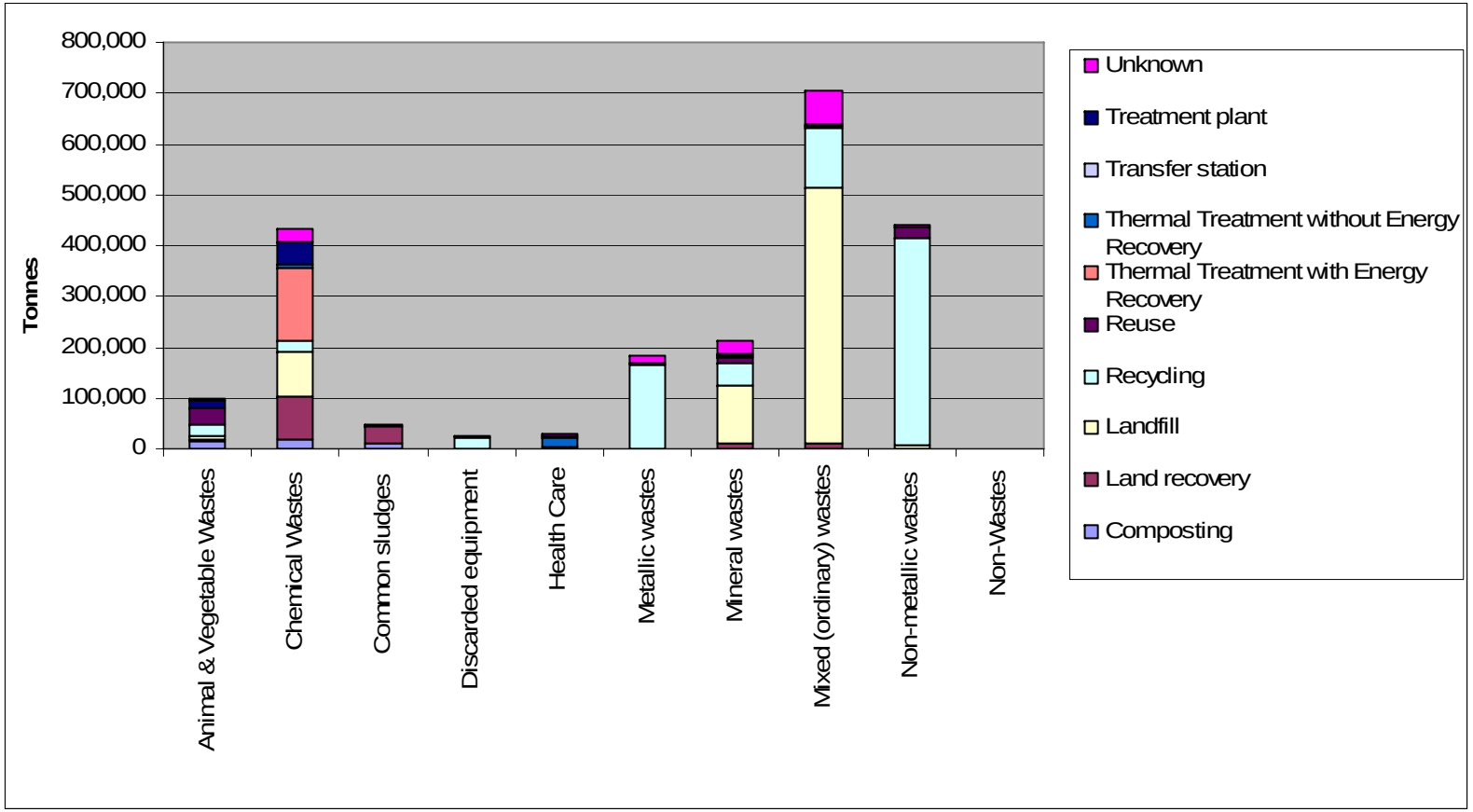

Figure 18: North East C&I waste arisings, by waste type (SOC group) and waste management method (stacked bar chart)

3.2 Tyne & Wear

Sector group	Company size (number of employees)							
	0 - 4	5 - 9	10 - 19	20 - 49	50 - 99	100 - 249	250+	Total
Food, drink and tobacco	80	153	622	4,050	6,943	14,455	14,862	**41,165**
Textiles/wood/paper/publishing	2,450	2,064	4,928	1,921	5,090	34,178	0	**50,631**
Power & Utilities	275	480	473	0	0	68,597	3,996	**73,821**
Chemical/non-metallic minerals manufacturing	1,014	1,092	718	36,456	8,106	40,759	5,695	**93,839**
Metal manufacturing	560	697	4,015	9,899	3,851	16,312	68,660	**103,995**
Machinery & equipment (other manufacturing)	903	942	2,342	6,782	7,036	12,410	24,378	**54,793**
Retail & wholesale	16,416	20,590	29,142	24,626	19,555	15,220	25,343	**150,892**
Hotels and catering	5,303	8,264	16,063	16,654	11,644	1,850	0	**59,779**
Public administration and social work	2,044	4,166	4,906	13,957	7,076	14,587	10,807	**57,542**
Education	265	357	1,755	8,196	4,403	16,984	7,003	**38,963**
Transport and storage	1,079	756	2,506	1,847	3,616	19,404	11,254	**40,462**
Other services	18,781	14,312	20,347	23,863	19,877	12,817	17,541	**127,539**
Total	**49,169**	**53,873**	**87,818**	**148,251**	**97,198**	**267,574**	**189,539**	**893,421**

Figure 19: Estimate of C&I waste arisings in Tyne & Wear, by sector and employee size band (in tonnes)

Sector Group	Waste Type										
	Animal & Vegetable Wastes	Chemical Wastes	Common sludges	Discarded equipment	Health Care	Metallic wastes	Mineral wastes	Mixed (ordinary) wastes	Non-metallic wastes	Non-Wastes	Total
Food, drink and tobacco	20,735	1,066	3,268	517	2	169	952	10,060	4,397	0	**41,165**
Textiles/wood/paper/publishing	81	22,342	109	17	6	669	205	6,603	20,600	0	**50,631**
Power & utilities	0	43,410	6,508	147	0	17	13,976	9,478	285	0	**73,821**
Chemical/non-metallic minerals manufacturing	3,511	54,473	5,635	96	163	2,178	5,413	15,296	7,073	0	**93,839**
Metal manufacturing	27	5,947	0	198	8	37,869	49,519	7,783	2,645	0	**103,995**
Machinery and equipment (other manufacturing)	302	3,777	0	448	14	24,780	1,808	13,931	9,733	0	**54,793**
Retail and wholesale	2,388	3,351	0	1,810	153	3,492	12,747	62,581	64,371	0	**150,892**
Hotels and catering	1,277	1,283	38	299	105	255	0	32,757	23,764	0	**59,779**
Public administration and social work	358	395	344	1,035	9,347	583	1,985	37,072	6,421	0	**57,542**
Education	1,047	45	0	824	1,263	87	217	30,080	5,400	0	**38,963**
Transport and storage	614	1,865	62	696	61	14,457	122	14,948	7,529	108	**40,462**
Other services	2,756	4,388	0	5,295	1,752	4,575	12,281	66,069	30,423	0	**127,539**
Total	**33,095**	**142,342**	**15,965**	**11,380**	**12,875**	**89,131**	**99,226**	**306,658**	**182,641**	**108**	**893,421**

Figure 20: Estimate of C&I waste arisings in Tyne & Wear, by sector and waste type (in tonnes)

Sector Group	Waste Management										
	Composting	Land recovery	Landfill	Recycling	Reuse	Thermal Treatment with Energy Recovery	Thermal Treatment without Energy Recovery	Transfer station	Treatment plant	Unknown	Total
Food, drink and tobacco	10,257	41	8,271	7,126	10,486	283	68	0	4,035	599	**41,165**
Textiles/wood/paper/publishing	26	21,957	4,636	20,612	2,858	54	38	30	131	289	**50,631**
Power & utilities	0	4,998	12,486	12,714	212	43,374	14	0	22	1	**73,821**
Chemical/non-metallic minerals manufacturing	8,074	5,392	33,908	11,900	1,723	8,930	1,288	316	11,049	11,260	**93,839**
Metal manufacturing	0	0	47,847	39,635	2,573	5,362	41	88	639	7,809	**103,995**
Machinery and equipment (other manufacturing)	218	0	10,470	34,927	2,336	1,361	289	326	1,093	3,774	**54,793**
Retail and wholesale	8	0	52,905	77,436	1,287	231	773	102	1,570	16,579	**150,892**
Hotels and catering	761	0	26,584	25,975	1,189	8	140	2	171	4,950	**59,779**
Public administration and social work	88	0	28,105	16,997	270	453	6,280	0	667	4,680	**57,542**
Education	176	0	22,879	13,759	280	12	1,134	69	269	384	**38,963**
Transport and storage	598	0	8,261	30,204	185	0	41	22	512	638	**40,462**
Other services	880	4	62,857	48,501	1,562	499	1,554	0	1,257	10,425	**127,539**
Total	**21,087**	**32,391**	**319,209**	**339,786**	**24,961**	**60,567**	**11,662**	**956**	**21,415**	**61,388**	**893,421**

Figure 21: Estimate of C&I waste arisings in Tyne & Wear, by sector and waste management method (in tonnes)

3.3 Tees Valley

Sector Group	Company size (Number of employees)							
	0 - 4	5 - 9	10 - 19	20 - 49	50 - 99	100 - 249	250+	Total
Food, drink and tobacco	29	153	415	6,074	3,472	14,455	0	**24,598**
Textiles/wood/paper/publishing	1,134	794	3,696	720	1,272	0	107,261	**114,878**
Power & Utilities	275	480	0	6,618	11,912	68,597	0	**87,883**
Chemical/non-metallic minerals manufacturing	585	819	410	24,304	8,106	40,759	17,086	**92,068**
Metal manufacturing	560	349	3,011	4,949	1,926	5,437	68,660	**84,892**
Machinery & equipment (other manufacturing)	510	576	1,102	2,422	2,010	4,137	0	**10,757**
Retail & wholesale	9,158	12,241	17,521	15,065	9,386	10,147	10,861	**84,379**
Hotels and catering	2,712	5,368	7,458	8,327	5,434	617	622	**30,538**
Public administration and social work	1,134	2,240	2,716	8,578	5,612	8,205	5,895	**34,379**
Education	175	179	683	4,381	4,403	13,064	2,334	**25,218**
Transport and storage	751	427	2,327	1,421	4,133	16,170	2,813	**28,042**
Other services	12,125	7,780	10,520	12,769	8,393	6,152	5,482	**63,220**
Total	**29,147**	**31,405**	**49,859**	**95,629**	**66,059**	**187,740**	**221,013**	**680,853**

Figure 22: Estimate of C&I waste arisings in Tees Valley, by sector and employee size band (in tonnes)

Sector Group	Waste Type										
	Animal & Vegetable Wastes	Chemical Wastes	Common sludges	Discarded equipment	Health Care	Metallic wastes	Mineral wastes	Mixed (ordinary) wastes	Non-metallic wastes	Non-Wastes	Total
Food, drink and tobacco	12,390	637	1,953	309	1	101	569	6,011	2,627	0	**24,598**
Textiles/wood/paper/publishing	183	50,693	247	38	13	1,518	466	14,981	46,739	0	**114,878**
Power & utilities	0	51,679	7,748	175	0	20	16,638	11,284	339	0	**87,883**
Chemical/non-metallic minerals manufacturing	3,444	53,445	5,529	94	160	2,137	5,311	15,007	6,940	0	**92,068**
Metal manufacturing	22	4,854	0	161	7	30,913	40,423	6,353	2,159	0	**84,892**
Machinery and equipment (other manufacturing)	59	742	0	88	3	4,865	355	2,735	1,911	0	**10,757**
Retail and wholesale	1,335	1,874	0	1,012	85	1,953	7,128	34,996	35,997	0	**84,379**
Hotels and catering	652	656	19	153	54	130	0	16,734	12,140	0	**30,538**
Public administration and social work	214	236	206	618	5,585	349	1,186	22,149	3,837	0	**34,379**
Education	678	29	0	533	817	56	141	19,469	3,495	0	**25,218**
Transport and storage	426	1,292	43	482	43	10,019	84	10,360	5,218	75	**28,042**
Other services	1,366	2,175	0	2,625	868	2,268	6,088	32,750	15,081	0	**63,220**
Total	**20,770**	**168,311**	**15,745**	**6,288**	**7,636**	**54,328**	**78,389**	**192,829**	**136,481**	**75**	**680,853**

Figure 23: Estimate of C&I waste arisings in Tees Valley, by sector and waste type (in tonnes)

Sector Group	Waste Management										
	Composting	Land recovery	Landfill	Recycling	Reuse	Thermal Treatment with Energy Recovery	Thermal Treatment without Energy Recovery	Transfer station	Treatment plant	Unknown	Total
Food, drink and tobacco	6,129	24	4,942	4,258	6,266	169	40	0	2,411	358	**24,598**
Textiles/wood/paper/publishing	60	49,818	10,519	46,767	6,485	122	86	69	297	655	**114,878**
Power & utilities	0	5,950	14,865	15,135	253	51,636	17	0	26	1	**87,883**
Chemical/non-metallic minerals manufacturing	7,922	5,290	33,268	11,676	1,690	8,762	1,263	310	10,840	11,047	**92,068**
Metal manufacturing	0	0	39,058	32,355	2,101	4,377	34	72	522	6,375	**84,892**
Machinery and equipment (other manufacturing)	43	0	2,055	6,857	459	267	57	64	214	741	**10,757**
Retail and wholesale	5	0	29,585	43,303	720	129	432	57	878	9,271	**84,379**
Hotels and catering	389	0	13,580	13,269	607	4	72	1	87	2,529	**30,538**
Public administration and social work	53	0	16,792	10,155	161	271	3,752	0	399	2,796	**34,379**
Education	114	0	14,808	8,905	181	8	734	45	174	248	**25,218**
Transport and storage	414	0	5,725	20,933	128	0	29	15	355	442	**28,042**
Other services	436	2	31,158	24,041	774	247	771	0	623	5,168	**63,220**
Total	**15,564**	**61,085**	**216,355**	**237,654**	**19,825**	**65,992**	**7,286**	**633**	**16,827**	**39,631**	**680,853**

Figure 24: Estimate of C&I waste arisings in Tees Valley, by sector and waste management method (in tonnes)

3.4 County Durham

Sector Group	Company Size (Number of employees)							
	0 - 4	5 - 9	10 - 19	20 - 49	50 - 99	100 - 249	250+	Total
Food, drink and tobacco	51	153	415	4,050	0	28,909	14,862	**48,440**
Textiles/wood/paper/publishing	907	794	3,080	480	1,272	11,393	0	**17,927**
Power & Utilities	549	961	473	0	0	0	0	**1,983**
Chemical/non-metallic minerals manufacturing	468	955	513	36,456	6,080	61,138	0	**105,610**
Metal manufacturing	274	261	2,008	4,949	1,926	5,437	0	**14,855**
Machinery & equipment (other manufacturing)	495	576	827	2,907	3,015	6,205	12,189	**26,214**
Retail & wholesale	8,147	8,845	11,621	8,692	5,475	3,805	7,241	**53,826**
Hotels and catering	2,672	7,417	5,737	6,245	3,881	617	0	**26,569**
Public administration and social work	999	1,808	2,190	6,688	3,416	5,470	5,895	**26,466**
Education	120	161	2,536	4,240	1,622	9,145	2,334	**20,157**
Transport and storage	1,014	460	1,611	995	1,550	6,468	2,813	**14,910**
Other services	7,608	5,117	5,665	5,861	2,650	2,051	3,289	**32,241**
Total	**23,304**	**27,507**	**36,674**	**81,561**	**30,888**	**140,639**	**48,623**	**389,197**

Figure 25: Estimate of C&I waste arisings in Durham, by sector and employee size band (in tonnes)

Sector Group	Waste Type										
	Animal & Vegetable Wastes	Chemical Wastes	Common sludges	Discarded equipment	Health Care	Metallic wastes	Mineral wastes	Mixed (ordinary) wastes	Non-metallic wastes	Non-Wastes	Total
Food, drink and tobacco	24,400	1,254	3,846	608	2	198	1,121	11,837	5,173	0	**48,440**
Textiles/wood/paper/publishing	29	7,911	39	6	2	237	73	2,338	7,294	0	**17,927**
Power & utilities	0	1,166	175	4	0	0	375	255	8	0	**1,983**
Chemical/non-metallic minerals manufacturing	3,951	61,306	6,342	108	184	2,451	6,092	17,215	7,960	1	**105,610**
Metal manufacturing	4	849	0	28	1	5,409	7,074	1,112	378	0	**14,855**
Machinery and equipment (other manufacturing)	145	1,807	0	214	7	11,855	865	6,665	4,657	0	**26,214**
Retail and wholesale	852	1,195	0	646	54	1,246	4,547	22,324	22,962	0	**53,826**
Hotels and catering	568	570	17	133	47	113	0	14,559	10,562	0	**26,569**
Public administration and social work	165	182	158	476	4,299	268	913	17,051	2,953	0	**26,466**
Education	542	23	0	426	653	45	112	15,562	2,794	0	**20,157**
Transport and storage	226	687	23	256	23	5,327	45	5,508	2,775	40	**14,910**
Other services	697	1,109	0	1,339	443	1,157	3,104	16,702	7,691	0	**32,241**
Total	**31,576**	**78,060**	**10,600**	**4,244**	**5,716**	**28,308**	**24,321**	**131,126**	**75,206**	**40**	**389,197**

Figure 26: Estimate of C&I waste arisings in Durham, by sector and waste type (in tonnes)

Sector Group	Waste Management										
	Composting	Land recovery	Landfill	Recycling	Reuse	Thermal Treatment with Energy Recovery	Thermal Treatment without Energy Recovery	Transfer station	Treatment plant	Unknown	Total
Food, drink and tobacco	12,070	48	9,732	8,385	12,339	333	80	0	4,749	705	**48,440**
Textiles/wood/paper/publishing	9	7,774	1,641	7,298	1,012	19	13	11	46	102	**17,927**
Power & utilities	0	134	335	341	6	1,165	0	0	1	0	**1,983**
Chemical/non-metallic minerals manufacturing	9,087	6,068	38,161	13,393	1,939	10,051	1,449	355	12,435	12,672	**105,610**
Metal manufacturing	0	0	6,835	5,662	368	766	6	13	91	1,116	**14,855**
Machinery and equipment (other manufacturing)	104	0	5,009	16,709	1,118	651	138	156	523	1,805	**26,214**
Retail and wholesale	3	0	18,872	27,623	459	82	276	37	560	5,914	**53,826**
Hotels and catering	338	0	11,815	11,544	528	3	62	1	76	2,200	**26,569**
Public administration and social work	41	0	12,926	7,818	124	209	2,889	0	307	2,153	**26,466**
Education	91	0	11,836	7,118	145	6	587	36	139	198	**20,157**
Transport and storage	220	0	3,044	11,130	68	0	15	8	189	235	**14,910**
Other services	222	1	15,890	12,261	395	126	393	0	318	2,635	**32,241**
Total	**22,186**	**14,026**	**136,098**	**129,283**	**18,500**	**13,411**	**5,908**	**616**	**19,432**	**29,736**	**389,197**

Figure 27: Estimate of C&I waste arisings in Durham, by sector and waste management method (in tonnes)

3.5 Northumberland

Sector Group	Company Size (Number of employees)							
	0 - 4	5 - 9	10 - 19	20 - 49	50 - 99	100 - 249	250+	Total
Food, drink and tobacco	22	76	415	2,025	3,472	14,455	0	**20,464**
Textiles/wood/paper/publishing	907	635	1,232	240	1,272	11,393	0	**15,680**
Power & Utilities	137	0	946	6,618	0	0	0	**7,701**
Chemical/non-metallic minerals manufacturing	351	273	205	18,228	2,027	20,379	5,695	**47,158**
Metal manufacturing	212	87	669	2,475	0	0	0	**3,443**
Machinery & equipment (other manufacturing)	379	262	551	1,938	2,010	2,068	6,094	**13,302**
Retail & wholesale	5,883	5,873	7,688	5,215	3,911	2,537	3,620	**34,726**
Hotels and catering	2,166	3,532	5,163	4,164	1,553	617	0	**17,194**
Public administration and social work	775	1,533	1,533	4,943	2,440	4,558	1,965	**17,747**
Education	105	125	1,268	2,544	2,317	3,919	0	**10,278**
Transport and storage	526	361	895	710	517	0	0	**3,009**
Other services	6,526	3,911	4,740	3,349	1,767	1,025	1,096	**22,414**
Total	**17,987**	**16,668**	**25,305**	**52,449**	**21,285**	**60,952**	**18,471**	**213,117**

Figure 28: Estimate of C&I waste arisings in Northumberland, by sector and employee size band (in tonnes)

Sector Group	Waste Type										
	Animal & Vegetable Wastes	Chemical Wastes	Common sludges	Discarded equipment	Health Care	Metallic wastes	Mineral wastes	Mixed (ordinary) wastes	Non-metallic wastes	Non-Wastes	Total
Food, drink and tobacco	10,308	530	1,625	257	1	84	473	5,001	2,186	0	**20,464**
Textiles/wood/paper/publishing	25	6,919	34	5	2	207	64	2,045	6,379	0	**15,680**
Power & utilities	0	4,529	679	15	0	2	1,458	989	30	0	**7,701**
Chemical/non-metallic minerals manufacturing	1,764	27,375	2,832	48	82	1,095	2,720	7,687	3,555	0	**47,158**
Metal manufacturing	1	197	0	7	0	1,254	1,639	258	88	0	**3,443**
Machinery and equipment (other manufacturing)	73	917	0	109	3	6,016	439	3,382	2,363	0	**13,302**
Retail and wholesale	549	771	0	416	35	804	2,934	14,403	14,814	0	**34,726**
Hotels and catering	367	369	11	86	30	73	0	9,421	6,835	0	**17,194**
Public administration and social work	110	122	106	319	2,883	180	612	11,434	1,980	0	**17,747**
Education	276	12	0	217	333	23	57	7,935	1,424	0	**10,278**
Transport and storage	46	139	5	52	5	1,075	9	1,112	560	8	**3,009**
Other services	484	771	0	931	308	804	2,158	11,611	5,347	0	**22,414**
Total	**14,005**	**42,650**	**5,291**	**2,462**	**3,683**	**11,616**	**12,564**	**75,276**	**45,561**	**8**	**213,117**

Figure 29: Estimate of C&I waste arisings in Northumberland, by sector and waste type (in tonnes)

Sector Group	Waste Management										
	Composting	Land recovery	Landfill	Recycling	Reuse	Thermal Treatment with Energy Recovery	Thermal Treatment without Energy Recovery	Transfer station	Treatment plant	Unknown	Total
Food, drink and tobacco	5,099	20	4,112	3,543	5,213	141	34	0	2,006	298	**20,464**
Textiles/wood/paper/publishing	8	6,800	1,436	6,383	885	17	12	9	41	89	**15,680**
Power & utilities	0	521	1,303	1,326	22	4,525	1	0	2	0	**7,701**
Chemical/non-metallic minerals manufacturing	4,058	2,710	17,040	5,980	866	4,488	647	159	5,552	5,659	**47,158**
Metal manufacturing	0	0	1,584	1,312	85	177	1	3	21	259	**3,443**
Machinery and equipment (other manufacturing)	53	0	2,542	8,479	567	331	70	79	265	916	**13,302**
Retail and wholesale	2	0	12,176	17,821	296	53	178	24	361	3,816	**34,726**
Hotels and catering	219	0	7,646	7,471	342	2	40	1	49	1,424	**17,194**
Public administration and social work	27	0	8,668	5,242	83	140	1,937	0	206	1,443	**17,747**
Education	46	0	6,035	3,630	74	3	299	18	71	101	**10,278**
Transport and storage	44	0	614	2,246	14	0	3	2	38	47	**3,009**
Other services	155	1	11,047	8,524	275	88	273	0	221	1,832	**22,414**
Total	**9,711**	**10,052**	**74,202**	**71,958**	**8,722**	**9,964**	**3,496**	**294**	**8,834**	**15,884**	**213,117**

Figure 30: Estimate of C&I waste arisings in Northumberland, by sector and waste management method (in tonnes)

4 Other survey data analysis

4.1 Source of data

For the grossed tonnages presented in this report, as reported elsewhere, tonnages came from a combination of sources of data, including:

- Results from 1,000 face to face and telephone surveys (357 by telephone, 643 by survey visit) plus data from 36 large retail supermarkets (provided by the operating companies)
- Data collated for the North East region during the Defra National survey, which was used to supplement and fill gaps in our survey data. This data was based upon a number of sources, including PPC data from the Environment Agency and other sources as well as direct survey data. This dataset therefore tended to cover the larger companies and larger waste producers in the region. This was used to fill gaps in the Urban Mines survey data
- Estimates for micro companies (i.e. 1-4 company size band) that were not surveyed
- Estimates for bricks in which data was not available in both surveys (i.e. power and utilities 50-99).

Figure 31 below presents results from both surveys, including waste estimates for micro companies and estimates made for bricks that were lacking survey data. Details of how Defra data was incorporated and waste estimates for the micro companies and missing bricks are presented in detail in Appendix 8.

Data Source	Samples	Survey Data (tonnes)	Grossed Data (tonnes)
Urban Mines Survey	1036	191,432	1,104,692
National Survey (Defra)	276	646,182	940,377
Estimated 1-4s	-	1,169	119,606
Estimated Power & Utilities 50-99	-	8,339	11,912
Total	**1,312**	**847,122**	**2,176,587**

Figure 31: Data Sources (in tonnes)

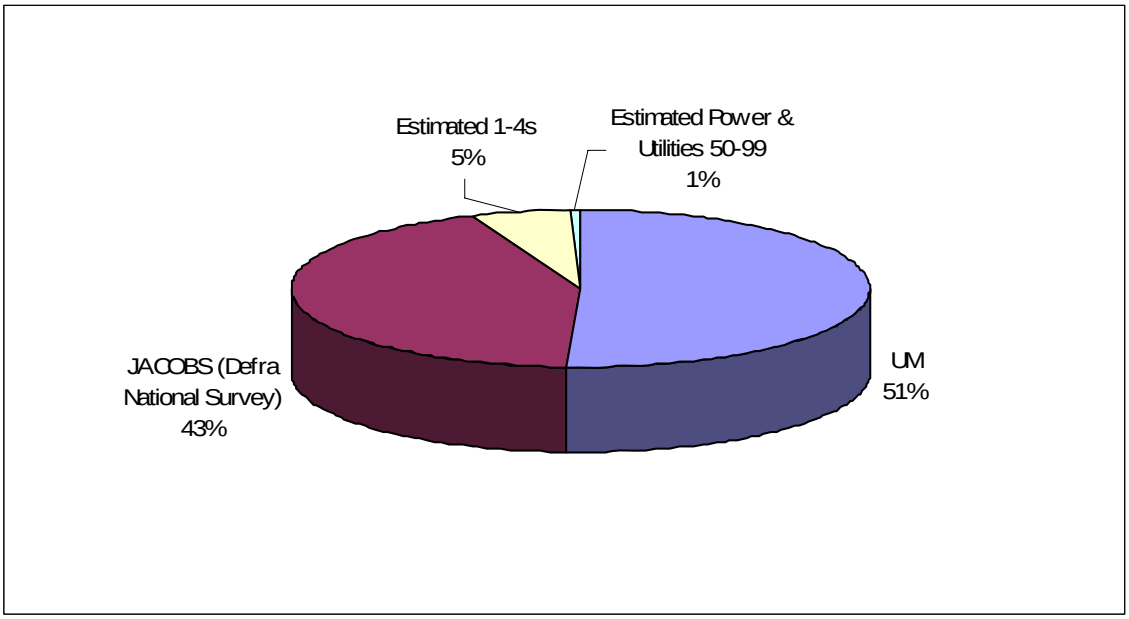

Figure 32: Data Sources (%) based upon grossed tonnages

During the survey, for each waste stream recorded, the source of the tonnage data entered was also recorded. The surveyors were told to ask for written evidence of tonnage where possible, for instance from waste management invoices, weighbridge receipts, transfer notes, consignment notes.

When such data was not available, a calculator built into the survey software calculated tonnages using standard container sizes (summarised in Appendix 5), conversion factors (a measure of specific gravity or density, summarised in Appendix 6) and standard items (summarised in Appendix 7).

When the calculator was used, estimates based on company information (i.e. the company provides details of number of containers and frequency of collection) were recorded as 'Company Estimate'. If the surveyor made some or all the assumptions themselves then data was recorded as 'Surveyor Estimate'.

The conversion factors used are consistent with those used in the previous surveys undertaken by Urban Mines, and in turn with those used for the recent national survey. All of the individual waste stream data has recorded, if applicable, the conversion factors and container sizes used for the tonnage calculations, so should conversion factors be revised in the future, the resultant tonnages can be recalculated.

From the Urban Mines survey data, the following data sources were used to calculate the grossed up tonnages:

Data Sources	Survey Data	Grossed Data
Company estimate	57,063	622,712
Surveyor's estimate	303	5,700
Written records	134,066	936,800
Total	**191,432**	**1,565,212**

Figure 27: Urban Mines sources of survey data (in tonnes)

Therefore, of the waste stream data recorded in Urban Mines survey data, 59.85% of the surveyed tonnage came from written records, 39.78% from company estimates (using tonnage calculator) and only 0.36% from surveyor estimates (also using tonnage calculator).

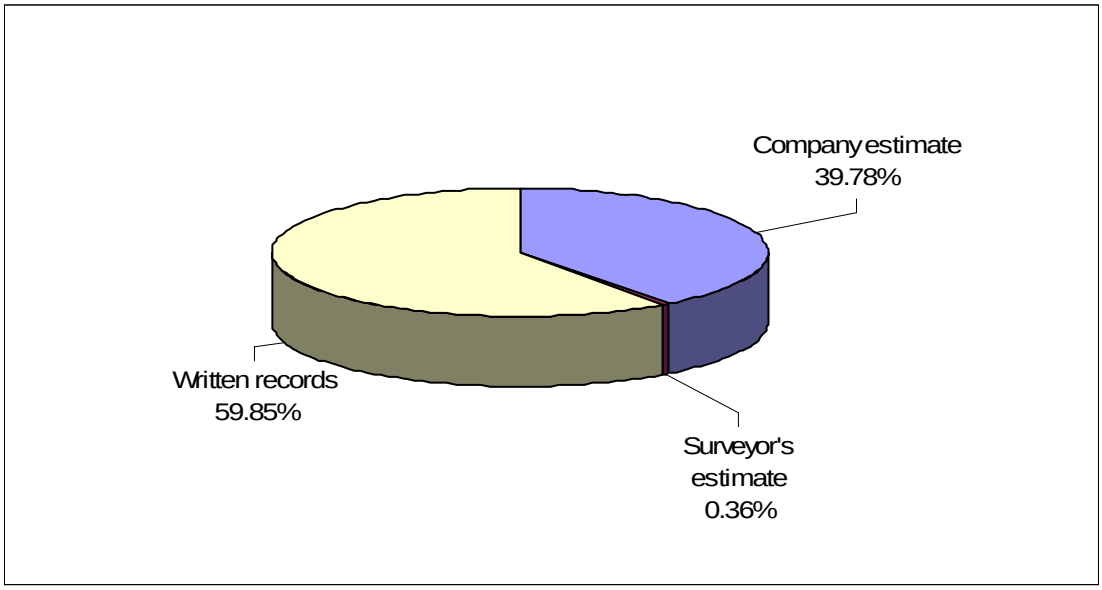

Figure 28: Urban Mines source of waste stream tonnage data (as %)

When combined with the National C&I survey data, from Defra, data source is less clear due to specific data missing from the dataset. The national survey data sources included:

- "Company records" and "waste collector returns", which were classified as "written records" for incorporation with Urban Mines survey data
- A general classification of "Other" which includes data from PPC and corporate sources – this made up a significant proportion of the North East data from the National Survey.

Therefore, the source of the data used to calculate the final grossed figures is as follows:

Source	Survey Data	Grossed Data
Company estimate	62,810	566,492
Surveyor's estimate	304	4,900
Written records	276,868	963,683
Other (National Survey Data)	507,140	641,512
Total	**847,122**	**2,176,587**

Figure 33: Source of survey data (in tonnes)

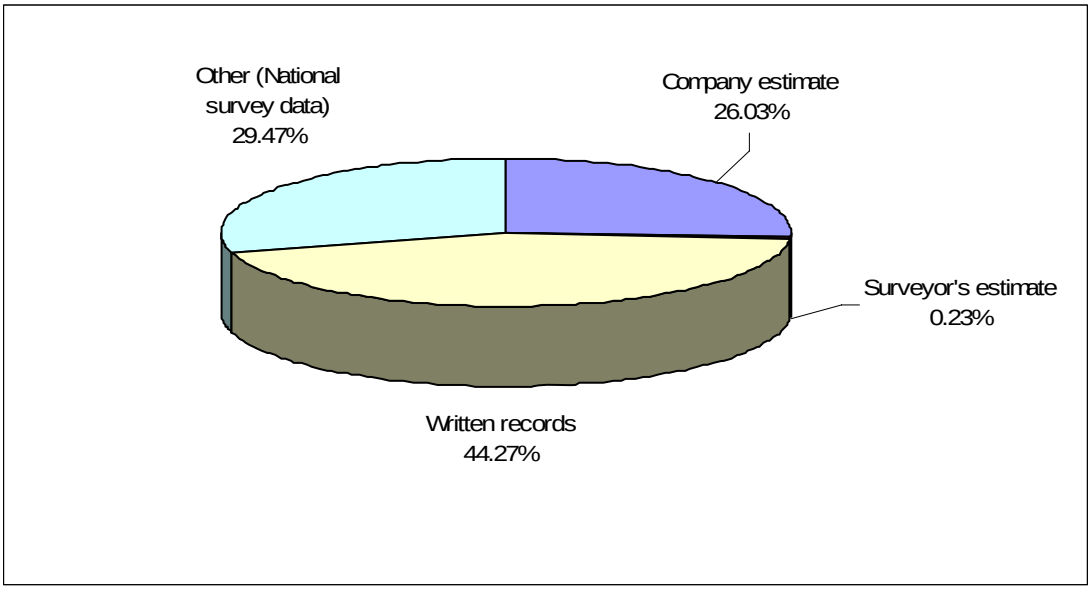

Figure 30: Source of survey data (in tonnes)

4.2 Nature of waste

The survey recorded the nature of each waste stream (as hazardous or non-hazardous) backed up if possible with consignment notes. These results are presented in figure 40 below.

Of the waste streams recorded, a grossed tonnage of 222,520 tonnes (10% of the total) of hazardous waste was recorded.

	Survey Data (tonnes)	Grossed Data (tonnes)
Hazardous	70,018	222,520
Non-Hazardous	777,104	1,954,067
Total	**847,122**	**2,176,587**

Figure 34: Nature of waste (in tonnes)

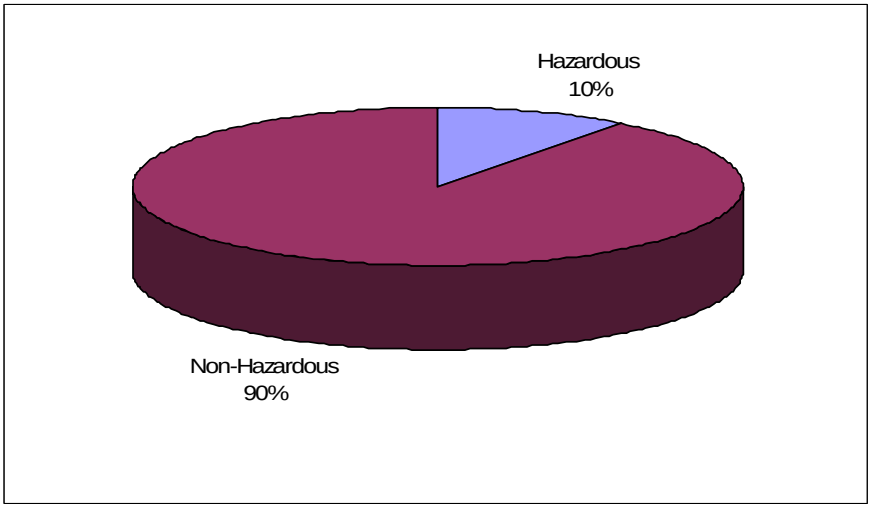

Figure 35: Nature of waste (as %)

4.3 Potential to recycle

During the survey visits, each waste stream recorded was assessed in terms of its propensity to be recycled, against a given set of criteria. These criteria are summarised in Appendix 9, and are based upon the composition of the waste stream, its state, and whether more work would be required to recycle the material or not.

The results obtained (based on grossed up data) are summarised in the following figures. By grossing up the data we have assumed that all businesses in a sector have similar waste management practices and therefore the waste has the same potential or not to be recycled. The results presented in the following figures are based on data for both the Urban Mines and National surveys, estimates for micro companies and estimates for companies with 50-99 employees in the power and utilities sector.

If recorded as 'recyclable' the waste contains mainly recyclable material which could easily be extracted for recycling. If recorded as 'possibly recyclable' the material contains a mixture of recyclable and non-recyclable material and requires treatment by the producer or post-collection to retrieve the recyclable materials.

Based on the results from the Urban Mines survey data, the figures below show the potential to recycle.

	Survey data	Grossed data
Currently recycled	104,454	744,833
Not recyclable	3,288	36,734
Possibly recyclable	50,148	571,494
Recyclable	33,543	212,151
Total	**191,432**	**1,565,212**

Figure 36: Potential to recycle, all wastes (in tonnes), based on Urban Mines survey data

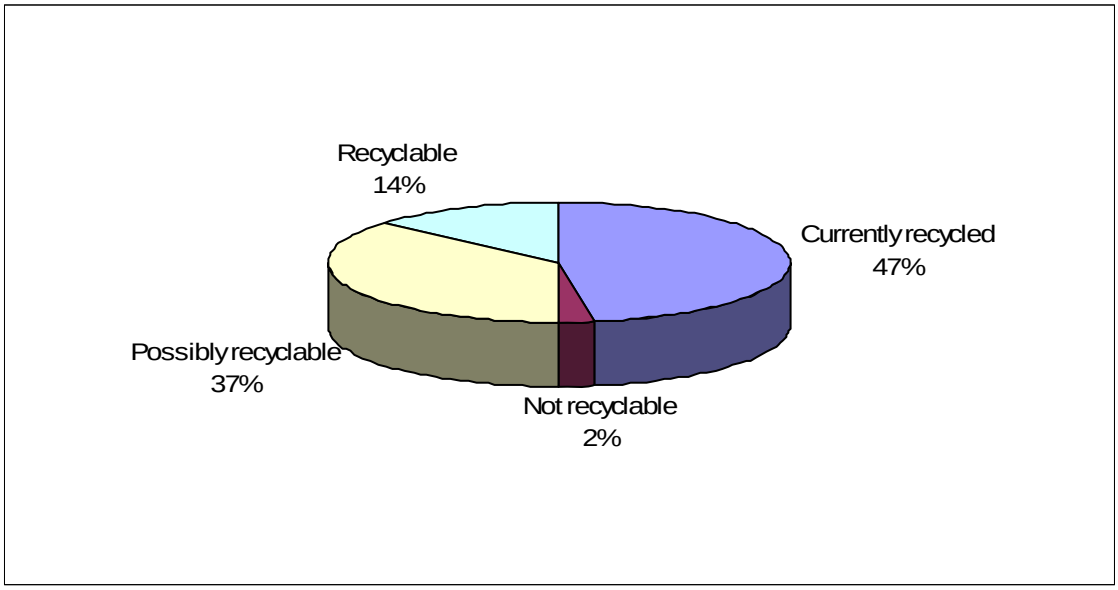

Figure 37: Potential to recycle, all wastes (as %), based on Urban Mines survey data

When combined with the National survey data, of the total grossed tonnages, 787,005 tonnes is not currently recycled, with 513,659 tonnes of this recorded as "possibly recyclable" and 204,464 tonnes recorded as "recyclable". The category recorded as "Don't Know" was recorded in the National survey data and includes lines of data that were unclassified.

	Survey Data	Grossed Data
Currently recycled	199,967	747,993
Not recyclable	22,795	68,882
Possibly recyclable	55,673	513,659
Recyclable	51,528	204,464
Don't Know (National survey)	517,159	641,590
Total	**847,122**	**2,176,587**

Figure 38: Potential to recycle, all wastes (in tonnes)

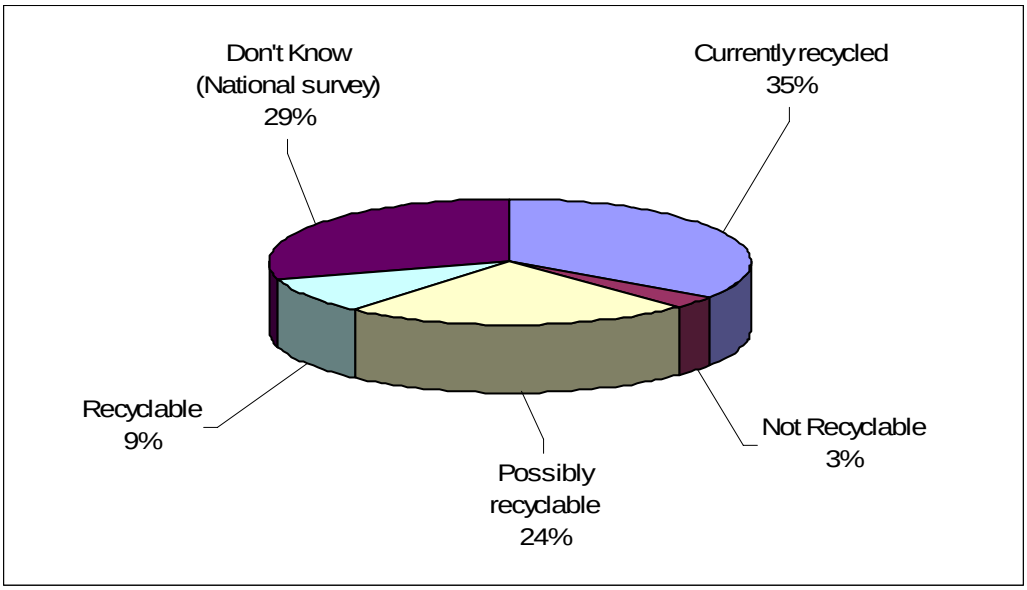

Figure 39: Potential to recycle, all wastes (as %)

Recycling Potential of Landfilled Material

However, of particular interest is the waste which is currently being landfilled, which could potentially be recycled.

Filtering out potential to recycle results from the Urban Mines survey dataset showed that 36,108 tonnes of the 501,837 tonnes of waste that goes to landfill is readily recyclable (i.e. recorded as 'recyclable'), with 457,151 tonnes requiring further work (e.g. separation at a MRF) to facilitate recycling of this material (i.e. recorded as 'possibly recyclable'). Hence the recorded data suggests that up to 98.3% of the C&I waste landfilled in the region could be recycled if the correct facilities and services were available.

	Survey data	Grossed data
Not recyclable	1,258	8,579
Possibly recyclable	38,427	457,151
Recyclable	3,079	36,108
Total	**42,765**	**501,837**

Figure 37: Recycling potential of landfilled wastes (in tonnes), based on Urban Mines survey data

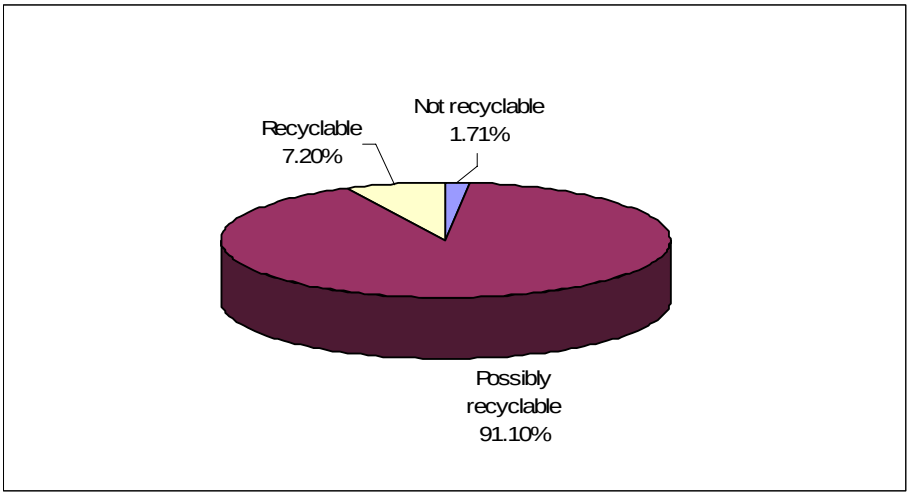

Figure 38: Recycling potential of landfilled wastes (as %), based on Urban Mines data

Filtering out these results from the overall dataset (i.e. Urban Mines and National survey datasets, estimated 1-4s and estimated 50-99 power and utilities data) showed that 61,178 tonnes of the 745,864 tonnes of waste that goes to landfill is readily recyclable (i.e. recorded as 'recyclable'), with 425,815 tonnes requiring further work (e.g. separation at a MRF) to facilitate recycling of this material (i.e. recorded as 'possibly recyclable'). Hence the recorded data suggests that up to 65.3% of the C&I waste landfilled in the region could be recycled if the correct facilities and services were available.

	Survey Data	Grossed Data
Not Recyclable	192,176	243,013
Possibly recyclable	42,647	425,815
Recyclable	11,050	61,178
Don't Know (National survey data)	4,940	15,858
Total	**250,813**	**745,864**

Figure 40: Recycling potential of landfilled wastes (in tonnes), based on overall data

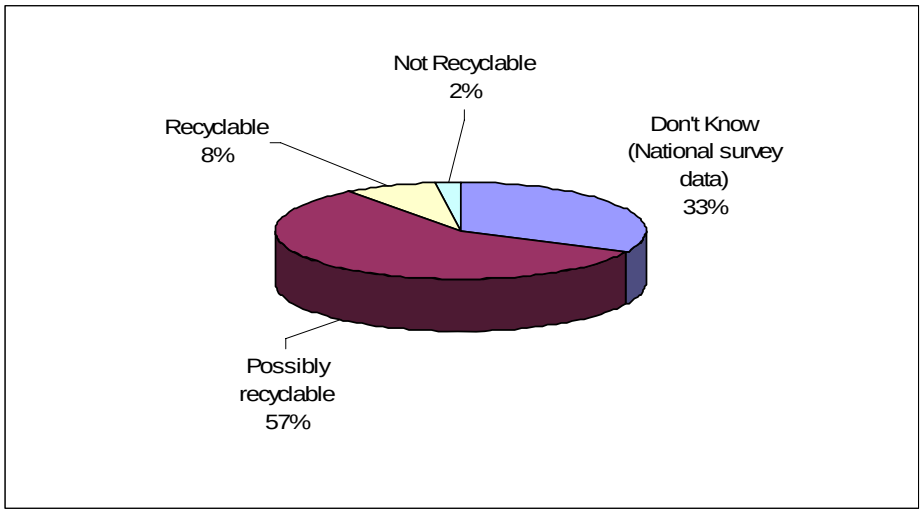

Figure 40: Recycling potential of landfilled wastes (as %), based on overall data

4.4 Potential to recover energy

Similarly, the potential to recover energy from material was also assessed, based on estimated calorific value of the materials concerned and again based on a set of pre-defined criteria. These criteria are explained in Appendix 9.

If recorded as "recoverable" the material could be incinerated to produce energy directly. If "possibly recoverable" the material would need processing before recovery e.g. dried.

Again, by grossing up the data we have assumed that all businesses in a sector have similar waste management practices and therefore the waste has the same potential or not to be recovered. The results presented in the following figures are based on data for both the Urban Mines and National surveys, estimates for micro companies and estimates for companies with 50-99 employees in the power and utilities sector.

Based on the results from the Urban Mines survey data, the figures below show the potential to recover energy. The majority of the waste is readily available for energy recovery (i.e. 864,079 tonnes) and 288,491 tonnes possibly recoverable.

	Survey data	Grossed Data
Currently recovered	5,876	21,590
Not recoverable	61,174	391,052
Possibly recoverable	39,142	288,491
Recoverable	85,239	864,079
Total	**191,432**	**1,565,212**

Figure 41: Potential for energy recovery, all wastes (in tonnes), based on Urban Mines data

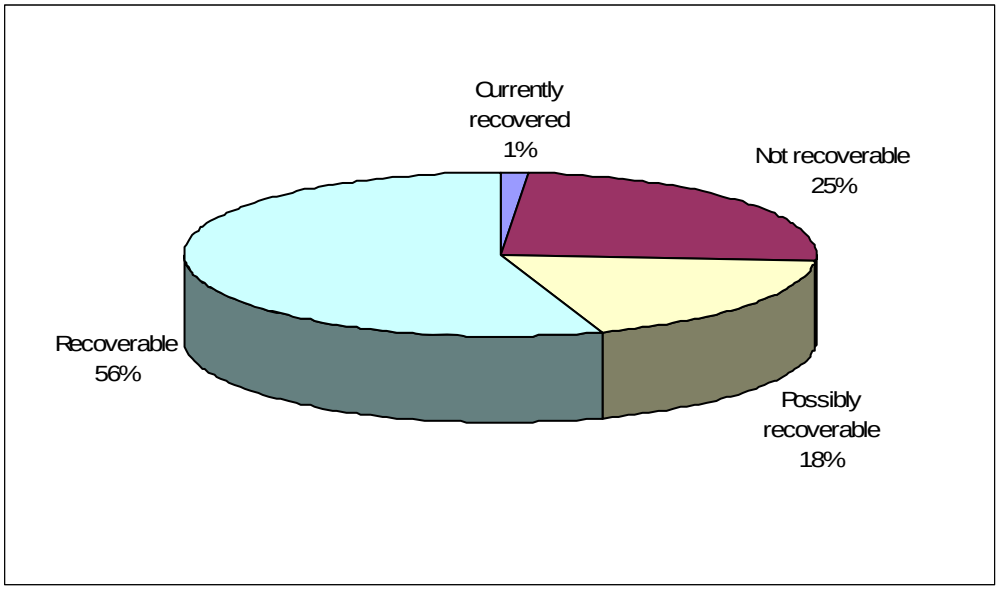

Figure 42: Potential for energy recovery, all wastes (as %), based on Urban Mines data

The grossed results tabulated below show that the majority of the waste recorded could be used directly for energy recovery (815,591 tonnes), with 226,259 tonnes possibly recoverable.

	Survey Data	Grossed Data
Currently recovered	51,786	127,750
Not recoverable	86,982	349,587
Possibly recoverable	44,085	226,259
Recoverable	138,975	815,591
Don't Know (National survey)	525,295	657,400
Total	**847,122**	**2,176,587**

Figure 43: Potential for energy recovery, all wastes (in tonnes)

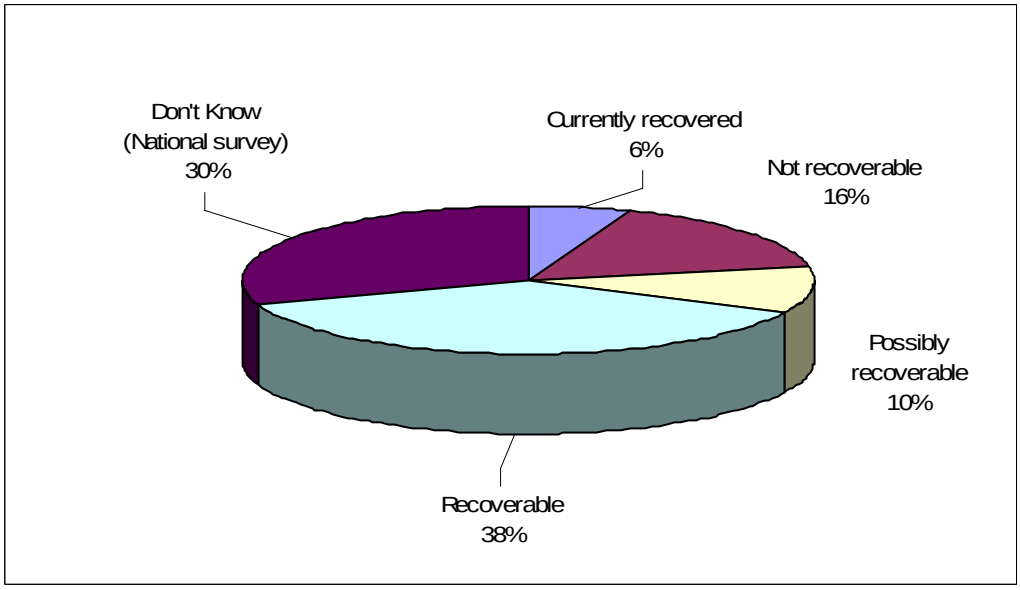

Figure 44: Potential for energy recovery, all wastes (as %)

Recovery Potential of Landfilled Material

Of particular interest is the waste which is currently being landfilled, which could potentially be recovered.

Filtering out these results from the Urban Mines survey dataset showed that 347,031 tonnes of the 501,837 tonnes landfilled is readily recoverable, with 124,348 tonnes requiring further work (e.g. processing) to facilitate recovery of energy from this material. Hence the recorded data suggests that up to 93.93% of the C&I waste landfilled in the region could be energy recovered if the correct facilities and services were available. Clearly there will be a considerable overlap between the material identified as recyclable, and that deemed recoverable.

	Survey data	Grossed data
Not recoverable	3,239	30,457
Possibly recoverable	8,790	124,348
Recoverable	30,736	347,031
Total	**42,765**	**501,837**

Figure 45: Recovery potential of landfilled wastes (in tonnes), based on Urban Mines data

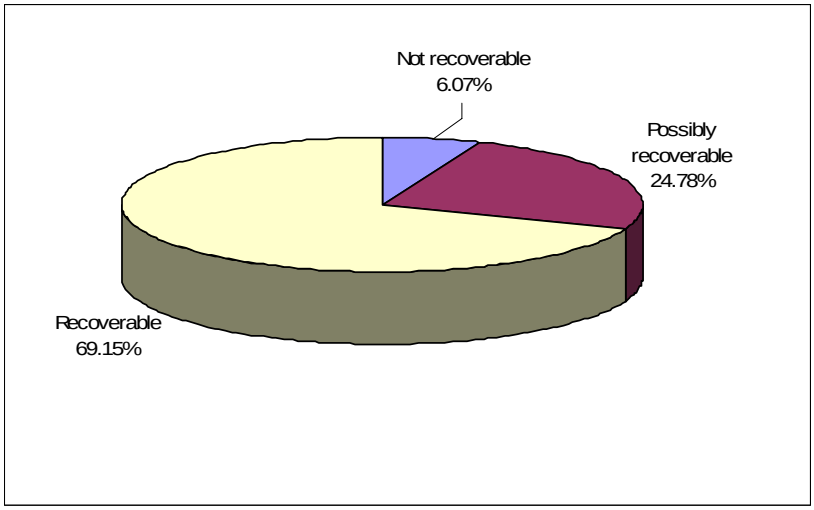

Figure 46: Recovery potential of landfilled wastes (as %), based on Urban Mines data

Filtering out these results from the overall dataset (i.e. Urban Mines and National survey datasets, estimated 1-4s and estimated 50-99 power and utilities data) showed that 324,185 tonnes of the 745,864 tonnes of waste that goes to landfill is readily recoverable, with 132,092 tonnes requiring further work (e.g. separation at a MRF) to facilitate energy recovery from the material. Hence the recorded data suggests that up to 62% of the C&I waste landfilled in the region could be recycled if the correct facilities and services were available.

Recovery potential - Landfill	Survey Data	Grossed Data
Not recoverable	7,130	47,214
Possibly recoverable	13,667	132,092
Recoverable	39,118	324,185
Don't Know (National survey data)	202,502	242,372
Total	**262,417**	**745,864**

Figure 47: Recovery potential of landfilled wastes (in tonnes), based on the overall data

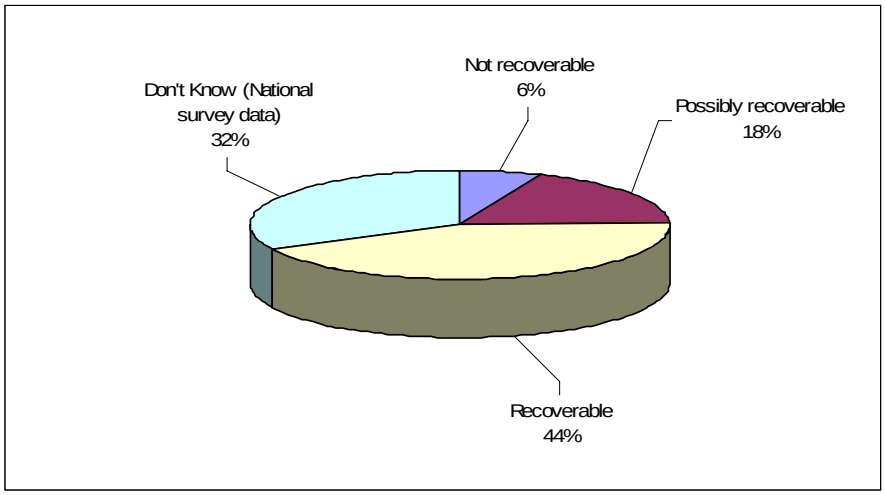

Figure 48: Recovery potential of landfilled wastes (as %), based on the overall data

4.5 Waste destination

For each waste stream recorded during survey visits, the final destination of that waste i.e. in terms of where the recorded waste management process or "fate" was carried out, was recorded. Waste destination was described as either 'within NE' or 'outside NE'. For 'within NE', the planning authority area was recorded while for 'outside NE', UK nation or export was recorded.

Based on only the Urban Mines survey data, the following figures show the final destination of the waste in terms of where it is managed or processed. Approximately 83% of the waste generated in the North East is managed or processed within the region.

	Survey data	Grossed data
Don't know	11,003	159,674
Outside NE	14,315	111,474
Within NE	166,114	1,294,064
Grand Total	**191,432**	**1,565,212**

Figure 49: Waste destination overview (in tonnes), based on Urban Mines survey data

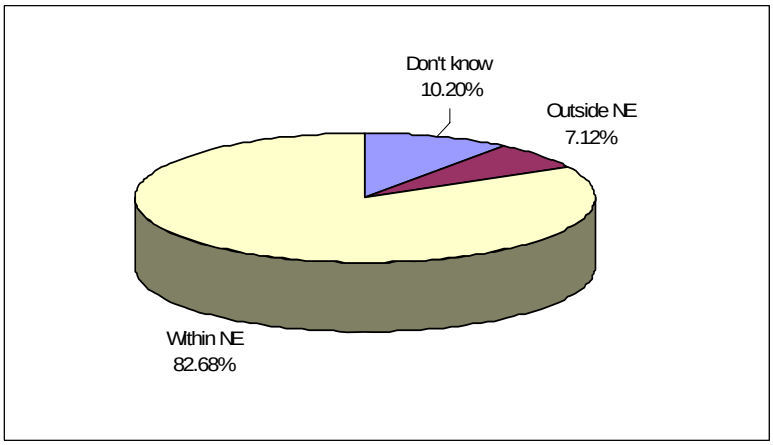

Figure 49: Waste destination overview (as %), based on Urban Mines survey data

Of that processed outside of the region, 88% had a final destination elsewhere in England, 7% in Wales, 4% in Scotland, with 0.4% exported outside the UK.

	Tonnage Surveyed	Grossed Tonnage
England (excl. NE)	11,580	87,534
Outside UK	127	434
Scotland	315	3,976
Wales	1,487	7,440

Figure 50: Waste destination outside region (in tonnes), based on Urban Mines survey data

For material processed within the region, the most popular destinations were Tyne and Wear, County Durham and Redcar and Cleveland.

	Survey data	Grossed data
County Durham	32,759	261,292
Tees Valley	28,836	216,391
Northumberland	9,441	63,693
Tyne and Wear	64,203	465,405
Don't know (within NE)	30,874	287,282

Figure 51: Waste destination inside region (in tonnes), based on Urban Mines survey data

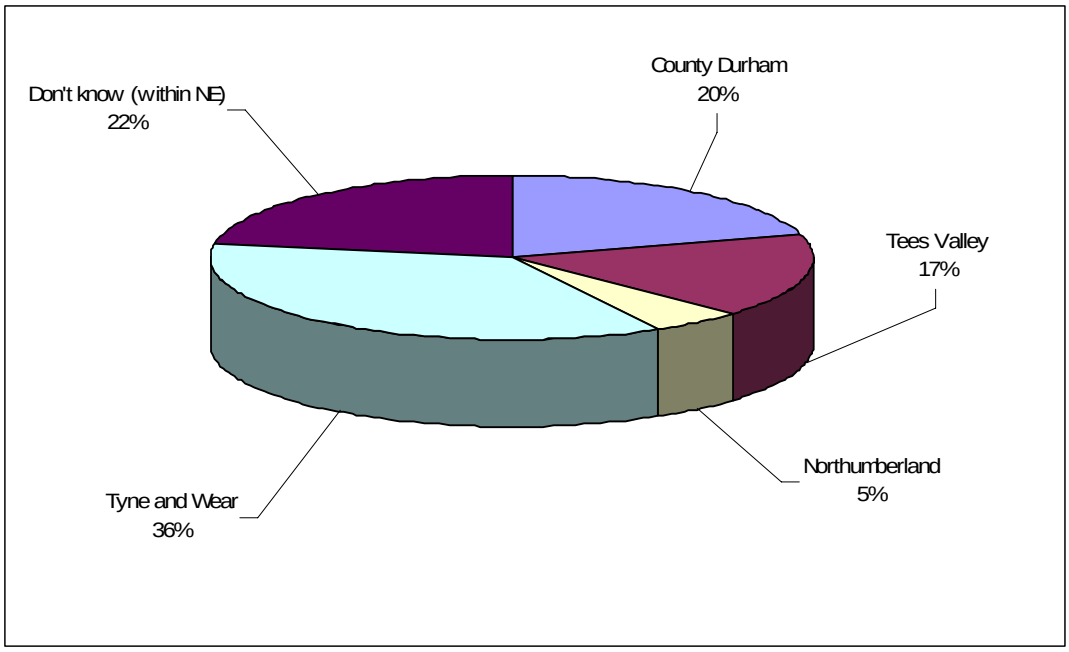

Figure 52: Waste destination inside region (as %), based on Urban Mines survey data

The results shown in the figures below include data from the National survey as well as estimates made for the micro companies and power and utilities sector, 50-99.

	Survey Data	Grossed Data
Outside NE	45,648	128,543
Within NE	264,586	1,210,008
Don't know	536,887	838,037
Total	**847,122**	**2,176,587**

Figure 53: Waste destination overview (in tonnes)

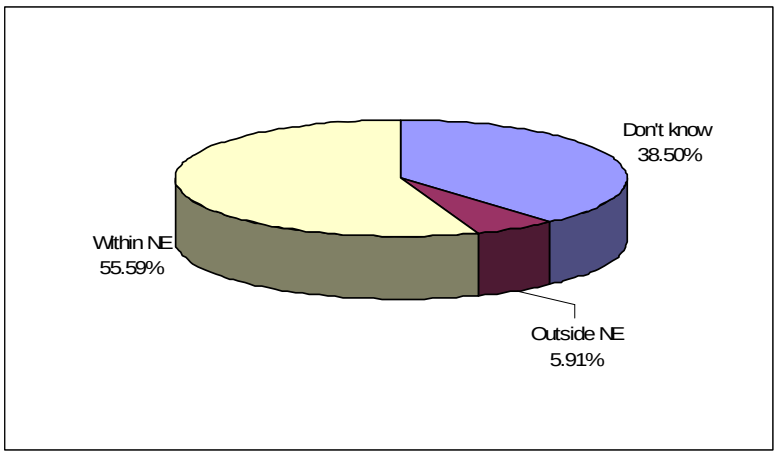

Figure 54: Waste destination overview (as %)

4.6 Including 1-4 employee companies

It was decided at the beginning of the survey, not to directly survey micro companies i.e. those companies employing between 1-4 employees. The consensus was that they were less likely to want to be involved in the survey itself (as has been demonstrated with previous surveys) and the waste they produce is more likely to be disposed of via the municipal waste collection route than commercial routes, either via household collections for home based businesses, or through material deposited at HWRCs.

However, there is a need to estimate the likely arisings from this group. To achieve this, we have used the same methodology as one employed in the previous surveys undertaken by Urban Mines i.e. calculated by applying the average waste per employee for the 5-9 company size band. Although averaged weights are understandably small, the number of companies in this size band (over 39,000 companies) means that the totals for the region and per sector can be substantial. Results obtained are presented in

Figure 55.

Sector	Population	Grossed Tonnage
Food, drink and tobacco	125	182
Textiles/wood/paper/publishing	595	5,399
Power & Utilities	45	1,235
Chemical/non-metallic minerals manufacturing	310	2,417
Metal manufacturing	645	1,606
Machinery & equipment (other manufacturing)	785	2,287
Retail & wholesale	9,795	39,604
Hotels and catering	3,175	12,852
Public administration and social work	2,205	4,952
Education	665	664
Transport and storage	1,795	3,370
Other services	18,945	45,039
Total	**39,085**	**119,606**

Figure 55: Estimated North East C&I waste arisings for size band 1-4 by sector (in tonnes)

4.7 Mixed Wastes

In this North East survey and in the English National Survey, when mixed waste streams were encountered, the surveyor with the company respondent, attempted to derive and record a composition from that mixed waste. Although clearly this is not an easy task, the assumption was that the respondent would be the best person to know what types of residual wastes would be deposited as mixed wastes in, for instance, a general waste skip for landfill disposal. Of course these figures need treating with a degree of scepticism as mixed waste compositions can vary from week to week, season to season, and accurately recording their composition over a period of time is not a trivial matter. However, we do think the use of the collected data will shed some light on the possible volumes of materials contained in these streams and the potential for recovery if these streams were separated for recycling rather than landfilling.

Applying this composition data, averaged per sector grouping, to the volume of mixed wastes recorded for each individual sector grouping, produced the waste type tables on the following pages, by distributing and adding the materials derived from the mixed wastes to those volumes already segregated.

For the regional figures, the grossed volume of 705,889 tonnes of mixed waste split down into the following grossed composition, showing considerable volumes of recyclable wastes including non-metallic wastes and metals:

	Grossed Survey Results	Mixed Wastes Re-distributed	Difference
Animal & Vegetable Wastes	99,446	174,061	74,615
Chemical Wastes	431,363	452,996	21,633
Common sludges	47,601	47,674	73
Discarded equipment	24,375	32,532	8,157
Health Care	29,910	31,365	1,455
Metallic wastes	183,382	261,085	77,703
Mineral wastes	214,500	292,715	78,215
Non-metallic wastes	439,890	883,928	444,038
Non-Wastes	232	232	0
Mixed Wastes	705,889	0	0
Total	2,176,588	2,176,588	705,889

Figure 56: Composition of Mixed Wastes - grossed tonnages

The following tables reflect these mixed waste distributions at regional and sub-regional level:

4.7.1 North East Region

Sector Group	Waste Type									
	Animal & Vegetable Wastes	Chemical Wastes	Common sludges	Discarded equipment	Health Care	Metallic wastes	Mineral wastes	Non-metallic wastes	Non-Wastes	Total
Food, drink and tobacco	84,909	7,445	10,697	1,703	7	3,490	3,155	23,263	0	**134,668**
Textiles/wood/paper/publishing	607	88,089	429	72	94	5,258	2,975	101,591	0	**199,115**
Power & utilities	216	108,588	15,110	340	0	743	35,993	10,397	0	**171,388**
Chemical/non-metallic minerals manufacturing	14,051	204,420	20,341	358	617	14,710	22,635	61,541	2	**338,675**
Metal manufacturing	156	11,991	0	423	16	76,835	109,750	8,014	0	**207,185**
Machinery and equipment (other manufacturing)	662	7,658	0	1,108	27	71,467	3,590	20,554	0	**105,066**
Retail and wholesale	36,133	7,624	0	5,373	374	19,436	27,701	227,182	0	**323,823**
Hotels and catering	3,978	2,882	85	3,974	236	5,186	37	117,702	0	**134,080**
Public administration and social work	4,436	1,105	814	3,909	22,431	3,340	42,065	58,033	0	**136,134**
Education	9,196	143	1	3,271	3,067	9,336	14,751	54,853	0	**94,616**
Transport and storage	5,296	4,158	197	1,486	580	33,913	551	40,011	230	**86,423**
Other services	14,420	8,894	0	10,514	3,916	17,371	29,513	160,786	0	**245,414**
Total	**174,061**	**452,996**	**47,674**	**32,532**	**31,365**	**261,085**	**292,715**	**883,928**	**232**	**2,176,587**

Figure 57: Estimate of North East C&I waste arisings, by sector and waste type (in tonnes), with redistributed mixed wastes

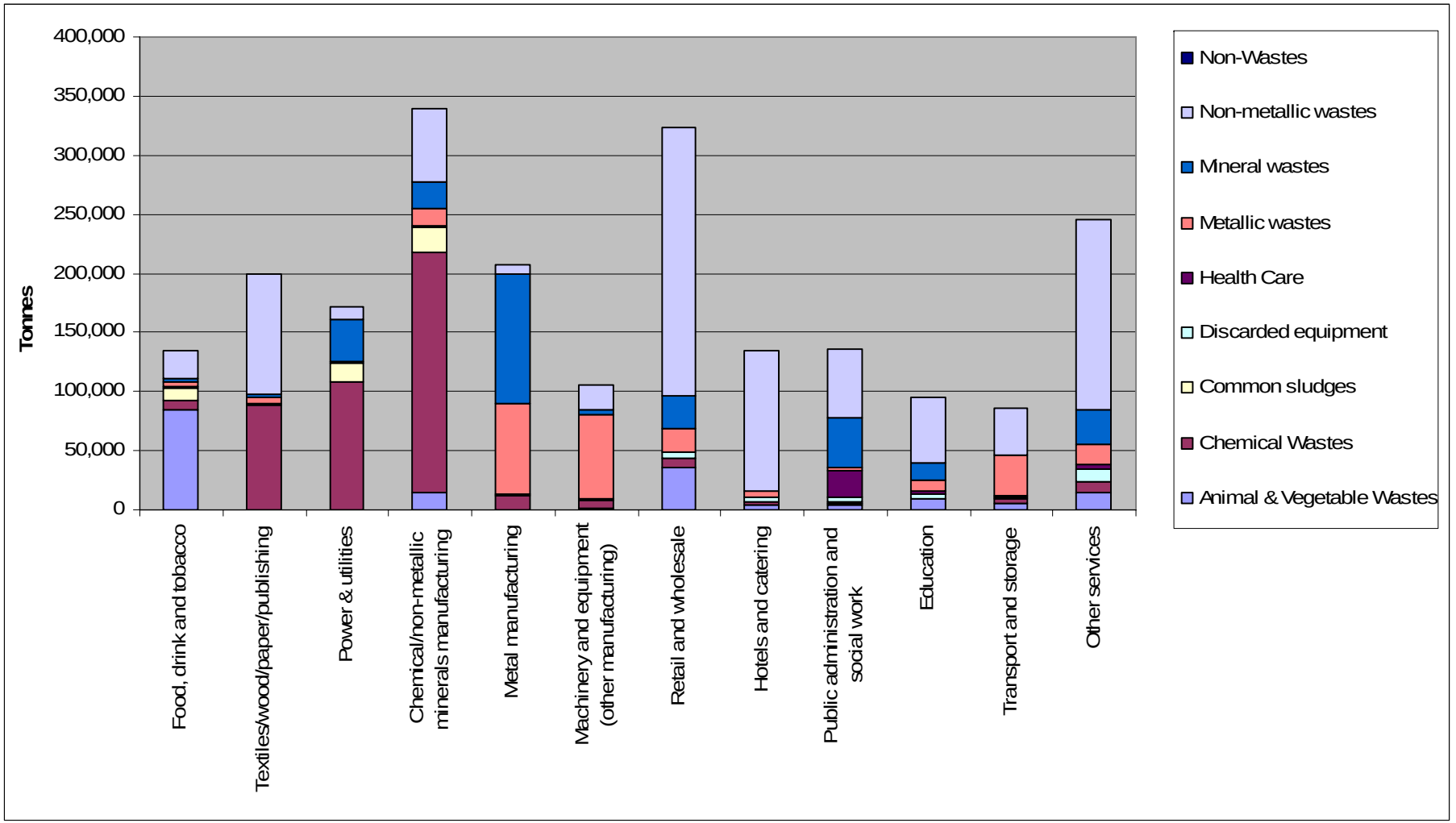

Figure 58: North East C&I waste arisings, by sector and waste type (stacked bar chart), with redistributed mixed wastes

4.7.2 Tyne & Wear

Sector Group	Waste Type									
	Animal & Vegetable Wastes	Chemical Wastes	Common sludges	Discarded equipment	Health Care	Metallic wastes	Mineral wastes	Non-metallic wastes	Non-Wastes	Total
Food, drink and tobacco	25,955	2,276	3,270	521	2	1,067	964	7,111	0	**41,165**
Textiles/wood/paper/publishing	154	22,399	109	18	24	1,337	757	25,832	0	**50,631**
Power & utilities	93	46,772	6,508	147	0	320	15,503	4,478	0	**73,821**
Chemical/non-metallic minerals manufacturing	3,893	56,640	5,636	99	171	4,076	6,272	17,052	0	**93,839**
Metal manufacturing	78	6,019	0	212	8	38,567	55,088	4,023	0	**103,995**
Machinery and equipment (other manufacturing)	345	3,993	0	578	14	37,271	1,872	10,719	0	**54,793**
Retail and wholesale	16,837	3,553	0	2,504	174	9,056	12,908	105,860	0	**150,892**
Hotels and catering	1,774	1,285	38	1,772	105	2,312	17	52,477	0	**59,779**
Public administration and social work	1,875	467	344	1,652	9,481	1,412	17,780	24,530	0	**57,542**
Education	3,787	59	0	1,347	1,263	3,844	6,074	22,588	0	**38,963**
Transport and storage	2,480	1,947	92	696	271	15,878	258	18,733	108	**40,462**
Other services	7,494	4,622	0	5,464	2,035	9,028	15,338	83,558	0	**127,539**
Total	**64,765**	**150,031**	**15,998**	**15,009**	**13,549**	**124,168**	**132,830**	**376,962**	**108**	**893,421**

Figure 59: Estimate of C&I waste arisings in Tyne & Wear, by sector and waste type (in tonnes), with redistributed mixed wastes

4.7.3 Tees Valley

Sector Group	Waste Type									
	Animal & Vegetable Wastes	Chemical Wastes	Common sludges	Discarded equipment	Health Care	Metallic wastes	Mineral wastes	Non-metallic wastes	Non-Wastes	Total
Food, drink and tobacco	15,509	1,360	1,954	311	1	637	576	4,249	0	**24,598**
Textiles/wood/paper/publishing	350	50,822	247	42	54	3,034	1,716	58,612	0	**114,878**
Power & utilities	111	55,681	7,748	175	0	381	18,456	5,331	0	**87,883**
Chemical/non-metallic minerals manufacturing	3,820	55,571	5,530	97	168	3,999	6,153	16,730	0	**92,068**
Metal manufacturing	64	4,913	0	173	7	31,483	44,969	3,284	0	**84,892**
Machinery and equipment (other manufacturing)	68	784	0	113	3	7,317	368	2,104	0	**10,757**
Retail and wholesale	9,415	1,987	0	1,400	97	5,064	7,218	59,197	0	**84,379**
Hotels and catering	906	656	19	905	54	1,181	9	26,808	0	**30,538**
Public administration and social work	1,120	279	206	987	5,665	844	10,623	14,656	0	**34,379**
Education	2,451	38	0	872	817	2,488	3,932	14,620	0	**25,218**
Transport and storage	1,718	1,349	64	482	188	11,004	179	12,983	75	**28,042**
Other services	3,715	2,291	0	2,708	1,009	4,475	7,603	41,419	0	**63,220**
Total	**39,247**	**175,732**	**15,768**	**8,266**	**8,063**	**71,907**	**101,801**	**259,994**	**75**	**680,853**

Figure 60: Estimate of C&I waste arisings in Tees Valley, by sector and waste type (in tonnes), with redistributed mixed wastes

4.7.4 County Durham

Sector Group	Waste Type									
	Animal & Vegetable Wastes	Chemical Wastes	Common sludges	Discarded equipment	Health Care	Metallic wastes	Mineral wastes	Non-metallic wastes	Non-Wastes	Total
Food, drink and tobacco	30,542	2,678	3,848	613	2	1,255	1,135	8,368	0	**48,440**
Textiles/wood/paper/publishing	55	7,931	39	6	8	473	268	9,146	0	**17,927**
Power & utilities	2	1,256	175	4	0	9	416	120	0	**1,983**
Chemical/non-metallic minerals manufacturing	4,382	63,745	6,343	112	192	4,587	7,058	19,190	1	**105,610**
Metal manufacturing	11	860	0	30	1	5,509	7,869	575	0	**14,855**
Machinery and equipment (other manufacturing)	165	1,911	0	276	7	17,831	896	5,128	0	**26,214**
Retail and wholesale	6,006	1,267	0	893	62	3,231	4,604	37,762	0	**53,826**
Hotels and catering	788	571	17	788	47	1,028	7	23,323	0	**26,569**
Public administration and social work	862	215	158	760	4,361	649	8,178	11,282	0	**26,466**
Education	1,959	30	0	697	653	1,989	3,142	11,686	0	**20,157**
Transport and storage	914	717	34	256	100	5,851	95	6,903	40	**14,910**
Other services	1,894	1,168	0	1,381	514	2,282	3,877	21,123	0	**32,241**
Total	**47,581**	**82,349**	**10,613**	**5,817**	**5,949**	**44,694**	**37,546**	**154,607**	**40**	**389,197**

Figure 61: Estimate of C&I waste arisings in Durham, by sector and waste type (in tonnes), with redistributed mixed wastes

4.7.5 Northumberland

Sector Group	Waste Type									
	Animal & Vegetable Wastes	Chemical Wastes	Common sludges	Discarded equipment	Health Care	Metallic wastes	Mineral wastes	Non-metallic wastes	Non-Wastes	Total
Food, drink and tobacco	12,903	1,131	1,625	259	1	530	479	3,535	0	**20,464**
Textiles/wood/paper/publishing	48	6,937	34	6	7	414	234	8,000	0	**15,680**
Power & utilities	10	4,879	679	15	0	33	1,617	467	0	**7,701**
Chemical/non-metallic minerals manufacturing	1,957	28,464	2,832	50	86	2,048	3,152	8,569	0	**47,158**
Metal manufacturing	3	199	0	7	0	1,277	1,824	133	0	**3,443**
Machinery and equipment (other manufacturing)	84	970	0	140	3	9,048	455	2,602	0	**13,302**
Retail and wholesale	3,875	818	0	576	40	2,084	2,971	24,363	0	**34,726**
Hotels and catering	510	370	11	510	30	665	5	15,093	0	**17,194**
Public administration and social work	578	144	106	510	2,924	435	5,484	7,565	0	**17,747**
Education	999	15	0	355	333	1,014	1,602	5,959	0	**10,278**
Transport and storage	184	145	7	52	20	1,181	19	1,393	8	**3,009**
Other services	1,317	812	0	960	358	1,587	2,696	14,685	0	**22,414**
Total	**22,467**	**44,884**	**5,295**	**3,440**	**3,804**	**20,317**	**20,537**	**92,365**	**8**	**213,117**

Figure 62: Estimate of C&I waste arisings in Northumberland, by sector and waste type (in tonnes), with redistributed mixed wastes

5 Conclusions and recommendations

Survey results

The survey has shown regional waste arisings for 2009-10 to be 2.18 million tonnes (including estimate for 1-4 employees). This compares to a regional estimate of 2.35 million tonnes from the recently delivered National C&I Survey[2]. These conclusions are based upon the grossing of data from 1,036 company locations (local units) distributed around the North East region plus 276 companies surveyed as part of the National Survey.

This report contains some basic analysis of the results obtained. The raw and grossed data is presented in separate electronic files, which can be used for further analysis or collation.

The survey delivered in 2010 recorded waste arisings data from the 2009-10 financial year, based upon a sample frame and grossing methodology which used ONS population data from March 2009, and therefore is likely to have fully represented the impact on waste arisings of the current economic turndown.

Methodology

This survey has again demonstrated that the basic methodology for delivery of this type of survey is robust, and can be delivered effectively and efficiently. This survey was delivered to time and budget. A number of issues were identified in the delivery of the survey this time, which are reported in "Lessons Learned" in Appendix 10. This includes comments on the use of companies data from commercial sources, as disclosive data from ONS was not available for this survey, and on the problems inherent in combining survey data from two independent sources.

Data confidence

We have taken steps to ensure that the data collected through the survey visits is robust, and that extensive data screening is carried out to ensure that errors are trapped, checked and corrected. We are therefore confident in the quality of our survey data collected. Data confidence levels have been calculated and are presented in this report.

However, we do need to be aware that there are a number of potential sources of error which we can only partially address in the delivery of this survey. These include, for instance, the assumptions required in use of conversion factors, and the company respondents knowledge of their actual waste production (eg. are waste bins actually 100% full when emptied?).

Unfortunately, although combining our survey data with that from the National Survey was required to fill data gaps (for instance, the National Survey had surveyed a number

[2] "Commercial and Industrial Waste Survey 2009" Jacobs for Defra, December 2010

of large companies which would have an adverse impact on grossed volumes if their data was not included) the fact that a proportion of this data had been sourced from non-surveyed sources (e.g. PPC data from the Environment Agency, corporate data from large businesses) responses to a number of questions on the questionnaire were missing from the dataset, for instance waste destination, recyclability and recoverability. This therefore introduced a significant element of "don't know" in the analysis presented in this report as although there were only a total of 276 records used, as these tended to be larger companies producing significant volumes of waste, their impact on the final grossed figures was sizeable.

Also, a high level of variability in data in the same sector/size "brick" of the sample matrix from the National Survey data, reflected in sizeable standard deviations, produced an adverse effect on overall calculated data confidence. The Urban Mine survey alone delivered a workable data confidence of $\pm$ 6.6% at 90%. Including the National Survey data increased this to $\pm$ 16.3% at 90% confidence.

Opportunities

The survey has shown significant opportunities for recycling or recovering energy from material which is currently landfilled. Although the majority of this material could be energy recovered as-is, the majority of the material available for recycling will need further work before reuse. This therefore highlights the need for increased separation and other facilities within the region.

Data

The raw data collected for this survey is available as a separate file. Note that the waste stream data is presented anonymously, in that any details which enable the allocating of individual waste streams to individual companies or locations, has been removed. This preserves the anonymity of the businesses who provided the data.

The presented data includes details on how the data was sourced and method used for entering waste volumes. If calculations have been used to produce estimates, the relevant parameters are included in the data set so, for instance, quantities can be re-calculated for new conversion factors if required.

Recommendations

We propose the following recommendations:

1. This dataset provides a wealth of information about the arisings of commercial and industrial waste not only in the region as a whole, but also down to sub-regional and WPA level. We suggest that to meet the requirements of PPS10, this data is modelled against existing and planned waste processing capacity to identify market gaps, both in terms of facility type and geographic need. In addition, the data can be used to forecast future C&I waste arisings as well as identify future capacity gaps. This is particularly important when taking into account the likely loss of landfill capacity in the future, and the commercial impact of the landfill tax escalator increasing the demand from the commercial and industrial sectors for more cost effective and more sustainable waste recycling and recovery options in the region.

2. This is the first detailed survey of commercial and industrial waste in the region, for what is an important and significant waste stream. We propose that unless this data can be sourced in the future from reporting associated with Duty of Care, as proposed and being developed by the Environment Agency, that this survey is repeated to identify trends and monitor progress.

3. Assumptions have been made in calculating the waste arisings from micro (1-4 employee businesses). The behaviour of this part of the commercial and industrial sector with regards to waste disposal is not understood. Although the waste production per business is likely to be small, the large number of businesses of this size adds up to a significant waste stream. We suggest therefore that at some stage this sub-sector is addressed through a separate piece of work

4. We suggest that recyclability, recoverability and mixed waste data is studied in more detail to help target recycling initiatives and business support in the region, and produce realistic targets for improvement.

1. Survey questionnaire

- Surveyor records employee numbers and sector to check ONS data

For each waste stream:

- SOC group and sub-group of waste stream
  - SOC groups and sub-groups, including “non-wastes”
  - Mixed wastes Sub-classify

- Nature of waste:
  - Hazardous
  - Non-hazardous

- Annual tonnage (written evidence or using conversion factor calculator)

- Source of data:
  - Written records
  - Company estimate
  - Surveyor estimate

- Waste Management:
  - Landfill
  - Land Recovery
  - Incineration with Energy Recovery
  - Incineration without Energy Recovery
  - Transfer station
  - Treatment plant
  - Recycling
  - Composting
  - Waste water treatment
  - Don’t know

- Recyclable?
  - Currently recycled
  - Recyclable
  - Possibly recyclable
  - Not recyclable

- Energy Recovery?
  - Currently recovered
  - Recoverable
  - Possible recoverable
  - Not recoverable

- Where is the waste treated or re-used?
  - Within Region, by sub-region (WPA area)
  - Outside region by England, Scotland, Wales, or outside UK
  - Don’t know

2. Development of the sample matrix

2.1. Survey design

The survey was based on a two-dimensional sample matrix in which businesses were grouped into one of 12 sectors based on the 2007 UK Standard Industrial Classification (UK SIC 2007) divisions (as summarised in Figure 63 below) and one of 6 company size bands, defined by the number of employees (as shown in Figure 64). A full description of the sectors considered in the survey is given in Appendix 3.

Sector	Description	C or I*
Food, drink and tobacco	Manufacture of food products Manufacture of beverages Manufacture of tobacco products	I
Textiles/wood/ paper/publishing	Manufacture of textiles Manufacture of wearing apparel Manufacture of leather and related products Manufacture of wood and products of wood and cork, except furniture Manufacture of pulp, paper and paper products, Publishing and printing	I
Power & Utilities	Manufacture of coke and refined petroleum products Production of gas, electricity, steam Air conditioning supply Water collection, treatment and supply	I
Chemical/non-metallic minerals manufacturing	Manufacture of chemicals and chemical products, Manufacture of basic pharmaceutical products and pharmaceutical preparations Manufacture of rubber and plastic products Manufacture of other non-metallic mineral products	I
Metal manufacturing	Manufacture of basic metals Manufacture of fabricated metal products, except machinery and equipment	I
Machinery & equipment (other manufacturing)	Manufacture of computer, electronic and optical products Manufacture of electrical equipment Manufacture of machinery and equipment n.e.c Manufacture of motor vehicles, trailers and semi-trailers Manufacture of other transport equipment Manufacture of furniture Other manufacturing Repair and installation of machinery and equipment	I
Retail & wholesale	Wholesale and retail trade and repair of motor vehicles and motorcycles Wholesale trade, except of motor vehicles and motorcycles Retail trade except of motor vehicles and motorcycles	C

Sector	Description	C or I*
Hotels and catering	Accommodation Food and beverage service activities	C
Public administration and social work	Public administration and defence, compulsory social security Human health services Residential care activities Social work activities without accommodation	C
Education	Education	C
Transport and storage	Land transport and transport via pipelines Water transport Air transport Warehousing and support activities for transportation Postal And courier activities	C
Other services	Civil engineering Specialised construction activities Publishing activities Motion picture; video and television programme production, sound recording and music publishing activities Programming and broadcasting activities Telecommunications Computer programming, consultancy and related activities Information service activities Financial service activities, except insurance and pension funding Insurance, reinsurance and pension funding, except compulsory social security Activities auxiliary to financial services and insurance activities Real estate activities Legal and accounting activities Activities of head offices and management consultancy activities Architectural and engineering activities, technical testing analysis Scientific research and development Advertising and market research Other professional, scientific and technical activities Veterinary activities Rental and leasing activities	C

Figure 63: Summary of sector description

Size Band Code	Number of employees
1	5-9
2	10-19
3	20-49
4	50-99
5	100-249
6	250+

Figure 64: Business size bands

Businesses with less than 5 employees were not included in the survey. This is because such companies are difficult to survey accurately as some are based at home and as a result much of the waste they produce is likely to find its way into the municipal waste stream either via household collections or through HWRC sites.

2.2. Sample matrix development

The sample size for the survey has been determined based on a standard stratified random sampling approach. In standard stratified sampling (also known as proportionate stratified sampling), the sample should be proportional to the total number of companies within each stratum.

The overall sample matrix was based on population statistics for the North East region obtained from the Office of National Statistics (ONS) in September 2010, but based upon March 2009 values, as shown in Figure 65 below. The Office for National Statistics (ONS) provided the "local unit" company data, from VAT and Income Tax records. It is worth noting that the ONS data supplied was rounded using the "Tau Argus" software to prevent disclosure.

Sector	5 - 9	10 - 19	20 - 49	50 - 99	100 - 249	250+	Total
Food, drink and tobacco	105	45	40	15	25	10	**240**
Textiles/wood/paper/publishing	135	100	70	35	25	5	**370**
Power & Utilities	20	20	10	10	10	5	**75**
Chemical/non-metallic minerals manufacturing	115	90	95	60	40	25	**425**
Metal manufacturing	160	145	135	40	25	10	**515**
Machinery & equipment (other manufacturing)	225	175	145	70	60	35	**710**
Retail & wholesale	3,360	1,845	925	245	125	65	**6,565**
Hotels and catering	1,735	905	595	145	30	5	**3,415**
Public administration and social work	1,240	1,295	1,175	380	180	125	**4,395**
Education	235	320	685	275	165	25	**1,705**
Transport and storage	305	205	175	95	65	30	**875**
Other services	3,740	1,785	1,095	370	215	125	**7,330**
Total	**11,375**	**6,930**	**5,145**	**1,740**	**965**	**465**	**26,620**

Figure 65: North East business population (ONS)[3]

The data used to develop the sample matrix excludes companies with less than 5 employees, for the reasons explained earlier. This gives a total population of companies of 26,620.

[3] Data source September 2009 (latest available) using SIC 2007.

The proposed overall sample size for the survey was estimated using equation (1);

$$n = \frac{\sum_{sb=1}^{k}\left[\frac{(N_{sb})^2 \times p_{sb} \times (1 - p_{sb})}{W_{sb}}\right]}{N^2 \times \frac{AE^2}{Z^2} + \sum_{sb=1}^{k}\left[N_{sb} \times p_{sb} \times (1 - p_{sb})\right]} \quad (1)$$

Where:
n is the overall sample size
W_{sb} is the weighted factor of each stratum/brick
N_{sb} is the population size of stratum/brick sb
p_{sb} is the expected prevalence/probability of each stratum/brick
k is the total number of strata/bricks
AE = acceptable absolute error (This is a measure of the desired precision. It is obtained by multiplying the prevalence by the relative error. The relative error should be less or equal to 0.20. The acceptable value for AE should be ≥ 0 and ≤ 1).
Z = the value obtained from the standard normal distribution. For each value of confidence, there is a corresponding value of Z. The levels of confidence frequently used are 90%, 95% and 99% and their corresponding Z values are 1.645, 1.96 and 2.58 respectively.

Using proportionate stratified sampling the sample size of each stratum is proportional to the population size of the stratum. Strata sample sizes have been developed using equation (2) below:

$$n_{sb} = \left(\frac{N_{sb}}{N}\right) \times n \quad (2)$$

Where:
n_{sb} is sample size of each stratum/brick (sb)
All other parameters are as described earlier.

Using equation (1) and (2), a sample matrix in which each stratum/brick was proportional to its population was developed. We propose in practise that the above sample matrix will be adjusted accordingly as follows:

- If the recommended sample size (n_{sb}) is greater than the population (N_{sb}),then the sample size for that stratum will be set equal to the population of the stratum hence all the companies in that stratum are to be surveyed (if $n_{sb} > N_{sb}$; $n_{sb} = N_{sb}$). The sample matrix will be redistributed accordingly.
- If the recommended sample size is less than or equal to 3 (number of regions considered for the survey) and the population of the stratum is greater or equal to 3, then the sample size will be adjusted accordingly to have a number of companies in each stratum so that a representative sample matrix is derived for each region.

Figure 66 shows the sample matrix on which the survey was based.

Sector	5 - 9	10 - 19	20 - 49	50 - 99	100 - 249	250+	Total
Food, drink and tobacco	4	3	3	2	7	5	23
Textiles/wood/paper/publishing	5	4	3	3	7	3	25
Power & Utilities	5	5	2	2	3	3	21
Chemical/non-metallic minerals manufacturing	4	3	4	3	20	7	41
Metal manufacturing	6	5	5	4	7	4	31
Machinery & equipment (other manufacturing)	8	7	5	3	17	7	48
Retail & wholesale	41	35	20	36	19	16	168
Hotels and catering	41	19	22	5	7	3	98
Public administration and social work	32	34	32	49	25	33	204
Education	9	12	26	10	20	9	86
Transport and storage	11	8	7	4	17	10	57
Other services	60	32	26	14	40	26	198
Total	**227**	**166**	**154**	**135**	**189**	**127**	**1,000**

Figure 66: Target sample matrix

Based on the above sample matrix developed and population data provided by ONS, the percentage of the population that was to be sampled was calculated for each brick (cell) (shown in Figure 67).

Sector	5-9	10-19	20 - 49	50 - 99	100 - 249	250+	Total
Food, drink and tobacco	4%	7%	8%	13%	28%	50%	**10%**
Textiles/wood/paper/publishing	4%	4%	4%	9%	28%	60%	**7%**
Power & Utilities	25%	25%	20%	20%	30%	60%	**28%**
Chemical/non-metallic minerals manufacturing	3%	3%	4%	5%	50%	28%	**10%**
Metal manufacturing	4%	3%	4%	10%	28%	40%	**6%**
Machinery & equipment (other manufacturing)	4%	4%	3%	4%	28%	20%	**7%**
Retail & wholesale	1%	2%	2%	15%	15%	25%	**3%**
Hotels and catering	2%	2%	4%	3%	23%	60%	**3%**
Public administration and social work	3%	3%	3%	13%	14%	26%	**5%**
Education	4%	4%	4%	4%	12%	36%	**5%**
Transport and storage	4%	4%	4%	4%	26%	33%	**7%**
Other services	2%	2%	2%	4%	19%	21%	**3%**
Total	**2%**	**2%**	**3%**	**8%**	**20%**	**27%**	**4%**

Figure 67: Percentage of business sites to be surveyed in each brick

Using these percentages, a request was made to LBM, a commercial data provider, for data for a total of 5,610 randomly selected local units. This provided the sample frame from which the units to be surveyed were drawn.

2.3. Delivered sample matrix

The survey was completed with 1,036 data records. Every effort was made to ensure that the survey was delivered to the developed and agreed target sample matrix, however due to the variances in the ONS and LBM data, the fact that 63 businesses

(mostly large scale) contacted had already taken part in the National Survey, and the lack of willingness of some businesses to take part in the survey there were differences in the delivered sample matrix in comparison with the developed target matrix. At the end of the survey period, the data received was further checked to ensure that the companies surveyed were placed in the right bricks. As a result of the alterations made, some bricks were either under or over surveyed in relation to the target sample matrix. Figure 68 shows the delivered survey visits for each brick as a percentage of the target sample matrix.

Sector	5-9	10-19	20 - 49	50 - 99	100 - 249	250+	Total
Food, drink and tobacco	100%	200%	67%	250%	100%	0%	104%
Textiles/wood/paper/publishing	60%	200%	100%	100%	100%	67%	104%
Power & Utilities	40%	0%	150%	0%	0%	0%	24%
Chemical/non-metallic minerals manufacturing	150%	200%	175%	300%	60%	71%	110%
Metal manufacturing	67%	200%	160%	200%	86%	50%	123%
Machinery & equipment (other manufacturing)	125%	129%	120%	167%	71%	114%	104%
Retail & wholesale	117%	114%	110%	89%	100%	81%	104%
Hotels and catering	115%	163%	86%	220%	57%	67%	116%
Public administration and social work	116%	124%	150%	82%	76%	33%	97%
Education	89%	150%	115%	110%	80%	178%	115%
Transport and storage	91%	150%	114%	175%	65%	10%	86%
Other services	148%	125%	108%	179%	65%	27%	109%
Total	**118%**	**134%**	**119%**	**116%**	**74%**	**53%**	**104%**

Figure 68: Delivered sample matrix as a percentage of the target matrix

As earlier mentioned, due to variances in the ONS data, businesses that had already taken part in the National Survey and the unwillingness of some businesses to take part in the survey, the final survey data had a few bricks for which no data was collated during our survey, i.e. power and utilities sector (10-19, 50-99, 100-249 and 250+ company size bands) and food and drink sector, 250+ company size band. These were filled using the National Survey data, except power and utilities, 50-99.

In addition to the survey data, 45 supermarket records were added to the retail and wholesale sector (10 companies, 13 companies, 15 companies and 7 companies in the 10-19, 50-99, 100-249 and 250+ size bands respectively). With this data added onto the Urban Mines and Defra survey data, there were 1,312 companies in total used for grossing up (as shown in Figure 69). It is worth noting that waste tonnages of 9 companies were not grossed up but added to the grossed up tonnage to reflect the non-typical waste tonnages generated by these businesses.

Sector	5-9	10-19	20-49	50-99	100-249	250+	Total
Food, drink and tobacco	6	8	5	10	17	8	**54**
Textiles/wood/paper/publishing	5	10	4	4	14	5	**42**
Power and utilities	9	4	4	0	4	2	**23**
Chemical/non-metallic minerals manufacturing	7	9	15	18	23	14	**86**
Metal manufacturing	6	13	12	10	12	7	**60**
Machinery and equipment (other manufacturing)	12	11	8	7	21	20	**79**
Retail and wholesale	55	42	36	35	24	33	**225**
Hotels and catering	50	33	21	12	5	3	**124**
Public administration and social work	39	44	51	43	21	13	**211**
Education	10	20	32	13	18	18	**111**
Transport and storage	12	13	11	8	13	3	**60**
Other services	92	46	32	28	28	11	**237**
Total	**303**	**253**	**231**	**188**	**200**	**137**	**1,312**

Figure 69: Data used for grossing

As the Defra data did not also include data in the 50-99 size band of the power and utilities sector, average waste per company for this brick was obtained using survey data records in the adjacent bricks, that is, 20-49 and 100-249 size bands in the power and utilities sector (i.e. 4 companies in the 20-49 size band and 3 companies in the 100-249 size band). The total waste between these companies was divided by 7 (total number of companies surveyed in these two size bands) to give an average weight per company for the 50-99 size band. This was used to represent a single company in this size and hence provided 1 record of data on which the grossing for this brick was based.

3. SIC codes and industrial sectors

Sector	Type	SICRange	SectorName
Food, drink and tobacco	Industrial	150-160	Manufacture of food products, beverages and tobacco products
Textiles/wood/paper/publishing	Industrial	170-193	Manufacture of textiles, wearing apparel, leather, luggage, handbags and footwear
	Industrial	200-205	Wood and wood products
	Industrial	210-212	Manufacture of pulp, paper and paper products
	Industrial	220-223	Publishing, printing and recording
Power and utilities	Industrial	230-233, 400-410	Manufacture of coke and refined petroleum products Production of oil, gas, electricity, steam Water collection, treatment and supply water
Chemicals/non-metallic minerals manufacturing	Industrial	240-252	Manufacture of chemicals and chemical products; basic pharmaceutical products and pharmaceutical preparations, rubber and plastic products
	Industrial	260-268	Other non-metallic mineral products
Metal manufacturing	Industrial	270-275	Manufacture of basic metals
	Industrial	280-287	Manufacture of fabricated metal products
Machinery and equipment |other manufacturing)	Industrial	290-297	Manufacture of machinery and equipment
	Industrial	300-335	Manufacture of office machinery, computers, electrical, radio, television and communication equipment; medical and optical instruments and clocks
	Industrial	340-355	Manufacture of motor vehicles and other transport equipment
	Industrial	360-366	Furniture and other manufacturing
	Industrial	370-372	RECYCLING (excluded from waste production estimates to avoid double counting)
Retail and wholesale	Commercial	500-527	Retail - motor vehicles, parts and fuel; wholesale; other retail
Hotels and catering	Commercial	550-555	Hotels, catering
Public administration and social work	Commercial	750-753, 853	Social work and public administration
Education	Commercial	800-804	Education
Transport and storage	Commercial	600-632, 640-642	Transport, storage, communications
Other services	Commercial	633-634, 650-726, 740-748, 910-930	Travel agents, other business, finance, real estate and computer related activities
	Commercial	730-732, 850-852	Miscellaneous

4. Waste descriptions

Below are the Substance Oriented Classification (SOC) codes used in the survey The SOC re-groups detailed EWC (6-figure) categories into a substance based classification.

SOC Group	SOC Sub-Group Name	EWC-Stat code
Chemical wastes	Spent solvents	1.1
	Acid, alkaline or saline wastes	1.2
	Used oils	1.3
	Spent chemical catalysts	1.4
	Chemical preparation wastes	2
	Chemical deposits and residues	3.1
	Industrial effluent sludges	3.2
Health care	Health care and biological wastes	5
Metallic wastes	Metallic wastes	6
Non-metallic wastes	Glass wastes	7.1
	Paper and cardboard wastes	7.2
	Rubber wastes	7.3
	Plastic wastes	7.4
	Wood wastes	7.5
	Textile wastes	7.6
	Waste containing PCB	7.7
Discarded equipment	Discarded vehicles	8.1
	Batteries and accumulators wastes	8.41
	WEEE and other discarded equipment	8.2, 8.43
Animal & vegetable wastes	Animal waste of food preparation and products	9.11
	Animal faeces, urine and manure	9.3
	Animal & vegetal wastes	9 excl. 9.11 & 9.3
Mixed (ordinary) wastes	Household and similar wastes	10.1
	Mixed and undifferentiated materials	10.2
	Sorting residues	10.3
Common sludges	Common sludges (excluding dredging spoils)	11 excl. 11.3
	Dredging spoils	11.3
Mineral wastes	Combustion wastes	12.4
	Contaminated soils and polluted dredging spoils	12.6
	Solidified, stabilised or vitrified wastes	13
	Other mineral wastes	12.5
	Construction and demolition wastes	12.1
	Asbestos wastes	12.2
	Waste of naturally occurring minerals	12.3
Non-wastes	virgin timber	
	blast furnace slag	

5. Standard container types

No	Container Group	Container Name	Container Volume
1	Front-end loader	6 yd3 front-loader	4.6
2	Front-end loader	8 yd3 front-loader	6.1
3	Front-end loader	10 yd3 front-loader	7.6
4	Rear-end loader	8 yd3 rear-loader	6.1
5	Rear-end loader	10 yd3 rear-loader	7.6
6	Rear-end loader	12 yd3 rear-loader	9.2
7	Rear-end loader	14 yd3 rear-loader	10.7
8	Rear-end loader	16 yd3 rear-loader	12.2
9	Large container - RoRo	15 yd3 RoRo	11.5
10	Large container - RoRo	18 yd3 RoRo	13.8
11	Large container - RoRo	20 yd3 RoRo	15.3
12	Large container - RoRo	25 yd3 RoRo	19.1
13	Large container - RoRo	30 yd3 RoRo	23
14	Large container - RoRo	35 yd3 RoRo	26.8
15	Large container - RoRo	40 yd3 RoRo	30.6
16	Wheeled bin	1100 litre bin	1.1
17	Wheeled bin	660 litre bin	0.66
18	Wheeled bin	240 litre bin	0.24
19	Wheeled bin	120 litre bin	0.12
20	Paladin	Paladin 850	0.85
21	Paladin	Paladin 560	0.56
22	Chamberlain	Chamberlain 940	0.94
23	Chamberlain	Chamberlain 720	0.72
24	IBC	1200 litre IBC	1.2
25	IBC	1100 litre IBC	1.1
26	Drum/barrel	200 litre drum	0.2
27	Drum/barrel	120 litre drum	0.12
28	Drum/barrel	30 litre drum	0.03
29	Refuse sack	Standard refuse sack	0.08

6. Conversion factors

SOC group	SOC sub-group	Conversion Name	Conversion Density
Chemical wastes		liquids and oils	0.9
Chemical wastes		petrol and similar fuels	0.72
Chemical wastes		spent carbon and carbon-containing wastes	0.24
Chemical wastes		powders	0.36
Chemical wastes		sludges	0.92
Health care		clinical waste incl. blood and organs	0.2
Metallic wastes		metal filings and turnings	0.3
Non-metallic wastes	glass	glass pieces (eg. waste from manufacture of glass products)	0.57
Non-metallic wastes	glass	glass powders and small particles	1.21
Non-metallic wastes	Paper & card	paper/card packaging and newspaper - whole	0.2
Non-metallic wastes	Paper & card	paper/card pulps and fibres	0.9
Non-metallic wastes	rubber	end-of-life tyres	0.47
Non-metallic wastes	plastic	plastic packing and shavings/turnings from manufacture of plastic products	0.22
Non-metallic wastes	wood	pallets and other wooden packaging	0.11
Non-metallic wastes	wood	sawdust, shavings from wood processing	0.25
Non-metallic wastes	textile	cloths, off-cuts and other textile pieces	0.2
Non-metallic wastes	textile	textile fibres	0.61
Discarded equipment	batteries	batteries	1.35
Discarded equipment	WEEE and other discarded equipmt	components, electronic equipment and similar items	0.3
Discarded equipment	WEEE and other discarded equipmt	fluorescent tubes	0.19
Animal & vegetable wastes		oils and fats	0.61
Animal & vegetable wastes		general food waste	0.28
Animal & vegetable wastes		sludges/manures	0.92
Mixed (ordinary) wastes		mixed wastes - uncompacted	0.26
Common sludges		sludges	0.92
Mineral wastes		slags (eg. furnace slags)	1.08
Mineral wastes		waste gravel, crushed rocks and other mineral wastes	1.23
Mineral wastes		flue-gas dust and similar	0.74
Mineral wastes		ash and boiler dust	0.5
		other liquid wastes	1
		other solid wastes	0
Metallic wastes		aluminium cans - whole	0.04
Metallic wastes		aluminium cans - compacted	0.2
Metallic wastes		ferrous cans - whole	0.09
Metallic wastes		ferrous cans - compacted	0.5
Non-metallic wastes	glass	glass bottles - whole	0.36
Non-metallic wastes	Paper & card	paper&card packaging and newspaper - compacted	0.51
Non-metallic wastes	plastic	plastic packing and shavings - compacted	0.32
Non-metallic wastes	plastic	plastic bottles - whole	0.02
Non-metallic wastes	plastic	plastic bottles - compacted	0.3
Non-metallic wastes	plastic	plastic film - compacted	0.5
Animal & vegetable wastes		green/garden wastes - not compacted	0.24
Animal & vegetable wastes		green/garden wastes - compacted	0.61
Mixed (ordinary) wastes		mixed waste - compacted	0.26
Mineral wastes		mixed C&D waste	0.42
Mineral wastes	asbestos wastes	waste containing asbestos	0.32
Mineral wastes		soils incl contaminated	1.3
Mineral wastes		mixed rock, stone and clays	1.1
Mineral wastes		moulding (foundry) sands	0.5
Mineral wastes		vitrified wastes	1.35

7. Standard items

Item Name	Item Weight	SOC group	SOC subgroup
Battery - commercial vehicle	25	Discarded equipment	batteries
Battery - car	18	Discarded equipment	batteries
Drums, steel, empty ca 200l	18	Metallic wastes	Metallic wastes
IBC, Empty ca 1,000l	70	Non-metallic wastes	plastic
Drums, plastic, empty ca 200l	10	Non-metallic wastes	plastic
Tyre - Commercial Vehicle	30	Non-metallic wastes	rubber
Tyre - car	10	Non-metallic wastes	rubber
Fridge	45	Discarded equipment	WEEE and other discarded equipment
Photocopier	50	Discarded equipment	WEEE and other discarded equipment
Cooker	52.5	Discarded equipment	WEEE and other discarded equipment
Computer - full	28	Discarded equipment	WEEE and other discarded equipment
Fluorescent tube	1	Discarded equipment	WEEE and other discarded equipment
Chairs - office	12	Discarded equipment	WEEE and other discarded equipment
Freezer	45	Discarded equipment	WEEE and other discarded equipment
Dishwasher	50	Discarded equipment	WEEE and other discarded equipment
Furniture - office	25	Discarded equipment	WEEE and other discarded equipment
Mattress	40	Discarded equipment	WEEE and other discarded equipment
Microwave cooker	17	Discarded equipment	WEEE and other discarded equipment
Printer - for computer	6	Discarded equipment	WEEE and other discarded equipment
Television set	20	Discarded equipment	WEEE and other discarded equipment
Video recorder	11	Discarded equipment	WEEE and other discarded equipment
Washing Machine	75	Discarded equipment	WEEE and other discarded equipment
Pallet	20	Non-metallic wastes	Wood

8. Data grossing methodology

The process of extrapolating waste arisings data from the surveyed local units to provide an estimate of the total waste arisings at a national level is known as 'grossing up'. Since the survey follows a sample matrix structured by sector (s) and size band (b), which form the cell/brick/stratum, the grossing up methodology was also executed on a brick by brick basis. The methodology assumes that company size bands are sufficiently narrow and that the sample average waste per site is representative of the population of that cell/brick.

Regional grossing up methodology

For each cell/brick (sb) the average sample weight per site ($\overline{w}_{sb}$) was calculated by dividing the total sample weight (w_{sb}) by the number of sample sites (n_{sb}) surveyed:

$$\overline{w}_{sb} = \frac{w_{sb}}{n_{sb}} \quad (1)$$

The grossed up weight for each brick (W_{sb}) was then estimated by multiplying the population (N_{sb}) by the average sample weight per site $\overline{w}_{sb}$ for each brick:

$$W_{sb} = N_{sb} \times \overline{w}_{sb} = \frac{N_{sb} \times w_{sb}}{n_{sb}} \quad (2)$$

The grossed up weights for each brick (W_{sb}) were then added together to give the regional total grossed up weight (W):

$$W = \sum_{s,b} W_{sb} \quad (3)$$

Grossing up by waste type and management option

The total grossed up waste arisings by waste type (i) was estimated using the total sample weight for each waste type (w_i) as a proportion of total sample weight within each brick (w_{sb}):

$$p_{wi} = \frac{w_i}{w_{sb}} \quad (4)$$

Where: p_{wi} is the sample weight of each waste type as a proportion of total sample weight within each brick.

Using the derived proportion in equation (4), the grossed up weight for each waste type (W_i) was then estimated by multiplying the proportion for each waste type (p_{wi}) by the grossed up weights for each brick (W_{sb}):

$$W_i = p_{wi} \times W_{sb} \quad (5)$$

The same approach was used to estimate the grossed up weight for each waste management option, however, in this case w_i, p_{wi} and W_i represent total sample weight, proportion and grossed up weight for each waste management option.

Sub-regional grossing up methodology

To estimate the total grossed up waste arisings at the sub-regional level, the total number of local units at the sub-regional level was obtained from ONS and used to determine the number of local units at the sub-regional level as a proportion of the total number of local units at the regional level for each brick.

$$p_{sbr} = \frac{N_{sbr}}{N_{sb}} \quad (6)$$

Where: p_{sbr} is the number of local units at the sub-regional level as a proportion of the total number of companies at the regional level for each brick (sb), N_{sbr} is the number of local units in each sub region for each brick, and N_{sb} is the number of local units at the regional level for each brick.

The sub-regional proportions (p_{sbr}) were then multiplied by the grossed up weights for each brick (W_{sb}) to determine the grossed up weights for each brick at the sub-regional level (W_{sbr}).

$$W_{sbr} = p_{sbr} \times W_{sb} \quad (7)$$

The grossed up weights for each brick for each sub region were then summed up to give the total grossed up weight for each sub-region (W_r).

$$W_r = \sum_{s,b} W_{sbr} \quad (8)$$

Grossed data quality checks and adjustments

In addition to the data screening done for outliers, checks were carried out on the grossed data to flag up any data inconsistencies and individual waste streams which needed checking. To achieve this, a sensitivity analysis of the grossed up data was undertaken to identify the waste streams that had the greatest impact on the waste total. As a result of the accuracy of these waste stream amounts were checked through contacting a number of surveyed companies by phone to check and confirm the data with them.

8.1. Estimation of precision

The sampling error and confidence levels determine how accurate the survey results are. The margin of error gives an idea of the measure of precision of the statistical estimate while the confidence level is an indication of how confident or certain we are about the level of error in the results of the survey. The margin of error was estimated as follows:

i) Estimation of the overall sample mean using:

$$\overline{X} = \sum \left(\frac{N_{sb}}{N} \times \overline{x}_{sb} \right) \quad (9)$$

Where:

$\overline{X}$ is the overall sample mean

$\overline{x}_{sb}$ is the mean of each stratum/brick (derived from the survey data)

N_{sb} is the population size of each stratum/brick

N is the overall population from which the sample was taken

ii) Determination of the sample standard error using the survey data:

$$SE = \left(\frac{1}{N} \right) \times \sqrt{\left\{ \sum \left[N_{sb}^2 \times \left(1 - \frac{n_{sb}}{N_{sb}} \right) \times \frac{S_{sb}^2}{n_{sb}} \right] \right\}} \quad (10)$$

Where:

SE is the standard error of the of the sample (this provides the standard deviation of the sampling distribution used for the survey)

n_{sb} is the sample size of each stratum

S_{sb} is the standard deviation of each stratum (derived from the survey data)

Using equations (9) and (10) and the critical value (α)[4], also known as the z score (derived from the normal distribution tables), the sampling error of the delivered sample matrix was computed at three different confidence levels for the Urban Mines data, Defra data and combined Urban Mines and Defra data as shown in Figure 70 .

Confidence Level (%)	Margin of error (%)
90	±6.59
95	±7.88
99	±10.37

Figure 70: Measure of precision at different confidence levels for the Urban Mines data

Figure 70 shows the computed margin of error of the results of the survey at different confidence levels for the Urban Mines survey data. The margin of error defines the range of the confidence interval and thus gives the amount by which the survey statistic deviates from the true population parameter/value (in this case the total waste produced by businesses in the North East region), while the confidence level denotes

[4] It is a factor used to compute the margin of error/sampling error.

the uncertainty. Therefore, given the sample size of 1,036 commercial and industrial companies in the North East region and taking the 90% confidence level, we can be 90% confident that the estimated total amount of the waste produced by businesses within the North East is the grossed tonnage ±6.59%.

However, the addition of the data from the National Survey, as well as filling data gaps, also introduced an additional level of uncertainty. Figure 71 shows the precision/margin of error using both survey data sets.

Confidence Level (%)	Margin of error (%)
90	±16.33
95	±19.52
99	±25.69

Figure 71: Measure of precision at different confidence levels for the combined data (i.e. 1,312 companies)

Figure 71 shows that at the 90% confidence level, we are 90% certain that waste produced by businesses within the North East region is 2,176,587 tonnes ±16.33%.

The difference in the margins of error for the 2 data sets is due to some relatively large standard deviations within the National Survey data in comparison to the Urban Mines data.

9. Recyclable or Recoverable

The waste survey included an assessment of whether an individual waste stream had the potential to be recycled or to be energy recovered, if the appropriate facilities were available. The following gives some background as to how this assessment was made:

Recyclable

Materials deemed Recyclable included:

Paper	Timber (not including MDF)	Drums, barrels, IBCs
Glass	Some oils	Garden and kitchen waste
Metals	Tyres	WEEE
Plastics:	Batteries	
○ HDPE	Computers	
○ PET	Toner/ink cartridges	
○ LDPE	Clothing	
○ Including mixed plastics	Fluorescent tubes	

For mixed recyclable wastes, these were recorded as "Possibly Recyclable" reflecting the fact that recyclable materials could possibly be separated or segregated at an earlier stage of processing, or post collection in the right type of facility.

Energy recoverable

Most materials have a calorific value and, if used in the right sort of facility, can be used to generate heat and/or electricity. Assessment of whether waste was considered recoverable or not was based upon the calorific value of its major component or constituents.

The calorific value of a material defines the amount of heat released during the combustion of the material. It is measured in units of energy per amount of material. The typical calorific value for coal is 28,000 kJ/kg whilst the typical value for crude oil is 45,700 kJ/kg.

The table below (Figure 72) gives calorific values for different materials that may be found in the waste stream (and for different general waste streams).

Eminently recoverable materials of course include:

- Paper/Card
- Plastics
- Textiles
- Wood/MDF
- Tyres

For such materials, values can be as high as 32,000 KJ/Kg, compared to 28,000 for coal and 46,000 for oil.

Hence, waste streams which include a majority of these materials were classed as “Recoverable”.

Other waste materials also have a significant calorific value and again can be incinerated in the right type of facility. These include:

- Meat and bone
- Municipal waste
- Food and garden waste
- Straw
- Poultry litter

Any stream predominantly made up of such materials was classed as “Potentially Recoverable”, particularly if wet.

Waste streams classified as “Not recoverable” included:

- Metals
- Glass
- Aqueous liquids
- Construction and demolition inert waste

Material	Calorific Value kJ/kg
Paper/board	16,900
Plastic	32,650
Food/garden	9,000
Textiles	15,580
Domestic wood	10,000
Tyres	32,000
Glass	Nil
Metal	Nil
Poultry litter	8,800
Straw	15,000
Meat and bone	18,600
Dried primary sewage sludge	18,000
Municipal solid waste	9,500
Refuse derived waste	18,500
General Industrial waste	16,000
Hospital waste	14,000
Other	10,600

Figure 72: Calorific values of different materials

10. Lessons learned

Use of Commercial Contact Datasets

The design of the sample matrix for a survey of this type relies upon the use of business population data from the Inter-Departmental Business Register (IDBR), which is a list of UK businesses maintained by the Office for National Statistics (ONS). The two main sources of input are the Value Added Tax (VAT) system from Customs & Excise and Pay As You Earn (PAYE) from Inland Revenue. So as to protect what could be deemed as commercially confidential or personal data, this dataset is deemed disclosive.

Disclosive IDBR data is not available to private organisations, as IDBR data is collected under the Statistics of Trade Act 1947; Section 9 of the Act does however allow ONS to supply Government Departments with information relating to individual undertakings for statistical purposes, when in receipt of a Ministerial Direction. As such, submission of a request for disclosive data and subsequent correspondence should be conducted by the Government dept commissioning the survey work, such as the Environment Agency which has such a Ministerial Direction, as has been the case in previous surveys.

However, in this case the work was commissioned by a regional body. RDAs are classed as non departmental public bodies, for which there is currently no legal gateway to receive disclosive data.

Therefore for this survey, we had to use non-disclosive population data for development of the sample frame and for grossing up final figures (data rounded using the "Tau Argus" software package to avoid disclosure) and could not have access to ONS held company contact details.

We therefore reviewed a number of commercially available datasets. As these are mostly marketed to drive marketing campaigns, the data was not always in the form which could be related directly to the developed sample frame. However, we finally selected data from LBM Marketing, which through operation of a bespoke query to their database, was able to provide a randomised selection of business contact details within the region, with appropriate sector group and employee number fields. The use of this data, along with the normal checking to ensure key data field were correct, proceeded well, especially as all records provided accurate telephone numbers in contrast to the ONS dataset.

The use of such commercial contact data may therefore be an option for future surveys.

Appending Data from other Surveys

As this Urban Mines survey was run concurrently with the end of the larger scale National Survey, steps had to be taken to ensure the same businesses were not surveyed twice, to maximise value from the two surveys and to avoid double counting when the output from the two surveys was combined. Also, it was unlikely that a specific business would volunteer to be surveyed twice in a matter of weeks.

As the National Survey data was appended with non-survey data such as PPC and corporate records, and businesses to survey in the North East were selected randomly on the basis of a sample matrix developed at a national level, the 276 sets of survey data from the North East favoured larger businesses whose waste arisings tonnages had regional significance. Although the Urban Mines survey mopped up many of the remaining larger businesses, the two datasets had to be combined at grossing to ensure a representative sample of North East businesses was used to estimate total regional and sub-regional arisings. Because the National dataset contained mostly larger companies, its impact on grossing on the final figures was larger than you might expect in combining 276 samples with the 1,036 samples collected in the Urban Mines survey.

However, this is where the different aims of the two surveys produced challenges in combining the data. The Urban Mines survey was North East focussed and specific, collected data such as destination reflected this, whereas the National Survey data did not retain a regional level of detail. Also, because a proportion of the 276 records were from non-survey sources such as PPC returns, a considerable volume of records did not contain responses to key questions such as recyclability and recoverability, introducing a significant volume of unhelpful “don’t know”s into the grossed figures.

However, the most significant difference was seen in the variability of data for given sector groupings and business sizebands. The Urban Mines data was thoroughly error checked during collection of the data, on receipt of the data at the central database, and thirdly at data grossing stage. This 3 step approach means we have considerable faith in the accuracy of our figures. For the National Survey, the North East samples represent only 276 out of the ca. 6,000 samples used for grossing to national level estimates, therefore any inconsistencies or inaccuracies in the North East records would be more difficult to spot, and would be less relevant to the survey if their impact on the final national grossed estimates was small. Therefore, we saw a considerably higher variability in the National Survey records, reflected in increased standard deviation for selected sector group - employee sizeband combinations, which has a considerable impact on final grossed figures and on data precision and confidence.

Nevertheless, the combined datasets do produce a much more detailed picture of waste arisings in the North East across the range of sectors and business sizes, and the volume of data allows the production of viable estimates at sub-regional level too.

Therefore despite its challenges, the combination of the two datasets has provided a detailed insight into the waste arisings in the region, and the ca. 8,000 line dataset of raw data produced will become invaluable in setting planning and resource policy in the region in the future.

11. Glossary and abbreviations

Statistical Terminology

Brick (cell)	A cell in the sample matrix, referring to a particular combination of size band and Standard Industrial Classification (SIC).
Confidence	Quoted in conjunction with a measure of precision, confidence is a measure of how confident one is in the reliability of an estimated quantity. For example, if total waste arisings were estimated with a precision of +/-4.7% at 90% confidence, then we can be 90% confident that the true (unknown) total waste arisings are within +/-4.7% of the estimated value.
Grossing (data)	In the context of this survey, data grossing means extrapolating the survey data to estimate the total waste produced by a national or regional population.
GUW	Grossed up weight
Mean	This is a measure of the central tendency or location of the population or sample data. It is the sum of the data values divided by the number of observations. If the data set is from a sample, then it is a sample mean and if it is from a population, it is a population mean.
Outlier	This is an observation in a set of data that is far removed in value from the others in the same data set. It is an unusually large or small value compared to others.
Population	A complete set of all units (i.e. people, places, objects or many other things) being studied and from which data is collected, described and conclusions drawn. In this report, the population is the collection of all businesses in Wales included in the scope of the survey.
Sample Matrix/Sample Frame	A table that indicates how many businesses are to be sampled from the population. The sample matrix is divided into a number of bricks.
Size Band	A classification of business size based upon the actual number of employees employed by the business on site.
Standard Deviation	Standard deviation measures the spread of the data about the mean value. It is used to summarise how much variability there is in a sample or population.

Waste Management Terminology

Anaerobic digestion	A method of composting that does not require oxygen. This composting method produces methane. Also known as anaerobic composting.
Animal By-Products Regulations (ABPR)	Legislation governing the processing of wastes derived from animal sources to prevent cross contamination.
Commercial waste	Waste arising from premises that are used wholly or mainly for trade, business, sport, recreation or entertainment, excluding household and industrial waste (as defined in Environmental Protection Act 1990, section 75).
Composting	The controlled biological decomposition and stabilisation of biodegradable materials (such as organic garden and kitchen wastes) under predominantly aerobic conditions to produce humus (organic)-rich, sanitised and stabilised product that can be beneficial to soil.
Construction and demolition waste	Arising from the construction, repair, maintenance and demolition of buildings and structures. It mostly includes brick, concrete, hardcore, subsoil and topsoil, but it can also include quantities of timber, metal and plastics.
Disposal	Any of the operations provided for in annex II A of the Waste Framework Directive.
Energy from waste (EfW)	The recovery of energy value from waste by burning the waste directly, or by burning a fuel produced from the waste.
Energy recovery	The process of extracting useful energy from waste, typically from the heat produced by incineration or via methane gas from landfills.
European Waste Catalogue (EWC)	A substance and activity-oriented classification of waste in 20 Chapters.
European Waste Catalogue for Statistics (EWC STAT)	A (mainly) substance-oriented statistical classification (SOC) of waste used for reporting waste statistics to the European Union. Do we need this?
Exempt waste	Waste handled by activities that are exempt from waste management licensing.
Gasification	Thermal treatment that involves heating waste in the presence of oxygen to recover energy in the form of gas.
Hazardous waste	Waste that is reactive, toxic, corrosive, or otherwise dangerous to living things and/or the environment.
Household waste	Waste from domestic properties including waste from caravans, residential homes and similar.

Industrial waste	Waste from a factory (within the meaning of the Factories Act 1961) or from any premises used for, or in connection with • provision of public transport • public supply of gas, water, electricity or sewerage services • provision to the public of postal or communication services
Landfilling	The final disposal of solid waste by placing it in a controlled fashion in a place intended to be permanent.
NACE	European Union classification system for economic activities.
Non-wastes	The Environment Agency and WRAP (Waste & Resources Action Programme) have reviewed and amended the legal classification of a number of materials including blast furnace slag and virgin timber, from waste to by-product, with clarification from the EU, and through consultation with industry, as part of the "Waste Protocols Project". A quality protocol gives guidance on how to recover waste, remove it from the regulatory regime and unnecessary regulations. In the context of this report, such wastes are described as "non wastes". See http://www.environment-agency.gov.uk/business/topics/waste/32154.aspx for more details.
Pollution Prevention and Control (PPC)	A system set up in the UK to implement the Integrated Pollution Prevention and Control Directive (96/61/EC) to prevent and control pollution from certain types of business. The PPC regime replaced the Integrated Pollution Control regime. Permitted sites are now under Environmental Permitting Regulations from 6th April 2008.
Pyrolysis	Chemical decomposition of a substance by heat in the absence of oxygen, resulting in various hydrocarbon gases and carbon-like residue.
Recovery	Generating value from wastes from a wide variety of activities such as recycling, composting and energy recovery.
Recyclables	Materials that are capable of being recycled.
Recycling	Recycling involves processing waste materials to produce new materials. Recycling materials like cans, glass, paper and textiles recovers the valuable resources in waste to make new products. The recycled materials can be made into the same product (closed-loop recycling) or a different product (open loop recycling).
Reuse	The use of a product more than once in its original form, for the same or a new purpose.
Thermal treatment	A broad generic term covering processes that involve the use of heat to treat waste. Incineration is the most common thermal treatment process. Pyrolysis and gasification are other high temperature processes but there are also low temperature processes used, for example, in technologies producing refuse-derived fuel.
Transfer station	A site to which waste is delivered for sorting and compacting prior to transfer to another place for recycling, treatment, or disposal.
Wastes	In the context of this report, wastes which are controlled under the EU Waste Framework Directive ie. not including "non wastes"

UK Standard Industrial Classification (SIC) codes	UK classification system for economic activities.
Waste	Any substance or object in the categories set out in Annex 1 of the Waste Framework Directive (91/156/EEC), which the holder discards or intends or is required to discard.
Waste arisings	The amount of waste generated in a given locality over a given period of time.
Waste minimisation	The reduction of waste at source, by understanding and changing processes to reduce and prevent waste. Waste minimisation can also include the substitution of less environmentally harmful materials in the production process. Also called process or resource efficiency.
Waste Statistics Regulations	European Union regulations that require Member States to report data on waste generation and treatment to the European Commission every two years.
WEEE	Waste Electrical and Electronic Equipment