Identification of key resource streams in commercial & industrial waste from small businesses in the food sector. Part 1: Main Report and Part 2: Appendices

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Identification of Key Resource Streams in Commercial & Industrial Waste from Small Businesses in the Food Sector

Part 2: Appendices

April 2007

Christine Thomas, Paul Dacombe, Angela Maycox, Charles Banks, Talat Khan and Rachel Slater

The Open University and University of Southampton
## Appendix 1: Resource classification:

<table>
<thead>
<tr>
<th>main resource streams</th>
<th>main waste categories</th>
<th>sub-categories</th>
</tr>
</thead>
</table>
| Organic               | organic food waste    | biodegradable kitchen / catering food waste (not containing or contaminated by fish or meat) (home compostable)  
                     |                       | biodegradable kitchen / catering food waste (containing or contaminated by fish or meat) (not home compostable)  
                     |                       | vegetable oils  
                     |                       | animal oils  
|                       | organic non-food waste| biodegradable garden + park waste/ plant matter soils  
|                       | other organic         | other organic waste  
| Wood                  | untreated wood        | natural wood - un-treated  
|                       | treated wood          | natural wood - chemically treated  
|                       |                       | composite wood  
| Paper and card        | newspapers & magazines| newsprint  
|                       |                       | glossy print / magazines  
|                       | other paper           | office paper  
|                       |                       | packaging paper  
|                       |                       | other non-packaging paper + and contaminated paper  
|                       | card and board        | corrugated board / board packaging  
|                       |                       | carton / thin board / card packaging  
|                       |                       | non-packaging card  
|                       |                       | liquid cartons  
| Textiles              | textiles              | textiles - predominantly natural fibres  
|                       |                       | textiles - predominantly synthetic fibres  
|                       |                       | shoes  
| Plastics              | dense plastic         | packaging dense plastic  
|                       |                       | non-packaging dense plastic  
|                       | plastic film          | packaging plastic film  
|                       |                       | non-packaging plastic film  
|                       | other plastics        | expanded plastics  
|                       |                       | other plastics and mixed plastics  
| Furniture, furnishings and non-electrical office equipment (not metals eg plastics, wood) | furniture, furnishings and non-electrical office equipment | carpet and underlay  
|                       |                       | furniture  
|                       |                       | other furnishings and non-electrical office equipment  

2
<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals</td>
<td>ferrous metal</td>
<td>ferrous packaging (e.g., food tins/drinks cans)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>process waste</td>
</tr>
<tr>
<td></td>
<td></td>
<td>non-process waste</td>
</tr>
<tr>
<td></td>
<td>non-ferrous metal</td>
<td>non-ferrous packaging (e.g., food tins/drinks cans)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>process waste</td>
</tr>
<tr>
<td></td>
<td></td>
<td>non-process waste</td>
</tr>
<tr>
<td></td>
<td>metal furnishings and non-electrical office equipment</td>
<td>metal furnishings and non-electrical office equipment</td>
</tr>
<tr>
<td>Electrical and electronic equipment / WEEE</td>
<td>electrical and electronic equipment</td>
<td>white goods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>large electronic goods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TV’s and monitors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>other WEEE</td>
</tr>
<tr>
<td>Chemicals and potentially hazardous</td>
<td>chemicals</td>
<td>organic chemicals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>inorganic chemicals</td>
</tr>
<tr>
<td></td>
<td>potentially hazardous</td>
<td>paint</td>
</tr>
<tr>
<td></td>
<td></td>
<td>portable batteries (less than 1kg; e.g., household type / rechargeable and non-rechargeable and button cells)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>automotive and industrial batteries and accumulators</td>
</tr>
<tr>
<td></td>
<td></td>
<td>engine oil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>other oils</td>
</tr>
<tr>
<td></td>
<td></td>
<td>clinical or healthcare risk waste (incl disposable nappies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>other potentially hazardous (incl fluorescent light bulbs)</td>
</tr>
<tr>
<td>Glass and ceramics</td>
<td>packaging glass</td>
<td>glass bottles and jars</td>
</tr>
<tr>
<td></td>
<td>non-packaging glass</td>
<td>other glass</td>
</tr>
<tr>
<td></td>
<td>ceramics</td>
<td>ceramics</td>
</tr>
<tr>
<td>Construction and demolition</td>
<td>construction and demolition</td>
<td>C&amp;D - excavations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C&amp;D - dredging / tailings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C&amp;D - building materials</td>
</tr>
<tr>
<td>Unclassified waste</td>
<td>mixed general waste</td>
<td>mixed general waste</td>
</tr>
<tr>
<td></td>
<td>other not classified above</td>
<td>other not classified above (incl fines)</td>
</tr>
</tbody>
</table>
Appendix 2: Questionnaire Design

The following description explains step-by-step the information sought and approach to questioning incorporated in the questionnaire.

Introductory prompt page

During piloting the survey it became clear that although all possible options for the removal of material had been considered when developing the questionnaire, interviewees only seemed to give details for removal of what they considered to be “waste”. However, it often became clear further on into the questionnaire that they had not mentioned all material that left their business, and that could be considered as waste/recyclables. For instance, glass taken to a bottle bank; this was despite the fact that one of the removal options was “Material is taken to one or more Recycling Banks by a member of staff”. The reason for this seems to be that the interviewee was focusing on “waste” and did not consider glass taken to a recycling bank to be waste.

Therefore, an introductory ‘prompt’ page (Figure A2.1) was created and inserted after the front page of the questionnaire. This was designed to make the interviewee think about all the different types of material that they generate and deal with, that can be considered waste or recyclables. The page was tailored towards the food and food-related sectors being surveyed and included examples of typical materials that they might generate. This effectively gave the interviewer a checklist that they could go through with the interviewee in order to prompt them to give details of the types of material they generate, and what happens to it. Then, when it comes to giving details later, the interviewee will be less likely to forget material/removal option.

![Figure A2.1: Introductory prompt page](image)

Interviewee details

The next page is where the actual information gathering begins; here, the name of the interviewee, their job title, the name of the business, and its location are entered. The two main aims in asking for this information are a. to give ownership of the questionnaire to the person answering the questions and b. gain insight into who the most appropriate person in a
business to contact for future surveys would be given business type. The combination of business name and location is used to search the database of approximately 5000 food and food-related businesses identified within Hampshire from various sources (FAME, Yellow Pages, ONS, etc.). The location has been used here as a means of filtering the businesses in order to limit the number of matches. For instance, businesses such as supermarkets have many branches throughout Hampshire; without a filtering system, all matches for a given name of business would be listed. However, adding the location as a search parameter limits the matches to those for a particular location only.

![Figure A2.2: Interviewee details](image)

**Business address and activity**

The name of the interviewee and business are carried over to the next page in order to personalise the questionnaire at the beginning, and give recognition/ownership to the interviewee.

If a unique match for the business/location combination is found within the database, then the address details are displayed; if necessary, these can be modified if any details are incorrect. If more than one business name is found for the location, then a drop-down list for the ‘Street/road name’ is given, from which the correct address can be selected; it is unlikely that two businesses with the same name will be situated at the same street address within the same location, hence a unique match should be provided from the list. If no match is found, then the address details can be entered manually.

The business details within the database have been arranged so that the address will appear on the page in a standard format. This is done not only for display purposes, but also so that the address can be stored in a new database in the same format. Additionally, some of the address details are used at a later stage in the questionnaire for filtering, etc., purposes; therefore, it is important to ensure that there is a uniform format to the address details.

Address details are used to tailor feedback to the business about legitimate facilities which are nearby as well as waste management companies that operate in the area. In addition, wastes can be then be geographically mapped for future infrastructure planning.
Next, the ‘main’ activity of the business is selected from a list, specific to the food and food-related business sectors. A summary of the different SIC groups associated with each activity is shown in Table A2.1; the full list of SIC codes within each group is given in Appendix 3.

Table A2.1: Questionnaire SIC code groups and descriptions

<table>
<thead>
<tr>
<th>SIC code group(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 15.1 – 15.9</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>2 51.17, 51.3</td>
<td>Wholesale</td>
</tr>
<tr>
<td>3 52.1, 52.2</td>
<td>Retail</td>
</tr>
<tr>
<td>4 55.1</td>
<td>Hotel, Motel</td>
</tr>
<tr>
<td>5 55.2</td>
<td>Guesthouse, campsite or similar</td>
</tr>
<tr>
<td>6 55.3</td>
<td>Restaurant, café, takeaway or mobile food stand</td>
</tr>
<tr>
<td>7 55.4</td>
<td>Public House, Bar, Club</td>
</tr>
<tr>
<td>8 55.5</td>
<td>Canteen or catering</td>
</tr>
</tbody>
</table>

**SIC Code generator**

Once the initial choice of main activity has been chosen, the questionnaire then follows a specific route dependent upon the choice of activity, in order to assign a business description and SIC code. For most options the interviewee is asked to give a description of their business activity. This description is then compared with both lists of keywords and lists of SIC code descriptions; each SIC code listed in Appendix 3 has a separate description and list of keywords stored in a database and the programme searches these lists for matches against the description entered. However, the programme filters the search, such that matches are only given for those SIC codes within the main activity group chosen. For example, if a businesses’ main activity is ‘Manufacturing’, then the programme will only give matches for SIC codes within the range 15.1 – 15.9.

An example of the results generated from this search is shown in Figure A2.4, for a description entered by the business of “caviar manufacture”. Here, two possible matches have been found: ‘Freezing of fish’ (SIC 15.20/1) and ‘Other fish processing and preserving’ (SIC 15.20/9). The business can then select the description that best described their activity. If the results displayed do not provide a match, then the ‘none of these’ option can be selected. The programme will then route the questionnaire to an alternative SIC code generator.
The alternative SIC code generator is a way of determining the business activity description and SIC code by use of an hierarchical system of questions designed to guide the interviewee to their business activity in as few steps as possible. The flow diagram for the manufacturing SIC code generator is given in Appendix 4.

In order to prevent the need to use this method of determining the business activity/SIC code the next time a business enters the same description as a previous business, the keyword list database is updated with the key descriptors from the description entered; i.e. standard (e.g. “the”, “and”) and generic (e.g. “manufacture”, “shop”) words are not included: for example, from the description “fish and chip shop”, the key descriptors “fish” and “chip” only would be added to the keyword list. It should be noted that only the list for the SIC code determined for the business via the alternative SIC code generator is updated. If it is not possible to define the business activity to the four/five digit SIC code description level, but only to the three digit level, then the keyword list is not updated. This is to prevent the programme subsequently including any results from a description list that is only at the three digit SIC code level: it is the desire of the questionnaire, wherever possible, to determine the SIC code of a business to the greatest level. As businesses in general do not know what their SIC code is, or may use a previous version to SIC 2003, the questionnaire avoids the use of the term SIC altogether thus alleviating any confusion or error. The SIC code digits are not revealed to the user, but recorded in the database only so that the interviewee thought processes are not sidetracked.

Details of facilities and secondary activities

If appropriate, the interviewee will then be asked to give information about the facilities that their business has; for example, the number of rooms that a hotel has, or the number of diners that a restaurant can seat. This is designed to gather additional information about the business to allow better comparison of businesses within the same SIC code group and size band range. In addition, the questionnaire asks if the business undertakes any secondary activities, and to give details of these activities. This also helps to distinguish between similar businesses and is
useful in highlighting reasons for differences in levels of waste generation, etc., between the businesses.

**Business premises**

The next section of the questionnaire gathers information about the business and its premises. The following details are logged:

- whether the premises are owned by the business, or leased/rented/managed
- whether there are other businesses within their premises; and, if so, how many
- if the business operates under any other trading name and/or if it is a franchise or subsidiary of another company
- how much floor space the business has for storing waste; this can either be given as an area, or length by breadth dimensions, and in units of feet, yards or metres
- whether other businesses share this space
- if other businesses share the waste/recyclables containers used by the business; and, if so, how many businesses

Reasons for asking each question in turn are:

1. If a business premises are not wholly owned by the business ie. rented, leased or managed, then a business may be tied into a contract which restricts the options available to them for waste management. Any changes proposed in the feedback from the questionnaire findings may then have to be checked with a landlord to ensure that conditions of a lease are not broken.
2. Other businesses located within a premises may impinge on waste management practices. For example, space may be limited for further bins, or bulk buying between the businesses could be taken forward.
3. If a business is a franchise or subsidiary then changes in the waste stream to encompass reuse or reduction are possibly outside the business’ control.
4. Lack of floor space may impinge on a business’ ability to incorporate more recycling bins. However, there may also be opportunities to increase separation activities.
5. There may be the potential for businesses to share bins if they utilise the same area in an attempt to increase resource recovery e.g. rather than having two businesses with individual mixed waste bins, one could be turned into a recyclable bin, thus capturing resource within limited floor space.
6. In addition to knowing if other businesses share the bins to allow for correct data recording in the questionnaire, this information is also of use to assess levels of current activity of this aspect.

It should be mentioned that no questions as to business income or turnover are asked. As the questionnaire is not being used by a government agency directly, businesses would be under no obligation to divulge this, what is often seen as sensitive, information and it was expected that questioning of this nature would lead to businesses not wanting to take part. As the SIC code and staffing levels are included, comparisons between businesses may still be made.

**Staffing levels**

In this section the number of full-time and, if applicable, part-time staff employed by the business is logged. Since the size of the business may be very small, then the level of staff should include everyone, including the owner. If the business indicates that it has part-time staff, then they are asked to give the average number of hours worked by these staff. The interviewee also has the option to give an estimate of staff levels if they cannot give a precise figure; in this case, there are drop-down menus with different size ranges for the number of
full-time and part-time staff. There are nine size ranges to choose from, which sub-divide the SME size band classifications in order to provide an accurate as possible estimate of the staff levels; and the mid-point of each size range is used as an estimate of the value.

In addition, any variation in staffing levels throughout the year can be logged; this is divided into the four seasons of the year. However, if the business can only give an estimate of its current staffing levels, then this question is not asked since it is likely that any variation would lie within the original size range estimate.

As well as staffing levels, details of the working hours, etc. of the business are taken, and the following questions are asked:

- how many hours per day is the business open, or operational (depending on the nature of the business)
- how many days per week is the business open/operational
- how many weeks per year is the business closed or non-operational

These questions are asked, as they may help to explain differences in waste generation for similar businesses. Also, it is important to know if the business is closed for any length of time (excluding standard public holidays), since this may affect the calculation required to determine the annual levels of material generated.

**Disposal or removal options**

The remaining part of the questionnaire is concerned with gathering information about the disposal methods used by the business, the containers used for this, and the types and amounts of waste generated by the business. This is only for material that is removed from the business on a regular basis, i.e. with a frequency of collection of at least about once a month. Details of material that leaves the business on a less frequent basis is collected further on in the questionnaire.

The first section gathers information about the different disposal options. The initial page for this section is a prompt page, similar to Figure A2.1, designed to refresh the memory of the interviewee as to the various methods selected on the initial prompt page. Following this page, the interviewee is asked to select the different options that they use (Figure A2.5). In order to ensure that any options are not accidentally missed, either ‘YES’ or ‘NO’ must actively be selected for each option in turn; it is not possible to continue to the next option until a selection has been made, nor is it possible to proceed to the next page of the questionnaire until all options have been selected. However, if the interviewee is uncertain about the removal methods then they can select the ‘do not know/not sure’ button; the route taken for this scenario will be described later in this section.

Separate information is then collected for each option positively selected on this page. The details for each option are given below, and a flow diagram for this section can be found in Appendix 5.
Figure A2.5: List of disposal options

**Removed by Local Authority**
If the interviewee indicates that their Local Authority removes waste/recyclables from their business then the programme displays the name of the local authority, and asks the interviewee to confirm if this is correct or not. If incorrect, then the interviewee can manually enter the name.

In order for the programme to display the name of the local authority, a database was created containing all of the postal towns within Hampshire (593). Using a map of Hampshire showing the boundaries of each local authority, the location of each postal town is found and, from this, its corresponding local authority can be assigned. In situations where the postal town is located at or near to the border between two or more local authorities then this is noted; since the postal town is located close to a border, the surrounding villages, etc. with this postal town as part of their address may be located across the border in another local authority district.

Each postal town is then assigned a code in the database, according to the local authority of the postal town, or combination of possible local authorities; this is then used to determine what should be displayed to the interviewee, based on the address of the business. If the local authority is one of the following, the name of the local authority is displayed as described:

- Basingstoke and Deane Borough Council
- Eastleigh Borough Council
- Fareham Borough Council
- New Forest District Council
- Southampton City Council
- Winchester City Council

However, if the local authority is one of the following:

- East Hants District Council
- Gosport Borough Council
- Hart District Council
- Havant Borough Council
- Portsmouth City Council
• Rushmoor District Council
• Test Valley Borough Council

The text “from your address, your business seems to be in an area where the Local Authority does not collect commercial waste. Are you sure that this waste is removed by your Local Authority? If you are, please enter the name of it here” is displayed. This is because the local authorities in the second group above do not (currently) provide a commercial waste collection service. However, if the interviewee is certain that their local authority collects their waste/recyclables then the name can be entered at this stage.

If the business is located in an area at the border of two or more authorities, then several possibilities exist:

• if the bordering authorities are all from the first group above, then all possibilities will be displayed, and the interviewee asked to choose the appropriate authority (or enter manually the name of the authority, in case the match is incorrect)
• if there is a mixture from both groups above, then only those local authorities from the first group are displayed and, if there is more than one of these, the interviewee is asked to choose the appropriate authority
• if there is a mixture from the second group only, then the same text is displayed as would be displayed if there is a match for one of these local authorities.

An example of the local authority confirmation displayed by the questionnaire is shown in Figure A2.6.

![DISPOSAL OPTIONS: WHO REMOVES YOUR WASTE?](image)

You have indicated that a Local Authority removes commercial (business/office) waste from your premises.
From your address, this Local Authority has been identified as SOUTHAMPTON CITY COUNCIL.

Is this correct? YES ☐ NO ☐

**Figure A2.6: Example of Local Authority confirmation page**

It should be noted that generally, the questionnaire has been designed in a flexible manner; i.e. the selections provided are not rigid – there is always an ‘other’, ‘not sure’, etc., option in order to prevent the interviewee from being forced to select an option that is not of their choosing; if they did not make such a selection, then they would not be able to proceed. In essence, this aspect ensures trapping of inherent errors of questionnaires of this type.

**Removed by private waste, recycling, or reprocessing company**

For this part of the disposal section, the interviewee can enter the name(s) of the private companies that remove waste/recyclables from their business (Figure A2.7). To aid them in giving the correct name of the company(ies), a pop-up list of the most common companies
operating within Hampshire is provided (Figure A2.8). The interviewee can then simply select the appropriate company(ies) from this list; if the name of a company they use is not on the list, then it can be entered manually.

![Figure A2.7: Example of private company selection page](image)

**Figure A2.7: Example of private company selection page**

![Figure A2.8: List of private companies operating in Hampshire](image)

**Figure A2.8: List of private companies operating in Hampshire**

*Material sent back to a central depot or similar*

This is generally for businesses that use backfilling of material, for example supermarkets, where vehicles that are used for delivery of goods are then used for removal of waste/recyclables back to a central depot. For this option, the interviewee can enter details of where material goes (i.e. its location), and a brief description of the material sent back (Figure A2.9). If there is more than one location, or multiple materials, these can be entered separately.
**Figure A2.9: Example of material sent back selection page**

**Removed by another business to use as a material for their process**

The interviewee should give details here of any material that is used by another business (Figure A2.10). An example of this might be waste packaging chips arising from one business being removed by another business to be re-used as filler material. If more than one type of waste is taken away to be used by another business, then details of each can be entered separately.

**Figure A2.10: Example of material removed by another business selection page**

**Business takes it directly to a waste transfer station**

This option is for cases where the business takes material directly to a waste transfer station themselves (Figure A2.11). Although it is unlikely than many businesses will select this option, it has been included for completeness, by ensuring that all possible removal options have been considered. Here, the business can manually enter the name and location of the waste transfer station(s) that they use; alternatively, they can select the waste transfer station...
from a pop-up list of those operating within Hampshire (grouped by local authority district; Figure A2.12).

Figure A2.11: Example of material taken to waste transfer station selection page

Figure A2.12: List of waste transfer stations in Hampshire

**Business takes it directly to a landfill site**

This option is for cases where the business takes material directly to a landfill site themselves (Figure A2.13). Here, the business can manually enter the name and location of the landfill site(s) that they use; alternatively, they can select the landfill site from a pop-up list of those located within Hampshire (grouped by local authority district; Figure A2.14).
Material donated to a charitable organisation or community group

If the business donates material such as clothing, etc., to charities or community groups then they can give details of the name of the charity and the material that is donated here (Figure A2.15).
Figure A2.15: Example of material donated to charity selection page

*Material taken to HWRC by a member of staff*

The name(s) of any Household Waste Recycling Centres used by the business to deposit waste/recyclables can be given on this page (Figure A2.16). This can be entered manually in the text box(es) provided.

Figure A2.16: Example of material taken to HWRC selection page

Alternatively, to assist the interviewee with identifying the particular HWRC(s) that they use, a pop-up list has been provided (Figure A2.17), which gives the various HWRCs in Hampshire, grouped by local authority districts.
Material taken to recycling bank by member of staff

Similarly, if the business takes material to recycling banks, then the location(s) can be given here (Figure A2.18). If the interviewee can give the specific name(s) of the recycling bank(s) used by the business, then they can enter the details manually.

Alternatively, a pop-up list is provided (Figure A2.19), which gives a list of local authority districts areas including the main towns within that area. Details have not been given of all the different possible recycling banks within each district because of the large numbers of these located throughout.
Figure A2.19: List of recycling bank areas in Hampshire

**Material taken home by member of staff**

Brief details of any materials that members of staff may take home from the business, for example leftovers, can be given in this section (Figure A2.20).

![Image](image1.png)

**Figure A2.20: Example of material taken home selection page**

**Material leaves business by another way**

Finally, if material leaves a business by any other way not covered by the other options, then details can be given here (Figure A2.21) of both the method(s) of removal and the material(s) removed.
Figure A2.21: Example of material leaving business by another way selection page

Description of containers, etc. section

For each of the removal options selected in the previous section, the questionnaire now gathers information about the type and number of different containers used for removal of material from the business. Images and descriptions of the bins are given in an attempt to give the user as much information as possible in order to make the right choice. Using this information for future resource management planning, the number of bins used and total space available can be combined to ascertain the need for alternative bin types, frequency of collection etc.

Figure A2.22: Example of start page for description section

For all removal options other than via local authority or private waste/ recyclables/ reprocessing companies, further details are also taken of the type of waste removed in order to provide an estimate of the amounts of the different materials removed by these methods. An example of the start page for this section is shown in Figure A2.22, which has selection
buttons for all of the different removal options described above. Details are given below, to show the information that is collected for each option.

**Removed by Local Authority**

This is where the business can give details of the type and number of different containers that are used by their local authority to remove waste/recyclables from their business. It can be seen from Figure A2.23 that the name of the local authority indicated by the business is highlighted at the top of the page as a prompt for the business. The questionnaire has also been designed so that the list of different containers displayed here is dependent upon the actual local authority used by the business. Each local authority that provides commercial waste collection was contacted and asked to give details of the different containers that they provide to businesses for collection of waste/recyclables. This information was then programmed into the questionnaire so that the appropriate list of containers can be displayed here, rather than giving a list of all the possible different containers that might possible be provided.

![Figure A2.23: Example of Local Authority details page](image)

The interviewee can then select which containers they have from this list, giving the number of each type of container they use for removal of the following types of material:

- mixed waste
- one type of waste
- mixed recyclate
- one type of recyclate

The screen has been constructed in this way as the bins and different materials the user puts in to them is visualised more easily than simply having a sheet to fill in from memory alone. The images and descriptions of the types of waste further reinforce memory recall, thus ensuring all bins and waste types are accounted for.

**Removed by private waste, recycling, or reprocessing company**

Similarly, the same information is collected for the private company(ies) used by the business (Figure A2.24). Again, the name of the company is highlighted at the top of the page; this is particularly important if the business uses more than one company for removal of waste/recyclables. Also, the list of containers is specific to the name of the private company: if the company is listed in the questionnaire database, then it will have a corresponding list of
container types used by this company associated with it. In addition, the list is also specific to the type of activity (i.e. SIC code) undertaken by the business. For instance, the list of containers for manufacturing businesses may include tankers, whilst they are not included for businesses such as restaurants, since it is unlikely that this type of business will use tankers for waste removal. Using filtered lists ensures that the questioning remains succinct and not confusing for the user. Moreover, as an error trapping device, the correct information can be logged without the need for repeatedly enquiring if the user is sure they have given the correct answer – an aspect which should be avoided if possible.

If the interviewee indicates that a company not included in the database removes material from their business, then a generic list is displayed containing a complete list of all containers available.

Although care has been taken to ensure that all possible types and sizes of containers are displayed, it may still be possible that a business uses a different container not displayed. Under these circumstances the interviewee can select the container displayed that compares closest, in terms of volume, to the actual container used; although it is useful information to have, the type of container used is of less importance than the container volume as it is this that is used subsequently to determine the amounts of material generated annually.

![Figure A2.24: Example of private company details page](image)

**Material sent back to a central depot or similar**

For this removal option a limited number of container types is displayed, indicative of the types and volumes of containers used by businesses for backfilling of material. The interviewee can then select the different type of container used for backfilling of each type of material (Figure A2.25). In addition, a description of each material is given, plus the number of containers used and the frequency that the material is taken away. For the frequency, drop-down menus are provided a range of number of times the material is removed per unit frequency of one to fifteen; and the unit of frequency chosen may be either ‘daily’, ‘weekly’, ‘monthly’ or ‘yearly’.
For removal of material by another business, the questionnaire only gathers information about the description of the material, the weight and frequency that it is removed by the other business (Figure A2.26). This is because, in order for another business to remove material they would require a Waste Transfer Note (WTN), and should have information about the weight of the material. Therefore, it is not necessary to collect information about the container used (volume).

Similarly, for material that is taken directly to a waste transfer station by the business, the questionnaire only gathers information about the description of the material, the weight and frequency that it is removed by the other business (Figure A2.27). In this instance, the business should be provided with a WTN by the operators of the waste transfer station, and would therefore have information about the weight of the material.
**Business takes it directly to a landfill site**

For material taken directly to a landfill site by the business, the questionnaire only gathers information about the description of the material, the weight and frequency that it is removed by the other business (Figure A2.28). Again, the business should be provided with a WTN by the operators of the landfill site, and should have information about the weight of the material.

![Figure A2.27: Example of material taken to waste transfer station details page](image_url)

**Material donated to a charitable organisation or community group**

Since it is unlikely that a business will use a standard waste container for material donated to a charity or similar, images of containers indicative of the types and size most likely to be used for such a purpose are given (Figure A2.29). Again, the interviewee can enter a description of the material donated, the number of containers and the frequency of collection; and, if known, the weight of material.

![Figure A2.28: Example of material taken to landfill site details page](image_url)
Figure A2.29: Example of material donated to charity details page

Material taken to HWRC by a member of staff

Again, since it is unlikely that a business will use a standard waste container for material taken to a HWRC, images of containers indicative of the types and size most likely to be used for such a purpose are given (Figure A2.30). Again, the interviewee can enter a description of the material they take to the HWRC, the number of containers and the frequency of collection.

Figure A2.30: Example of material taken to HWRC details page

Material taken to recycling bank by member of staff

The layout of the page displayed for material taken to recycling banks (Figure A2.31) is similar to that for the HWRC page, and the same information is collected.
Figure A2.31: Example of material taken to recycling banks details page

*Material taken home by member of staff*

Again, the layout for this option is similar to that for the HWRC page (Figure A2.32).

Figure A2.32: Example of material taken home details page

*Material leaves business by another way*

The layout for this page is similar to that for material sent back to a central depot, and the same list of containers is used and the same information collected (Figure33).
Frequency of collection

The remainder of the questionnaire is concerned with gathering further information for waste/recyclables removed by the local authority and private companies. The next page of the questionnaire asks the interviewee to give information about how often the containers are collected, and how full they are when collected (Figure A2.34).

Each of the containers selected previously are displayed separately, grouped together by who collects them, e.g. name of local authority, which is shown highlighted on the page. The interviewee can then indicate for each container how full it is on average when collected, and how frequently it is collected. A text box is provided for the interviewee to enter the number of collections, and can then choose the unit for the frequency of collection from a drop-down menu with ‘daily’, ‘weekly’, ‘fortnightly’, ‘monthly’ and ‘yearly’ values.
If a business shares waste/recyclables containers with other businesses, then the questionnaire indicates that they should only enter how much their business fills up the bin.

**Waste section**

This section of the questionnaire collects information about the types of material that the business produces on a regular basis. However, it is only necessary to give details of material that goes into the containers removed by the local authority and private companies, since information has already been collected about the materials removed from the business by other means.

The first page of the waste section is a simple introductory page giving an explanation of the information required by the questionnaire. However, the title header for this page is variable, and is dependent on the SIC code of the business, determined at the beginning of the questionnaire. This can be seen in Figure A2.35, which is the introductory page for fish manufacturing.

![Figure A2.35: Example of front page of waste section](image)

Indeed, this part of the questionnaire has been designed so that the pages that are displayed, although similar in content, are specific to the SIC code of the business, or to a group of SIC codes. The route through the programme taken by the various SIC codes is given in Appendix 6, together with an example of the flow diagram for the programme. For each SIC code given in Appendix 3 it has been determined whether or not businesses with this SIC code are likely to produce each type of waste, both at the main category and sub-category level. Furthermore, lists of materials found within each sub-category have also been produced for each SIC code, as will be discussed later in this section.

The next page of the questionnaire is the entry page where the interviewee can begin to select the types of materials produced by their businesses. Again, this page is dependent upon the SIC code of the business, and displays images of the most likely types of material that the business will produce, based on its SIC code, as is shown in Figure A2.36. Here, the interviewee is asked to select the material that it produces the most of; in this instance, it is taken to be ‘Food, plants, soil, etc.’ Images are used on this entry page to focus the user in on the types of waste they may produce and acts as a reminder.
The interviewee is then taken to the next page, which is the entry page for the particular category of material selected previously (Figure A2.37). This page gives examples of typical material found within each category of material, together with appropriate pictorial images. At the top of the page are buttons for each of the twelve main material categories used for the questionnaire classification system. Any material that is unlikely to be produced by the particular business (i.e. SIC code specific) is crossed-out with a red line to indicate this fact. However, it is still possible to select the buttons for these materials, in order to allow for the possibility that the business might still produce these materials.

At this stage the interviewee can either select the central button to be taken to the next page for this material or, alternatively, if they decide (after reading the description) that they do not produce any of this material then they can select one of the material buttons at the top of the page.
If they do select the central button, then they are taken to a page where they can select the sub-category of materials that they produce for this main material category (Figure A2.38). Each main category of waste has been further divided into sub-categories, as described previously. On this page, the interviewee can select the different sub-categories that they produce, by way of a tick-box below sub-category name. To aid with identification of the types of material found within each sub-category, a pop-up ‘INFO’ button is given below each. An example of this information page is given in Figure A2.39.

![Figure A2.38: Example of material sub-category selection page](image)

The interviewee can firstly select the main category material tick-box and then the appropriate sub-category tick-boxes. However, if they are not sure which sub-categories of material they produce then these tick-boxes can be left unchecked. In this instance the programme will simply record that the business produces the main material category; otherwise it will record both the main and sub-categories of material. Additionally, the interviewee may leave all tick-boxes unchecked, and the programme will not record anything.

![Figure A2.39: Example of material sub-category information page](image)

If the interviewee selected any sub-categories at this stage then on the next set of pages they have the opportunity give more information about the types of material they produce within
each of the sub-categories. An example of this is shown in Figures A2.40 and A2.41. If the lists of different materials are particularly long, then they have been split into smaller lists for display purposes, as can be seen in Figure A2.40.

![Figure A2.40: Example of material sub-category list pages (1)](image)

On selection of a particular list, the interviewee is taken to a page displaying the most likely types of material found within that list heading. These lists have been designed so as to be SIC code specific. For example, the lists here are for fish manufacturing, so give a detailed list of the types of material found within the particular sub-category shown. The interviewee can then select the appropriate material(s) from the list and this will be recorded by the programme. Thus, the questionnaire allows the interviewee the flexibility to give as much (or as little) information as they are able to.

![Figure A2.41: Example of material sub-category list pages (2)](image)

Once the interviewee has completed each section for a particular material they are taken to a continuation page (Figure A2.42), where they can either continue with logging the other material that they produce or, if finished, move on to the next section of the questionnaire.
Bin-filling section

The next stage of the questionnaire is where the interviewee fills up each of the different containers with the different materials that go into each container. Volumes rather than weights are asked for a few users would be able to say with any certainty what the weights of materials are. The questionnaire has an inbuilt database of all densities based on waste type and business, sourced from the Environment Agency. Thus all waste types have a density linked to them so that when it is selected by the user, the background programming volumes are reassigned as weights once the volume is known. An example of this start page is given in Figures A2.43 and A2.44, which shows the information carried over from earlier in the questionnaire. At the top of the screen is a row of all the different containers. The containers are arranged as follows:

- firstly, all containers for one particular collector are grouped, and the name of the collector highlighted above them.
- the containers are then further grouped by waste type (mixed waste, etc.)
- where there are multiple containers of one particular type, these are then grouped together (within the subset of the waste type)
- to aid with identification purposes and to help distinguish between similar containers, the container type is highlighted, and its fullness also shown.

The interviewee can then select all the different containers that contain material with the same composition, for each particular collector. Hence, it is not possible to select containers from different collectors and assign the same composition to each. Additionally, only containers within the same subset of waste type can be selected together, since it would not be possible in practice to have, for example, ‘mixed waste’ and ‘one type of waste’ containers to have the same material composition. However, it is possible to select different types of containers as long as they have been assigned the same waste type identifier. By using this method, errors can further be minimised by keeping the user firmly focused on the types of waste each bin contains, while at the same time speeding up the process so interest is maintained.
Once the interviewee has selected all the containers for a particular collector that has the same composition, they can then enter the proportions of each different material that goes up into these containers. As the interviewee selects the percentage (by volume) of each material that goes into the container, a graph is displayed at the left-hand side of the screen as a visual aid (Figure A2.43).

When the interviewee is happy with the breakdown they have given, then they can proceed to the next step. However, they can only continue if the total percentage is equal to 100 (Figure A2.44); if not, the programme will display a message and the ‘continue’ button will be disabled. Additionally, if the interviewee has forgotten to select any containers for filling, the programme will display a message and return to this page. It should be noted that the interviewee only needs to enter the percentage of materials that go into the container(s) selected. They can leave blank the boxes for any materials that do not go into the containers.
Also, only those materials selected in the waste section of the questionnaire will be displayed here.

![Image of a waste bin filling sub-category page]

**Figure A2.45: Example of bin-filling sub-category page (1)**

The next step is for the interviewee to indicate the breakdown of each of the material categories selected on the start page. This is the split of the different sub-categories that the interviewee selected previously that go into the container(s) selected. Again, the interviewee only needs to give a percentage breakdown for those sub-categories of material present within the selected container(s). If only one sub-category was selected previously (as shown in Figure A2.45), then the interviewee simply enters 100 percent; similarly, if the interviewee only went to the main material category level of detail in the waste section then, again, a value of 100 percent can be used.

![Image of a waste bin filling sub-category page]

**Figure A2.46: Example of bin-filling sub-category page (2)**

If, however, there is more than one sub-category as shown in Figure A2.46, then the interviewee should give the split between each of the appropriate sub-categories. Again, if the
total does not equal 100, then a message will be displayed and the interviewee cannot proceed to the next page.

The above procedure is repeated for each category of material selected until the breakdown for each has been given. Once this is complete, the programme will return to the start page for the bin-filling section. The interviewee can then select the next container/set of containers with the same composition, either for the same collector or the next collector and repeat the procedure of filling the bins once more. This will be repeated until all containers have been selected and filled, after which point the questionnaire will continue to the next section.

Details of the programme flow diagram for this section is given in Appendix 7.

**Occasional waste**

As mentioned previously, the above sections of the questionnaire were only concerned with material generated on a regular basis. The next section aims to collect information about any material that is produced on an occasional basis that the business has generated within the previous twelve months. This section has been split into two sections, and the interviewee can indicate on the start page (Figure A2.47) whether they have produced any material from the following:

- waste from maintenance and refurbishment activities
- other waste produced occasionally throughout the year

An explanation of the sorts of material generated for each type is given on the page when the interviewee scrolls over the appropriate text (so as to minimise clutter on the page).

![Figure A2.47: Occasional waste start page](image)

Depending on which buttons are selected, the interviewee will then be taken to one or both (in succession) of the different occasional waste pages. If the interviewee indicates that no occasional material is generated, then the questionnaire will skip to the next section.

**Maintenance and refurbishment waste**

Here the interviewee can give details of any material generated through maintenance and refurbishment activities. An example of the information entered on this page is shown in Figure A2.48. For each different maintenance or refurbishment activity, a description of the material generated by the activity, plus the container used for removal and an estimate of the volume is entered. Additionally, if known, the weight of material can be entered. Then the
frequency with which this material is produced is selected: the range for this is from a minimum of once less often than four years, to ten times every year to allow as much flexibility of choice as possible. The interviewee can also indicate whether the material is recycled or not; if they do not know then they can select ‘not sure’.

![Figure A2.48: Maintenance and refurbishment waste page](image)

*Other occasional waste*

Similar information is collected for any other occasional waste the business may produce. However, the interviewee can select from a drop-down list of different waste types (Figure A2.49) in order to help classify this occasional waste more readily.

![Figure A2.49: Other occasional waste page](image)

Again, for each different type of occasional waste, the description of the material together with an estimate of its volume is collected, and the frequency of generation selected (ranging from a maximum of ten times per year, to a minimum of once every two years). Again, the interviewee can indicate whether this material is recycled or not.
Summary of main waste: confirmation and additional information

Following the occasional waste section, the questionnaire now gives a summary of the waste/recyclables produced by the business that is subsequently removed by the local authority and/or private companies.

The first summary page (Figure A2.50) lists all the containers for each collector, together with details of the type of waste within each container, its fullness and corresponding volume of material per collection. To help identify more clearly between the same container types that might contain different materials, the ‘type of material’ descriptions displayed on this page are dependent on the information gathered previously. If the container has been designated ‘Mixed waste’ or ‘Mixed recyclate’, then the same text is still displayed. However, if the container has been designated ‘One type of waste’ or ‘One type of recyclate’, then the description of the type of material displayed on this page varies according to the type of material. The list of descriptions displayed according to the type of material is given in Appendix 8.

On this page, the interviewee has the opportunity to check this information and a note can be made if they feel the values are not correct; for instance, they may decide the container is not quite so full as they previously indicated. This information is recorded by the questionnaire, but the programme does not make any adjustments at this stage. Instead, during analysis, the database can be checked to see if any information was logged and any necessary changes made.

![Figure A2.50: Example of summary page 1](image)

The next summary page, Figure A2.51, again gives a list of the different containers and, for containers where it is appropriate, the interviewee is asked to indicate if material going into this container is either compacted or ground-up first. If they check the tick-box for any of these containers, then a compaction factor is applied to waste in this container; the density value assigned to each different material within this container is then multiplied by this factor to, effectively, give an increased density value for each material.
The next summary page is where the interviewee can give information about the weight of material removed by the different collectors, if it is known. This information should generally be found on the Waste Transfer Note that each collector provides to the business when they collect material from their premises. However, if this information is not available, and the interviewee can themselves give a good estimate of the weight(s), then this can also be entered here, and the fact that it does not come from a WTN recorded by the programme.

Waste awareness

This section gathers information about how aware the interviewee is with regard to waste regulations, legislation, etc. Details of the questions asked are shown in Figure A2.53.
Reasoning behind the questioning

For purposes of the survey, it is not only important to understand the waste arisings from a business type, but also to gain an understanding of the levels of awareness businesses currently have. If new structures are to be put into place, it is possible that businesses will need to be made more aware of the issues involved and the need for appropriate management. Questions were targeted to understand if businesses really understood as to what their legal obligations were. Asking about licences rather than waste transfer notes enabled the user to think more about the reasons why a transfer note is required, and feedback on this important aspect to be given. Housekeeping issues such as waste expenditure and auditing follow to assess current activity and if there is an understanding of the linkages between the two. Enquiring about Business Environment Groups links into the housekeeping questioning as an assessment of their current status and potential development may be made. The section ends by asking about legislation or initiatives, if they aware of any rather than fully conversant. One of the options given was ‘Special Waste Regulations’ – old legislation, but was included to assess how many businesses were actually aware of this. The correct answer is given in the feedback to alleviate any misconceptions. All answers to waste awareness questioning are logged so that appropriate feedback can be given.

Summary of main waste: pie chart

In order to provide the interviewee with instant feedback, details of the composition and percentage recycling rate for their business is shown here (Figure A2.54). This is only for material that is removed by the local authority and/or private waste company, since the programme is presently unable to calculate the amounts of material generated via any other removal options used by the business. When explaining the pie charts, this is indicated to the interviewee, so that they do not misinterpret the data.

The compositional pie chart is the composition by weight, normalised to a monthly material generation. This has been done in order to account for the different collection frequencies with which different materials may be collected from the business. Because the programme does not automatically account for any closure periods for the business, it was decided that
normalising to a monthly figure would be better than an annual figure, which can be subsequently determined during analysis of the data.

![Figure A2.54: Summary of waste pie chart](image)

Also given is the split between material disposed and recycled by the business based on information collected during the questionnaire (the ‘NOW’ chart); and the potential split between the two methods, based on assumptions as to whether each material produced by the business has the potential to be recycled using present methods (including, for example, technologies such as Anaerobic Digestion for any organic material). The first chart is determined simply by summing the weights of material within each container that has been designated as containing either waste (‘mixed’ or ‘one type’) or recyclate (‘mixed’ or ‘one type’) in order to determine the split between each. For the second graph, each material (main or sub-category) must be designation as either potentially recyclable (‘1’) or not (‘0’), and a list of these designations can be found in Appendix 8.

**Comments page**

Here the interviewee has an opportunity to give any additional information comments about the questionnaire or aspects of their waste management (Figure A2.55). In particular, they are encouraged to give their thoughts on any improvements that could be made in order to enhance the service they receive by their waste/recyclables collectors; or to provide details of any perceived barriers they feel exist that prevents them from recycling (more of) their waste. This page is a useful addition to the main questionnaire as it serves to allow the user to write about the issues that will have been thought about during the questionnaire process in addition to other issues. This ensures the process ends with a degree of ownership for the user, and as a stakeholder in business waste issues, ensures that their views are reported.
Thank you and feedback request page

The final page of the questionnaire (Figure A2.56) thanks the interviewee for their participation and informs them that, as part of the project, tailored feedback information can be provided to them giving details of local waste/recycling companies that might be of use to them. Feedback is primarily based on:

- business location
- type of business and secondary activities
- waste produced and discarded to mixed waste bins
- best practice and legislation

The interviewee then has the option to choose whether they wish to receive such feedback, and this is recorded by the programme.
Appendix 3: SIC codes and descriptions for Food-related Business Sectors

15 Manufacture of Food Products and Beverages
15.1 Production, processing and preserving of meat and meat products
15.11 Production and preserving of meat
15.11/1 Slaughtering of animals other than poultry and rabbits
15.11/2 Animal by-product processing
15.11/3 Fellmongery
15.12 Production and preserving of poultry meat
15.13 Production of meat and poultry meat products
15.13/1 Bacon and ham production
15.13/9 Other meat and poultry meat processing
15.2 Processing and preserving of fish and fish products
15.20 Processing and preserving of fish and fish products
15.20/1 Freezing of fish
15.20/9 Other fish processing and preserving
15.3 Processing and preserving of fruit and vegetables
15.31 Processing and preserving of potatoes
15.32 Manufacture of fruit and vegetable juice
15.33 Processing and preserving of fruit and vegetables not elsewhere classified
15.4 Manufacture of vegetable and animal oils and fats
15.41 Manufacture of crude oils and fats
15.42 Manufacture of refined oils and fats
15.43 Manufacture of margarine and similar edible fats
15.5 Manufacture of dairy products
15.51 Operation of dairies and cheese making
15.51/1 Liquid milk and cream production
15.51/2 Butter and cheese production
15.51/9 Manufacture of other milk products
15.52 Manufacture of ice cream
15.6 Manufacture of grain mill products, starches and starch products
15.61 Manufacture of grain mill products
15.61/1 Grain milling
15.61/2 Manufacture of breakfast cereals and cereals-based foods
15.62 Manufacture of starches and starch products
15.7 Manufacture of prepared animal feeds
15.71 Manufacture of prepared feeds for farm animals
15.72 Manufacture of prepared pet foods
15.8 Manufacture of other food products
15.81 Manufacture of bread; manufacture of fresh pastry goods and cakes
15.82 Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes
15.83 Manufacture of sugar
15.84 Manufacture of cocoa, chocolate and sugar confectionery
15.84/1 Manufacture of cocoa and chocolate confectionery
15.84/2 Manufacture of sugar confectionery
15.85 Manufacture of macaroni, noodles, couscous and similar farinaceous products
15.86 Processing of tea and coffee
15.86/1 Tea processing
15.86/2 Production of coffee and coffee substitutes
15.87 Manufacture of condiments and seasonings
15.88 Manufacture of homogenised food preparations and dietetic food
15.89 Manufacture of other food products not elsewhere classified
15.89/1 Manufacture of soups
15.89/9 Manufacture of other food products not elsewhere classified
15.9 Manufacture of beverages
15.91 Manufacture of distilled potable alcoholic beverages
15.92 Production of ethyl alcohol from fermented materials
15.93 Manufacture of wines
15.93/1 Manufacture of wine of fresh grapes and grape juice
15.93/2 Manufacture of wine based on concentrated grape must
15.94 Manufacture of cider and other fruit wines
15.94/1 Manufacture of cider and perry
15.94/2 This code is no longer in use
15.94/9 Manufacture of other fermented fruit beverages
15.95 Manufacture of other non-distilled fermented beverages
15.96 Manufacture of beer
15.97 Manufacture of malt
15.98 Production of mineral waters and soft drinks

51 Wholesale Trade And Commission Trade, Except Of Motor Vehicles And Motorcycles
51.1 Wholesale on a fee or contract basis
51.17 Agents involved in the sale of food, beverages and tobacco
51.3 Wholesale of food, beverages and tobacco
51.31 Wholesale of fruit and vegetables
51.32 Wholesale of meat and meat products
51.33 Wholesale of dairy produce, eggs and edible oils and fats
51.33/1 Wholesale of dairy produce
51.33/2 Wholesale of eggs
51.33/3 Wholesale of edible oils and fats
51.34 Wholesale of alcoholic and other beverages
51.34/1 Wholesale of fruit and vegetable juices, mineral waters and soft drinks
51.34/2 Wholesale of wine, beer, spirits and other alcoholic beverages
51.36 Wholesale of sugar and chocolate and sugar confectionery
51.37 Wholesale of coffee, tea, cocoa and spices
51.38 Wholesale of other food including fish, crustaceans and molluscs
51.39 Non-specialised wholesale of food, beverages and tobacco

52 Retail Trade, Except of Motor Vehicles and Motor-cycles; Repair of Personal and Household Goods
52.1 Retail sale in non-specialised stores
52.11 Retail sale in non-specialised stores with food, beverages or tobacco predominating
52.11/1 Retail sale by confectioners, tobacconists and newsagents (CTNs)
52.11/2 Retail sale in non-specialised stores (excluding CTNs) holding an alcohol licence, with food, beverages or tobacco predominating
52.11/3 Retail sale in non-specialised stores (excluding CTNs) not holding an alcohol licence, with food, beverages or tobacco predominating
52.12 Other retail sale in non-specialised stores
52.2 Retail sale of food, beverages and tobacco in specialised stores
52.21 Retail sale of fruit and vegetables
52.22 Retail sale of meat and meat products
52.23 Retail sale of fish, crustaceans and molluscs
52.24 Retail sale of bread, cakes, flour confectionery and sugar confectionery
52.25 Retail sale of alcoholic and other beverages
52.27 Other retail sale of food, beverages and tobacco in specialised stores

52.6 Retail sale not in stores
52.61 Retail sale via mail order houses
52.62 Retail sale via stalls and markets
52.63 Other non-store retail sale

55 Hotels and Restaurants
55.1 Hotels
55.10 Hotels
55.10/1 Hotels and motels with restaurant (licensed)
55.10/2 Hotels and motels with restaurant (unlicensed)
55.10/3 Hotels and motels, without restaurant

55.2 Camping sites and other provision of short-stay accommodation
55.21 Youth hostels and mountain refuges
55.22 Camping sites, including caravan sites
55.23 Other provision of lodgings not elsewhere classified
55.23/1 Holiday centres and holiday villages
55.23/2 Other self-catering holiday accommodation
55.23/9 Other tourist or short-stay accommodation

55.3 Restaurants
55.30 Restaurants
55.30/1 Licensed restaurants
55.30/2 Unlicensed restaurants and cafes
55.30/3 Take-away food shops
55.30/4 Take-away food mobile stands

55.4 Bars
55.40 Bars
55.40/1 Licensed clubs
55.40/2 Independent public houses and bars
55.40/3 Tenanted public houses and bars
55.40/4 Managed public houses and bars

55.5 Canteens and catering
55.51 Canteens
55.52 Catering
Appendix 4: Flow diagram for the manufacturing SIC code generator
PROCESSING AND PRESERVING OF POTATOES (15.31)

Processing or preserving fruit and vegetables

Yes: select list?

No

Yes:

CRUDE OILS AND FATS (15.41)

MANUFACTURE OF CRUDE OILS AND FATS (15.41)

No:

OILS AND FATS (15.41)

MANUFACTURE OF OILS AND FATS (15.41)

Yes: select list?

No

Yes:

MANUFACTURE OF REFINED OILS AND FATS (15.42)

No:

Refined oils and fats

Yes: select list?

No
MANUFACTURE OF OTHER NON-DISTILLED FERMENTED BEVERAGES (15.55)

Other fermented beverages

select list?

Malt

MANUFACTURE OF MALT (K-97)

select list?

Manufacture of other food products not elsewhere classified 15.899

select list?

MANUFACTURE OF OTHER FOOD PRODUCTS (15.88)
Appendix 5: Flow diagram for disposal section
Bin Type

Disposal option

Type of Business (sic code)
- Mixed waste
- One type of waste
- Mixed recycle
- One type of recycle

Bin-type - list

not-sure

Disposal_Type_Count = n

Next Section 2: bin frequency assignment

Store
Average "Fullness" (%) of each bin

Bin Type

Unknown

Local

Pwrc

Pwrc
### Appendix 6: Route taken through spreadsheet for different SIC codes

<table>
<thead>
<tr>
<th>SIC CODE:</th>
<th>PAGE NAME</th>
<th>SIC CODE:</th>
<th>sub-folder</th>
<th>PAGE NAME</th>
<th>SIC CODE:</th>
<th>sub-folder</th>
<th>PAGE NAME</th>
</tr>
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<tbody>
<tr>
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<td>waste1-15.htm</td>
<td>15.1, 15.11, 15.11/1, 15.11/2, 15.11/3, 15.12, 15.13, 15.13/1, 15.13/9</td>
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<td>list1</td>
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<td>list2</td>
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</tbody>
</table>

77
Example of flow diagram for waste section:

Waste Section

15.1, 15.10, 15.11, 15.11/1, 15.11/2, 15.13/3, 15.12, 15.13, 15.13/1

15.2, 15.20, 15.20/1, 15.20/9

15.3, 15.30, 15.31, 15.32, 15.33

15.4, 15.40, 15.41, 15.42, 15.43

15.5, 15.50, 15.51, 15.51/1, 15.51/2, 15.51/9, 15.52

15.6, 15.60, 15.61/1, 15.61/2, 15.62

15.8, 15.80, 15.81, 15.82, 15.83, 15.84, 15.84/1, 15.84/2, 15.85, 15.86, 15.86/1, 15.86/2, 15.87, 15.88, 15.89, 15.89/1, 15.89/2, 15.89/9

15.9, 15.90, 15.91, 15.92, 15.93, 15.93/1, 15.93/2, 15.94, 15.94/1, 15.94/9, 15.95, 15.96, 15.97

51

51.1, 51.10, 51.17

51.3, 51.30, 51.31, 51.32, 51.33

51.33/1, 51.33/2, 51.33/3, 51.34, 51.34/1, 51.34/2, 51.36, 51.37, 51.38, 51.39

52, 52.00

52.1, 52.10, 52.11, 52.11/1, 52.11/2, 52.11/3, 52.12

52.2, 52.20, 52.21, 52.22, 52.22, 52.27

52.23, 52.24, 52.25, 52.26

52.6, 52.60, 52.61, 52.62, 52.63

55.1, 55.10, 55.10/1, 55.10/2, 55.10/3, 55.2, 55.20, 55.21, 55.22, 55.23

55.23/1, 55.23/2, 55.23/9

55.3, 55.30, 55.30/1, 55.30/2, 55.30/3, 55.30/4

55.4, 55.40, 55.40/1, 55.40/2, 55.40/3, 55.40/4

55.50, 55.51, 55.52
Select each of the different types (categories) of this waste that you produce?
Select each of the different types (Sub categories) of this waste that you produce?

List_Count = 0

NO

ORGC, ORGM, ORGA, ORGY, ORGP, ORGS & ORGZ ≠ "" => ORG = ""

YES

ORGC, ORGM, ORGA, ORGY, ORGP, ORGS & ORGZ ≠ "" => ORG = ""

Store

{21} S1 List1, List2, S2 List1, List2, S3 List1, List2, S4 List1, List2

Select for different lists the type of food waste (descriptions) with each sub-category

NO

YES

Return

?
Appendix 7: Flow diagram showing bin-filling
For each collector select bins with same composition

If Bin = 0
Grouping list 1 ≠ 0

Next section 2

If Bin ≠ 0
Selected bin count = x
Bin count = n - x

TBin count = n
Select input composition for each material selected?
Flowchart:

1. **NO**
   - Bin count = 0
   - Ein = Ein + Next

2. **YES**
   - Grouping list 1 + Next
### Appendix 8: Material type designations

<table>
<thead>
<tr>
<th>Material type</th>
<th>Material</th>
<th>Description alias</th>
<th>Potentially recyclable?</th>
<th>Code</th>
</tr>
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<tr>
<td>One type of recyclate</td>
<td>ORGANIC</td>
<td>ORGANIC</td>
<td>Mixed organic recyclate</td>
<td>1</td>
</tr>
<tr>
<td>One type of recyclate</td>
<td>ORGANIC</td>
<td>Food waste not containing or contaminated by fish or meat</td>
<td>Uncontaminated food recyclate</td>
<td>1</td>
</tr>
<tr>
<td>One type of recyclate</td>
<td>ORGANIC</td>
<td>Food waste containing or contaminated by fish or meat</td>
<td>Contaminated food recyclate</td>
<td>1</td>
</tr>
<tr>
<td>One type of recyclate</td>
<td>ORGANIC</td>
<td>Animal oils and fats</td>
<td>Animal oils and fats recyclate</td>
<td>1</td>
</tr>
<tr>
<td>One type of recyclate</td>
<td>ORGANIC</td>
<td>Vegetable oils and fats</td>
<td>Vegetable oils and fats recyclate</td>
<td>1</td>
</tr>
<tr>
<td>One type of recyclate</td>
<td>ORGANIC</td>
<td>Park and garden waste including plant matter</td>
<td>Garden material recyclate</td>
<td>1</td>
</tr>
<tr>
<td>One type of recyclate</td>
<td>ORGANIC</td>
<td>Soils and composts</td>
<td>Soil and compost recyclate</td>
<td>1</td>
</tr>
<tr>
<td>One type of recyclate</td>
<td>ORGANIC</td>
<td>Any other type of plant or animal material</td>
<td>Misc. organics recyclate</td>
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<td>One type of recyclate</td>
<td>WOOD</td>
<td>WOOD</td>
<td>Mixed wood recyclate</td>
<td>1</td>
</tr>
<tr>
<td>One type of recyclate</td>
<td>WOOD</td>
<td>Natural wood untreated</td>
<td>Untreated wood recyclate</td>
<td>1</td>
</tr>
<tr>
<td>One type of recyclate</td>
<td>WOOD</td>
<td>Natural wood chemically treated</td>
<td>Treated wood recyclate</td>
<td>1</td>
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<td>One type of recyclate</td>
<td>WOOD</td>
<td>Composite wood</td>
<td>Composite wood recyclate</td>
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</tr>
<tr>
<td>One type of recyclate</td>
<td>PAPER</td>
<td>PAPER</td>
<td>Mixed paper and card recyclate</td>
<td>1</td>
</tr>
<tr>
<td>One type of recyclate</td>
<td>PAPER</td>
<td>Newsprint</td>
<td>Newspapers for recycling</td>
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</tr>
<tr>
<td>One type of recyclate</td>
<td>PAPER</td>
<td>Glossy print/magazines</td>
<td>Magazines for recycling</td>
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</tr>
<tr>
<td>One type of recyclate</td>
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<td>Office paper</td>
<td>Office paper for recycling</td>
<td>1</td>
</tr>
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<td>One type of recyclate</td>
<td>PAPER</td>
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<td>Paper packaging recyclate</td>
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</tr>
<tr>
<td>One type of recyclate</td>
<td>PAPER</td>
<td>Other non-packaging paper and contaminated paper</td>
<td>Misc. paper for recycling</td>
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</tr>
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<td>One type of recyclate</td>
<td>PAPER</td>
<td>Corrugated board/board packaging</td>
<td>Cardboard packaging recyclate</td>
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</tr>
<tr>
<td>One type of recyclate</td>
<td>PAPER</td>
<td>Carton/thin board/card packaging</td>
<td>Carton, etc. packaging recyclate</td>
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<td>PAPER</td>
<td>Non-packaging card</td>
<td>Misc. card for recycling</td>
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<td>Liquid cartons</td>
<td>Liquid cartons for recycling</td>
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<td>Mixed textile recyclate</td>
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</tr>
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<td>One type of recyclate</td>
<td>TEXTILE</td>
<td>Textiles predominantly natural fibres</td>
<td>Natural fibre textiles recyclate</td>
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</tr>
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<td>TEXTILE</td>
<td>Textiles predominantly synthetic fibres</td>
<td>Synthetic fibre textiles recyclate</td>
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<td>Shoes</td>
<td>Shoes for recycling</td>
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<td>PLASTIC</td>
<td>Mixed plastic recyclate</td>
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<td>One type of recyclate</td>
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<td>Description</td>
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<td>One type of recyclate</td>
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<td>Packaging dense plastic</td>
<td>Dense plastic packaging recyclate</td>
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<td>Misc. dense plastic recyclate</td>
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<td>Film plastic packaging recyclate</td>
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| One type of waste | ELECTRICAL | Other WEEE | Misc. electrical waste | 1 | WE EZ
| One type of waste | CHEMICAL | CHEMICAL | Mixed chemicals waste | 1 | CHE  |
| One type of waste | CHEMICAL | Organic chemicals | Waste organic chemicals | 1 | CHEB |
| One type of waste | CHEMICAL | Inorganic chemicals | Waste inorganic chemicals | 1 | CHED |
| One type of waste | CHEMICAL | Paint and varnishes | Waste paint and varnish | 1 | CHEV |
| One type of waste | CHEMICAL | Portable batteries | Waste batteries | 1 | CHEP |
| One type of waste | CHEMICAL | Automotive and industrial batteries and accumulators | Waste industrial batteries, etc. | 1 | CHEA |
| One type of waste | CHEMICAL | Engine oil | Waste engine oil | 1 | CHEE |
| One type of waste | CHEMICAL | Other oil (non-cooking) | Misc. oil (non-cooking) waste | 1 | CHEO |
| One type of waste | CHEMICAL | Clinical or healthcare risk waste | Clinical/healthcare risk waste | 0 | CHEC |
| One type of waste | CHEMICAL | Other potentially hazardous | Misc. hazardous waste | 0 | CHEZ |
| One type of waste | GLASS | GLASS | Mixed glass waste | 1 | GLA |
| One type of waste | GLASS | Glass bottles and jars | Waste glass containers | 1 | PAKG |
| One type of waste | GLASS | Other glass | Misc. glass waste | 0 | GLAZ |
| One type of waste | GLASS | Ceramics | Waste ceramics | 0 | GLAC |
| One type of waste | CONSTRUCTION | CONSTRUCTION | Mixed C and D waste | 1 | CON |
| One type of waste | CONSTRUCTION | C&D excavation | Excavation waste | 1 | CONE |
| One type of waste | CONSTRUCTION | C&D dredgings/tailings | Waste dredgings/tailings | 1 | COND |
| One type of waste | CONSTRUCTION | C&D building materials | Waste building materials | 1 | CONB |
| One type of waste | UNCLASSIFIED | UNCLASSIFIED | Mixed unclassified waste | 0 | UNC |
| One type of waste | UNCLASSIFIED | Mixed general waste | Mixed general waste | 0 | UNCM |
| One type of waste | UNCLASSIFIED | Other material not classified elsewhere | Misc. unclassified waste | 0 | UNCZ |
Acknowledgements

The authors would like to thank the Veolia Environmental Trust (formerly Onyx Environmental Trust) for their support in funding this research; and to South East England Development Agency (SEEDA) and Hampshire County Council for additional support. We are grateful to the members of the project Advisory Panel: Ian Avery, Hampshire County Council; Melvin Caton, SEEDA; Nick Blakey, Defra; Alan Bell, Environment Agency; and Christine Watkins, The Environment Centre, Southampton. We also wish to thank Susie Pocock and Terry Coleman at the Environment Agency for help, cooperation and provision of data, and to Julian Ellis for his calculations and advice.