

# Household food waste collections guide



This publication updates the 2009 guide and pulls together the findings from more recent studies and pilots conducted by WRAP and others. Through the various sections, this guide is designed to support local authorities by detailing good practice and evidence which can help inform the design and delivery of high capture, cost-effective food waste collections

## Section 7: Treatment of food waste (including bulking and haulage)

This section summarises the two options available for the treatment of household food waste collected for recycling: anaerobic digestion (AD) and in-vessel composting (IVC). It also includes detailed information on the requirements for the bulking and haulage of food waste, including those detailed in the Animal By-products Regulations (ABPR), for those local authorities for whom direct delivery to a treatment plant is not an option.

WRAP's annual 'gate fees report' provides information on current gate fees and lists the median and range of prices charged at UK waste processing facilities (including AD and IVC). You can download the 2015 gate fees report from [www.wrap.org.uk/content/comparing-cost-alternative-waste-treatment-options-gate-fees-report-2015](http://www.wrap.org.uk/content/comparing-cost-alternative-waste-treatment-options-gate-fees-report-2015)

### Contents

<b>7.1</b>	Food waste treatment.....	3
<b>7.1.1</b>	Anaerobic digestion (AD) .....	3
<b>7.1.2</b>	In-vessel composting (IVC).....	3
<b>7.2</b>	Bulking and haulage of food wastes.....	4
<b>7.2.1</b>	Distance/ time taken to travel to treatment facility.....	5
<b>7.2.2</b>	Maximising the productivity of collection crews.....	5
<b>7.2.3</b>	Environmental benefits.....	6
<b>7.2.4</b>	Local policies or operations (WDA or partnership working) .....	6
<b>7.2.5</b>	Trial schemes.....	7
<b>7.3</b>	The need to think holistically .....	7
<b>7.4</b>	Legal requirements for the bulking of food waste .....	7
<b>7.4.1</b>	Site licensing/ permitting .....	8

7.4.2	Animal By-Products Regulations .....	8
7.4.3	Duty of Care .....	8
7.5	Site selection .....	9
7.5.1	Type of collection vehicle used .....	9
7.5.2	Site location .....	9
7.5.3	Site size .....	11
7.5.4	Storage capacity .....	12
7.5.5	Storage arrangements .....	13
7.6	Site layout .....	16
7.7	Site operation .....	16
7.7.1	Delivery of food waste .....	16
7.7.2	Storage of food waste .....	17
7.7.3	Loading of food waste .....	19
7.7.4	Haulage from bulking sites to treatment facilities.....	20
7.8	Costs and indicative pricing for bulking and onward haulage.....	21
7.8.1	Cost factors to consider at an existing site .....	21
7.8.2	Haulage costs .....	21

## 7.1 Food waste treatment

### 7.1.1 *Anaerobic digestion (AD)*

AD involves the breakdown of biodegradable material in the absence of oxygen by micro-organisms called methanogens. It is widely used to treat organic wastes, including domestic and commercial food waste, manures and biofuel crops

There are two main types of AD: thermophilic and mesophilic. The primary difference between them is the temperatures reached in the process. Thermophilic processes reach temperatures of up to 60°C and mesophilic processes normally run at about 35-40°C. AD sites have to comply with the ABPR, so a mesophilic site also has a pasteurisation unit to make sure the end product is safe.

The system chosen will depend largely on the feedstock to be processed. 'High solid materials', such as a garden and food waste mixture, tend to be processed at a thermophilic temperature using the batch system. 'Low solid materials', such as household food wastes, are more likely to be processed at a lower temperature using a continuous flow system.

The AD process provides a source of renewable energy, since the food waste is broken down to produce biogas (a mixture of methane and carbon dioxide), which is suitable for energy production. The biogas can be used to generate electricity and heat to power on site equipment and the excess electricity can be exported to the National Grid. Other possible uses for the biogas currently being explored in the UK include injection to the gas grid and as a vehicle fuel.

A further by-product of the process is a biofertiliser which is rich in nutrients such as nitrogen, phosphorus and other elements required for healthy plant growth and fertile soil. There are strict standards governing the materials that can be used to produce quality compost and biofertiliser for use in agriculture. These are set out in the British Standards Institution's Publicly Available Specification 100 (PAS 100) for compost and PAS 110 for biofertiliser. BSI PAS 110 aims to remove the major barrier to the development of AD and its markets for digestion process outputs by creating an industry specification against which producers can verify that they are of consistent quality and fit for purpose.

### 7.1.2 *In-vessel composting (IVC)*

IVC can be used to treat food and garden waste mixtures. An IVC system ensures that composting takes place in an enclosed environment, with accurate temperature control and monitoring. There are many different systems, but they can be broadly categorised into six types:

- containers;
- silos;

- agitated bays;
- tunnels;
- rotating drums; and
- enclosed halls.

The food waste, which comes primarily from local authority waste collections, either separate or already mixed with garden waste, as well as commercial and industrial sources, is first delivered to an enclosed reception area. It is then shredded to a uniform size and loaded into what is known as the first 'barrier', which is a bay or tunnel depending on the system used. The composting process is kick-started by naturally occurring micro-organisms already in the waste. They break down the material, releasing the nutrients and in doing so increase the temperature to the 60–70°C needed to kill pathogens and weed seeds, and meet the regulations for processing animal by-product (ABP) material.

After the first stage, which can take between seven days and three weeks, the material is transferred to the second 'barrier', where the composting process continues, usually for a similar duration. Processing in two stages ensures that all parts of the composting mass reach the required temperature.

The oxygen level, moisture and temperature are carefully monitored and controlled during both composting stages to ensure the material is fully sanitised.

Screening usually takes place pre or post maturation to produce a range of product grades suitable for various end uses such as soil conditioning. Often the oversize material is fed back into the processing system to break down fully.

Facilities which process to BSI PAS 100 and the Quality Protocol for compost produce products that are no longer considered a waste by the Environment Agency.

## **7.2** Bulking and haulage of food wastes

For local authorities unable to easily deliver the collected food waste directly to an organic waste treatment facility, a food waste bulking facility to enable onward transfer may provide a range of benefits including reduced operational costs and improved service delivery.

This section outlines key factors to consider when thinking about the introduction of bulking and transfer arrangements. It covers the bulking and haulage of segregated food waste and also where it is mixed with garden waste. The single term 'food waste' is used throughout this section to describe both food only and mixed food and garden waste collections.

Guidance is given on the key steps involved, decisions required and practical arrangements for the bulking and haulage of food waste.

The reasons for choosing the bulking and haulage of food waste to a treatment facility rather than a direct delivery option include:

- distance or time taken to travel to treatment facility;
- maximising the productivity of collection crews;
- cost benefits;
- environmental benefits;
- local policies or operational considerations, e.g. Waste Disposal Authority (WDA) requirements or partnership working arrangements; and
- trial schemes (testing operations prior to commissioning a local facility).

### *7.2.1 Distance/ time taken to travel to treatment facility*

The distance between the collection rounds and the treatment facility determines the travel times for crews to offload material.

The scaling of plants could mean, for example, that a reasonably sized AD facility with an annual throughput of around 40,000 tonnes seeking a large proportion of food waste from household sources might need to obtain this from as many as eight local authorities. Given the difficulties in siting a facility in a good location to service suburban or rural areas, the travel distances could be 20–50 miles with a complete turnaround of 1–3 hours for collection crews. While the travel distances in urban areas might be smaller, congestion and busy road networks might mean that the turnaround time for crews could still be considerable.

The more time collection crews spend away from the collection round means fewer properties are able to be serviced in a given day. Long travel distances or times are likely to mean smaller collection rounds, increasing the need and costs for further resources to deliver the service.

An added complexity concerns multi-location delivery points. If a vehicle collects food waste at the same time as other recyclable materials, it may have to deliver materials to two (or more) separate sites.

### *7.2.2 Maximising the productivity of collection crews*

Maximising the productivity of the collection crews in terms of numbers of properties serviced per round is important in developing an efficient collection system and keeping costs down. Since salaries make up the largest proportion of operating costs, it is vital to maximise the amount of time crews can be productive (i.e. collect and load containers).

It is also important to minimise the amount of time spent on the non-productive phase of leaving and returning to the collection round (i.e. going to the delivery points and then returning). Reducing the non-productive time by using a suitably located bulking up facility can mean larger round sizes and a reduction in overall resource needs and

therefore costs. Depending on the resource implications, a cost argument can be made for investing in the bulking and haulage of food waste in preference to direct delivery.

In terms of costs, it is necessary to compare any savings obtained by reducing the vehicle fleet, possibly by increasing round sizes, from tipping locally with the cost of the bulking up and haulage of larger bulk loads. A wide range of cost factors need to be considered including:

- the impact on labour and work patterns;
- vehicle depreciation;
- fuel consumption; and
- the impact on the service of not being able to deliver scheduled collections.

One benefit of bulking may be that, if collection crews are not spending as much time off round as previously, they will be more able to help support other busy collection rounds and fulfil any missed collections.

The tipping point occurs when the loss of productivity and cost of extended travel to a direct deliver site requires an additional collection round to complete the collection activities on any one day. If the time taken to tip is excessive and requires a significant reduction in households collected per round then an additional crew or crews may be required.

### **7.2.3** *Environmental benefits*

Environmental impacts will depend on the cumulative distance travelled by vehicles and the associated fuel economy of differing vehicle types. Bulk hauling waste should reduce the total distance overall as the number of trips to the treatment facility will fall due to the bulk vehicles having significantly greater capacity.

### **7.2.4** *Local policies or operations (WDA or partnership working)*

If an authority is a Waste Collection Authority (WCA) or an authority involved in partnership working, the choice of treatment facility for the collected food waste may be a strategic one which benefits the group of authorities as a whole.

Bulking of food waste should be considered as part of a network of delivery and treatment facilities for all materials:

- within a local authority partnership between disposal and collection authorities;
- with cross boundary working; and
- within a unitary authority.

Working with other local authorities can provide greater efficiencies through developing opportunities for better siting of facilities. An analysis of collection rounds to identify a

network of depots and transfer stations should allow the most efficient and practicable sites to be used.

### 7.2.5 Trial schemes

Many local authorities operate collection trials before making important decisions about collection changes. A trial allows any number of factors to be tested including:

- practicality of vehicles;
- round structures;
- time taken to conduct collections; and
- communications to householders.

The treatment facility used during the trial may not be the same one used when a full scheme is rolled out. This may mean it is necessary to use a facility during the trial phase that is too distant for direct delivery.

## 7.3 The need to think holistically

Thinking about the whole collection system at both the present time and in the future will help to anticipate issues and identify opportunities for reducing costs.

- How will a food waste collection fit with other collection and disposal or treatment services?
- If changes are made to a current service, how will this affect onward transport to a treatment facility?
- Are the collection vehicles suitable in terms of access and loading height for the tipping arrangements at the treatment site for direct delivery operations or at a transfer site for bulking and haulage operations?

These decisions are particularly pertinent for a WCA working with a WDA where the end treatment facility may have already been identified and infrastructure is in place for bulking.

Procuring the right vehicles for the collection part of the service is crucial as different collection vehicles will work better with different methods of bulking. For example, vehicles with a food waste pod may cause issues if the bulking facility requires a rear eject vehicle, or using a rear eject vehicle may require increased use of equipment (mechanical shovel) and space if it is necessary to use skips.

## 7.4 Legal requirements for the bulking of food waste

**Food waste collections, handling and processing must comply with the ABPR.**

### 7.4.1 Site licensing/ permitting

For all permitting and planning issues, liaison with the appropriate enforcement authority is recommended to ensure the requirements detailed below are met.

### 7.4.2 Animal By-Products Regulations

The ABPR state that operators must collect, transport and dispose of Category 3 catering waste in accordance with national rules under the Waste Framework Directive.

In England, Wales and Northern Ireland this is interpreted as meaning that waste transfer stations do not additionally need to be approved as 'handling/ storage plants' under the ABPR. However, it is desirable that waste transfer stations should meet the principles of the ABPR in addition to their environmental permit or waste management licence.

In Scotland, however, waste transfer stations require approval as 'handling/ storage plants' under the ABPR and those accepting ABP must be approved by the Scottish Government.<sup>1</sup> Operators are required to complete an application form (ABPR3) with the following information:

- category of ABP under their control;
- details relating to the premises where it is proposed that ABP will be handled/ stored; and
- details relating to the handling/ storage.

Once a facility is approved, it is the operator's responsibility to notify the relevant enforcement authority if there are any changes in operation (e.g. plant closure) or change to the category of ABP accepted.

**Full details of the legal requirements for the bulking and haulage of food waste are provided in Appendix D.**

### 7.4.3 Duty of Care

Because food waste is a controlled waste, the requirements of the Duty of Care apply in addition to those of the ABPR. Therefore the food waste must be:

- stored and transported securely;
- transported by a person or organisation that is authorised to do so (i.e. registered waste carrier);
- transported to a suitably authorised facility (i.e. site which holds an appropriate permit or licence); and

---

<sup>1</sup> Note that an application is submitted to the Animal and Plant Health Agency and the approval is granted by the Scottish Government.

- accompanied by a completed waste transfer note, a copy of which must be retained for two years.

## 7.5 Site selection

A number of factors influence the location and size of the site where kerbside collected food waste is delivered.

### 7.5.1 Type of collection vehicle used

The choice of collection vehicle influences the design of the tipping off point and its operation (or vice versa).

A standard refuse collection vehicle (RCV) needs to discharge its load onto the floor of a dedicated and bunded food waste tipping bay or hall. This may not be possible when using a side ejection pod or be suitable for use by a forklift truck unloading and emptying food waste collection vehicles.

Some specialist food waste vehicles are designed to tip directly into low level skips. Similarly, an RCV with pod and a stillage unit vehicle, with forklift emptying, are both able to tip directly into covered skips.

Use of a fixed bulking point may not be practical or economically viable in more rural areas due to the lack of convenient waste transfer stations. An alternative is 'vehicle to vehicle' transfer of food waste, i.e. from a 'slave' or satellite vehicle to a 'parent' vehicle.

### 7.5.2 Site location

Rather than develop a new site for the delivery and bulking of the collected food waste, it may be possible to make use of available land or space within an existing waste facility such as an operations depot. Table 7.1 summarises the factors to consider.

**Table 7.1** Factors affecting the choice of location for a bulking facility for food waste

<b>Factor</b>	<b>Considerations</b>
Proximity to the collection round areas	
Access	<p>Is there good road access to the location?</p> <p>What will be the impact of additional vehicles on the site and surrounding area (e.g. queues and congestion)?</p> <p>There should be direct and convenient access to local and trunk roads for both collection and bulk haulage vehicles.</p>
Available on site	Is there land available to accommodate the food waste bulking

<b>Factor</b>	<b>Considerations</b>
capacity	operation?  Is it possible to expand into any unused land within or next to the site?
Planning issues	Is there any risk that planning approval may not be obtained?  Is the site identified in any local plan for a waste use?  Influencing factors will include: <ul style="list-style-type: none"> <li>• current operations at the site (e.g. is there already a waste transfer operation?);</li> <li>• the expected number of vehicle movements; and</li> <li>• vehicle access to the site.</li> </ul>
Permitting issues	Is an extension to an existing permit or a bespoke permit required?  Influencing factors will include: <ul style="list-style-type: none"> <li>• internal storage (as required);</li> <li>• proximity to local housing;</li> <li>• odour mitigation control; and</li> <li>• foul water discharge requirements.</li> </ul>
Site suitability	Is the current site infrastructure suitable (hardstanding area, drainage, covered area, weighbridge, etc.) or is additional work required?
Space	Is there adequate space (and height) available to accommodate a delivery/ storage area, skips or trailer units for loading, and to manoeuvre vehicles and plant?
Operational impacts	Will additional resources and equipment be required on site (e.g. labour, plant and vehicles)?

Larger local authorities that have multi-functional depots may find it easier than smaller local authorities to locate a food waste delivery area within an existing depot. Features to consider include:

- an impermeable concrete hardstanding area;
- roof cover;
- suitable drainage; and
- staff to manage and operate the service.

Use of an existing depot, especially if it is one at which the collection vehicles are based, is likely to have less of a detrimental impact on collection rounds as haulage distances and travel time will be within acceptable limits.

Similarly there may be an existing small waste transfer operation in place (e.g. for street sweepings or highways materials) and this should make the permitting process simpler.

For smaller authorities, or those without sufficient spare capacity at their own depots, it may be possible to arrange with the WDA to use an area within an existing waste transfer station or at another site for the delivery of food waste. Such arrangements are in place in a number of areas where the WDA has made available space for the location of skips or changed the use of waste reception bays so that food waste can be delivered for bulking up and onward transfer to a treatment facility.

If an authority cannot utilise a WDA facility, it may need to set up a contract with a waste operator to utilise their facilities.

### 7.5.3 Site size

A number of factors influence the amount of land required to provide a food waste storage, bulking and transfer arrangement. These include:

- type of food waste (segregated or mixed with garden waste);
- quantity of waste collected and delivered to the site, taking into account seasonal variations (e.g. at Christmas and seasonal peaks associated with garden waste), with minimum, maximum and peak deliveries; and
- permitted storage times for food waste at the site.

The size of the food waste transfer facility required is also determined by:

- any changes to the collection service during the life of the facility such as:
  - expansion of the service following a pilot;
  - extension of the service to flats, difficult-to-reach properties, schools or commercial premises;
  - addition of garden waste as a combined collection service; and
  - population and housing growth;
- the types of vehicles to be used for the collection service and the interface between delivery, storage and bulk haulage arrangements (i.e. rear eject versus side eject vehicles, delivery direct into skips or the floor, use of loading shovels or forklift trucks, etc.);
- patterns of food waste delivery and their impact on existing operations (e.g. queuing of vehicles and shared use of loading plant); and
- the interface of the tipping floor with the loading for onward haulage.

In simple terms, the size of the site is determined by calculating the following:

- maximum storage capacity in m<sup>3</sup> and the associated delivery point footprint required for the location of skips or the construction of a tipping bay;
- frequency of onward haulage from the site (limited space can still be utilised if bulky loading is more frequent);

- approach requirements including turning circle, overhead obstructions (e.g. cables), entry into and height of internal unloading/ storage areas for the range of delivery vehicles (smallest to largest) or temporary parking requirements for stillage vehicles;
- loading route requirements for any loading shovel that loads into a skip unit or loads into an articulated trailer unit (or other haulage vehicle);
- stillage vehicle unloading and skip loading requirements of a forklift truck; and
- any ancillary storage requirement (e.g. spare skip bodies and washing/ cleaning equipment).

#### 7.5.4 Storage capacity

The main factor that determines storage capacity is the anticipated daily, weekly and annual waste volumes (including seasonal variations). Such data are required as part of the application for the environmental permit (or waste management licence in Scotland). Once these quantities are known, it is possible to determine the capacity needed to accommodate anticipated and projected maximum and peak volumes.

A useful calculation of the storage space required is to estimate the storage requirement for maximum deliveries and add to it the requirement of storing an additional day's arrival of material in case of emergency (e.g. temporary closure of the treatment facility).

The maximum delivery storage requirement is also influenced by how long food waste can be stored as part of permitting or licensing requirements. For example, where 48 hours' storage is allowed, the minimum planned storage capacity should be for three days of food waste.

The actual storage capacity required for food waste, whether contained in a skip or on the floor in a bay (prior to loading), can be calculated once the quantities of food waste to be delivered have been estimated. The bulk densities for food waste and mixed food and garden waste are given in Table 7.2. Use of the mean bulk density values allow the volume of storage capacity required to be calculated.

**Table 7.2** Bulk densities (kg/m<sup>3</sup>)

	<b>Food waste</b>	<b>Food and garden waste</b>
Vehicle/ container	7.5–15 tonne dedicated vehicle or stillage (no compaction)	Rear end loader RCV
Mean bulk density, kg/m <sup>3</sup>	500	338
Lowest value	453	45
Highest value	527	711

Source: *Material bulk densities summary report*, WRAP, 2010

([www.wrap.org.uk/sites/files/wrap/Bulk%20Density%20Summary%20Report%20-%20Jan2010.pdf](http://www.wrap.org.uk/sites/files/wrap/Bulk%20Density%20Summary%20Report%20-%20Jan2010.pdf))

Where food is collected mixed with garden waste, the composition and bulk density are subject to significant variation due to seasonality. For example, grass clippings in summer are considerably denser than branch or dry leaf-fall in autumn. The highest value indicated in Table 7.2 is not typical and is likely to be attributable to additional soil material within the garden waste.

Table 7.3 provides a worked example of calculating the storage capacity for 100 tonnes of food and 150 tonnes of food and garden waste collected weekly. Daily delivery quantities are assumed to vary. The mean bulk density values of 500kg/m<sup>3</sup> (0.5 tonnes/m<sup>3</sup>) for food waste and 338kg/m<sup>3</sup> (0.338 tonnes/m<sup>3</sup>) from Table 7.2 are used.

The floor area always needs to be larger, as neither food nor garden waste stack and there will often be a pyramiding effect.

**Table 7.3** Storage capacity calculation

Day	Daily tonnage	Bulk density (tonnes/m <sup>3</sup> )	Daily minimum storage requirement (m <sup>3</sup> )
<b>Food waste - 100 tonnes collected per week</b>			
Monday	25	0.50	50
Tuesday	15	0.50	30
Wednesday	22	0.50	44
Thursday	21	0.50	42
Friday	17	0.50	34
<b>Food and garden waste - 150 tonnes collected per week</b>			
Monday	35	0.338	104
Tuesday	27	0.338	80
Wednesday	28	0.338	83
Thursday	27	0.338	80
Friday	33	0.338	98

### 7.5.5 Storage arrangements

#### Skips

The size of skip and frequency of emptying depend on the daily volume of food waste delivered and any on site storage time restrictions imposed by its permit.

Typically, skip bodies with a payload of 12–14 tonnes are suitable for loading with a mechanical shovel. Food waste collected in side ejection vehicles and vehicles with a food waste stillage can be emptied directly into a skip. The skip size and type are determined by the quantities of food waste to be stored.

Two examples of fully enclosed skips are shown in Figure 7.1 and 7.2. The skip with the hydraulic roof (Figure 7.1) has a full roof, which can be supplied clad with either steel or

polyvinylchloride (PVC), and is hinged along one side of the container. Feedback from operators indicates that a steel roof is more durable and less likely to be damaged in high winds or by accidents. The roof is lifted by use of a hydraulic ram to rise to an angle of 85° and is closed by opening a valve to allow it to fall back gently. Once lowered, the roof provides a completely waterproof seal to the container.

This type of skip is also suitable for use with a side ejection (or pod) vehicle, but care should be taken to ensure that the heights are appropriate for the vehicles.

---

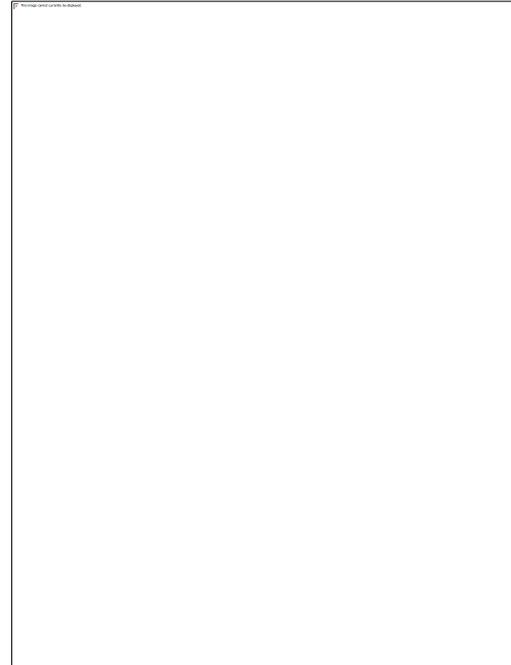
**Figure 7.1** Food waste storage containers with hydraulic lid and container in use at Surrey Waste Management, Epsom



Fully enclosed skips, with a rolling or sliding roof, are also available. The skip shown in Figure 7.2 with the rolling roof consists of two roof sections that each have roll on tracks. The front section rolls back over the rear section to allow the front of the container to be filled. Similarly, the rear section can be rolled under the front section to allow the rear of the container to be filled.

This type of system is not suitable for a side ejection vehicle, but works well when unloading stillage units with a forklift truck. The main advantage of this type of container is it can be filled from above and the use of forklift trucks means that a larger container size can be chosen to maximise payload.

**Figure 7.2** Skip with rolling (sliding roof) and in use with a forklift truck emptying a stillage unit



### **Dedicated tipping areas**

Where the type of collection vehicle makes it unsuitable for direct tipping of food waste or transfer (e.g. by forklift) into a skip or container, a dedicated tipping area for food waste is required.

The food waste must be unloaded and stored in a dedicated tipping bay and under cover in an enclosed building. This should have an appropriate entrance and internal roof height to allow for the access and egress of collection vehicles, loading shovels and, where appropriate, articulated trailer units.

The surface of the tipping area must be leak-proof. Reinforced concrete push walls to a height of 3 metres should be used to ensure the food waste is segregated from any adjacent stored wastes or other activity.

The site must be covered and have appropriate drainage to manage surface water run-off. Depending on the other materials managed at the site, the use of separate, dedicated handling equipment for food waste is recommended; this will be a permitting requirement.

Food waste can be tipped directly from a rear ejection collection vehicle and bulked up by a dedicated loading shovel. The site should be bunded to prevent leakage and the entry door closed when the unloading cycle is complete.

Detailed guidance on the legal requirements for the bulking of food waste and best practice for tipping areas is given in Appendixes D and E respectively.

## 7.6 Site layout

The design and layout of an existing facility are known factors and the new operation must be designed to complement and fit in with the existing operation of the site.

Typically the factors that need to be considered when introducing a food waste delivery and storage operation to an existing site include:

- size and location, within the site, of the food waste operational area;
- road entrances and exits;
- traffic flow routes on the site;
- turning circles, reversing areas;
- queuing or waiting areas;
- any weighbridge operation;
- vehicle washing arrangements and wheel wash;
- additional site management arrangements; and
- need to make changes to, or introduce new, safe systems of work and other on-site health and safety procedures.

These factors are considered in detail in Appendix E.

## 7.7 Site operation

All hardstanding areas ideally should be constructed using reinforced concrete rather than conventional tarmac. Reinforced concrete is not damaged as easily by heavy vehicles and generally is preferred at waste transfer station operations and other waste sites. Some sites also have metal runners sunk into the concrete to prevent damage by loading shovels when materials are being redistributed.

The tipping bay area should be contained in an enclosed portal frame (or similar) building. The food waste bulking and loading operations should be based on shovel-loading into skip containers or articulated vehicles with multi-axle bulk trailers.

### 7.7.1 Delivery of food waste

The site management or traffic plan should contain details of:

- the route from the site entrance to the food waste delivery area;
- the protocols to be observed while on site including speed limits, any weighbridge requirements, use of queuing or waiting areas, the need to follow the directions of a banksman or other site staff in the approach and entry to and exit from the food waste delivery area, and any other site-specific instructions; and
- the route from the delivery area to the site exit.

Careful planning of delivery procedures will minimise the number of site staff required and their input.

Direct delivery of food waste to a skip or the tipping floor area can be monitored remotely and supervised once collection vehicles are within the delivery area. The exception is forklift transfer from stillage vehicles which requires the use of a forklift truck and operator.

### **7.7.2** *Storage of food waste*

The time interval between delivery and containment is a crucial difference for storage in a skip or container and internally or in a bay.

Direct delivery to a skip or container is immediate and improves ABPR compliance as it minimises the risk of seepage, odour and interference by birds and pests, and avoids manoeuvring time around a bay inside a building. This has a positive impact on the site's housekeeping activities as the lowest level of cleaning is required for plant, equipment, vehicles and the food waste storage area.

While the storage capacity of skips is limited, careful selection of skip size, frequency of skip exchange and number of spare skips helps plan operations to match the needs of the food waste collection service and the storage time dictated by the site's permit or waste management licence.

Delivery to the floor of a designated tipping area has the potential to create odour and seepage problems, while birds and vermin can also be a problem. Ideally the food waste storage building should be orientated so that any openings do not face public streets and/or the dominant wind direction. If odour becomes an issue at a site, the regulator can require the operator to produce an odour management plan so that measures are in place to minimise odour generation. Although covered, a food waste storage area should have the ability to close the frontage to exclude birds and vermin. Appendix I presents a template for an Odour Management Plan.

The movement of vehicles and loading shovels across the tipping area can result in food waste residues being dragged out of the tipping area on vehicle tyres. To minimise this, it is important to ensure:

- the availability of cleaning equipment to allow plant, vehicles, wheels and floors to be washed down; and
- bulk loading occurs as close to the delivery point as possible to minimise the distance food waste is transferred for loading.

Another important consideration is the interval between the delivery of the food waste and its transfer off site. Under certain circumstances, this depends on the permitted storage time for food waste and may extend up to 72 hours when a full consignment is transferred into the transfer container in a single loading operation. Ideally, empty

containers (skips or trailer units) should be located on site in a dedicated loading area and be loaded continuously as food waste is delivered to the site.

**Table 7.4** Advantages and disadvantages of different storage arrangements

Storage type	Advantages	Disadvantages	Application
Direct delivery into a skip by the collection vehicle	<ul style="list-style-type: none"> <li>• Very simple arrangement with low potential for breakdown or equipment failure.</li> <li>• Low capital cost – no buildings, plant or equipment other than the skips.</li> <li>• Reduced housekeeping – no tipping area, plant or equipment to clean or maintain.</li> <li>• Delivery area requirement can be minimised by frequency of skip exchange.</li> </ul>	<ul style="list-style-type: none"> <li>• Waste cannot be delivered if suitable empty containers are not available.</li> <li>• No unexpected peak storage capacity – unless the number of spare containers is increased.</li> <li>• Need to ensure vehicle is of appropriate design to prevent spillage and can tip to appropriate height to avoid higher costs in hauling small sided skips.</li> <li>• Pyramiding of waste at tipping points</li> </ul>	<ul style="list-style-type: none"> <li>• Segregated food waste where a pod or small collection tipping vehicle is in use.</li> <li>• Can be set up in an existing depot (subject to planning and permitting).</li> </ul>
Forklift transfer into a skip from a stillage collection vehicle	<ul style="list-style-type: none"> <li>• Simple arrangement with low potential for breakdown or equipment failure.</li> <li>• Forklift should be readily available if this is an extension of an existing kerbside recycling collection service using stillage vehicles.</li> <li>• Low capital cost – no buildings, plant or equipment other than the skips.</li> <li>• Reduced housekeeping – no tipping area, plant or equipment to clean or maintain.</li> <li>• Delivery area requirement can be minimised by frequency of skip exchange.</li> </ul>	<ul style="list-style-type: none"> <li>• Waste cannot be delivered if suitable empty containers are not available.</li> <li>• No unexpected peak storage capacity – unless the number of spare containers is increased.</li> </ul>	<ul style="list-style-type: none"> <li>• Segregated food waste can be added to a service where a stillage/ resource recovery vehicle is in use for kerbside recycling collections.</li> <li>• Can be set up in an existing depot (subject to planning and permitting).</li> </ul>

<b>Storage type</b>	<b>Advantages</b>	<b>Disadvantages</b>	<b>Application</b>
Direct delivery into a tipping bay by the collection vehicle	<ul style="list-style-type: none"> <li>• Simple arrangement with low potential for breakdown or equipment failure.</li> <li>• Disconnects food waste delivered from that exported (shortage of containers or haulage failure will not affect deliveries in the short term).</li> <li>• Allows for the potential screening of waste.</li> <li>• Suitable for delivery of larger loads (i.e. combined food and garden waste).</li> </ul>	<ul style="list-style-type: none"> <li>• Larger footprint of land required for storage and loading.</li> <li>• Food waste on floor can be messy and cause slip hazards (exacerbated by the need to wash down tipping area).</li> <li>• Potential for traffic management problems in the delivery/ export and loading vehicles interface.</li> <li>• Some capital expenditure needed to set up a covered tipping area and purchase any loading equipment (depending on existing infrastructure).</li> <li>• Increased need for housekeeping procedures to minimise potential nuisance (odour, leakage, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Suitable for rear ejection collection vehicles.</li> <li>• Larger storage capacity more suitable for greater volumes of mixed food and garden waste.</li> <li>• Addition or extension to an existing waste transfer operation.</li> </ul>

### 7.7.3 Loading of food waste

In all loading operations, either directly to skip or by loading shovel, the risk of spillage of food waste during delivery, transfer (by loading shovel or forklift truck) and loading, and seepage from storage containers must be considered.

All collection crew members and site staff should be informed of the procedures and responsibilities in respect of reporting and rectifying spillage, leaks or similar issues. This is particularly important where direct delivery to a skip occurs from a collection vehicle. The collection crew should be made aware of their responsibility to report any spillage so that it can be dealt with promptly.

**Table 7.5** Advantages and disadvantages of different loading procedures

<b>Delivery procedure</b>	<b>Advantages</b>	<b>Disadvantages</b>	<b>Comments</b>
Direct tipping into skips	Minimal involvement for site staff. Skips are sealed when not being filled – minimising odour issues.	Skip size is limited to tipping height of delivery vehicle. Delivery operation can be interrupted during skip exchange. Chance of spillage	Suitable for a food waste collection service that generates smaller quantities of material.
Direct tipping onto	Minimal involvement	Waste remains open	Good housekeeping

Delivery procedure	Advantages	Disadvantages	Comments
floor	for site staff Provides greater storage capacity, therefore less interruption to deliveries.	to exposure, although in an enclosed building. Risk of odour and vermin nuisance Seepage may be a problem. Potential for vehicles to track waste out of the operational area Risk of spillage from loading shovel during transfer and loading	and odour control management needed. Potential problems can be minimised by continuous loading into bulk export containers or trailers using a body/ trailer exchange approach rather than full loading into an empty unit as a single operation.
Forklift transfer and tipping into skips	Some site staff required during delivery period. Allows use of larger skips. Limited number of skilled forklift operators required, therefore minimising the chance of any mishaps.	Possible interface risks between forklift truck and collection vehicles Chance of spillage Skips may not remain fully sealed between deliveries.	Spillage problems will be minor and easily rectified by the forklift operator.

#### 7.7.4 Haulage from bulking sites to treatment facilities

Bulk transport of ABP run as a dedicated part of an already approved operation (see Appendix D) does not require separate registration of the transport operation. However, all independent transporters that wish to transport ABPs must be registered with the appropriate authority.

Application forms for organisations wishing to register as an approved transporter are available from:

- England, Scotland and Wales (AB117): [www.gov.uk/government/publications/approval-of-sites-using-animal-by-products-registration](http://www.gov.uk/government/publications/approval-of-sites-using-animal-by-products-registration)
- Northern Ireland (ABPR 7): [www.dardni.gov.uk/publications/animal-products-applications](http://www.dardni.gov.uk/publications/animal-products-applications)

**Full details of the legal requirements for the bulking and haulage of food waste are provided in Appendix D.**

Section 12 describes the assessment of the occupational health effects of all aspects of food waste collection including bulking and transfer. Example safe systems of work for different tasks are given in Appendix E.

## 7.8 Costs and indicative pricing for bulking and onward haulage

The costs of setting up a food waste storage, bulking, loading and haulage operation are determined by a number of factors. The main one is whether this is a new operation to be located at a new site or an adaptation to or expansion of an existing site.

Actual set-up and operational costs will depend on

- the type of operation; and
- the extent to which existing infrastructure (depots, transfer stations, etc.) and resources (staff, plant, equipment, etc.) can be utilised or adapted for use in the new food waste operation.

### 7.8.1 Cost factors to consider at an existing site

- Assess existing site and the potential for adaptation. Consider elements such as whether there is sufficient entrance space and weighbridge facilities to prevent queuing, any need for new bays, undercover storage, signage, traffic/ pedestrian routes to be painted, costs of licence changes and planning applications, administrative costs and any other internal costs.
- Estimate costs of additional vehicles, such as loading shovels and forklifts, and options such as purchasing, leasing, etc. Decide on a sensible depreciation period for capital items and examine the potential to share equipment with other services.
- Estimate the quantities and frequency of food waste to be delivered, the space available and whether the quantities can be managed within the existing facilities.
- Assess staff workload for operational and administrative functions, and staff requirements on site for potential future operations. Include recruitment costs as capital costs, and salary and on-costs as revenue/ operational costs.
- Assess the costs of a haulage contract and examine the costs of procuring a new contract including drawing up tender documentation and the service specification. The cost will increase if the estimated costs are high enough to necessitate a full procurement procedure through the Official Journal of the European Union (OJEU).

### 7.8.2 Haulage costs

Haulage is a significant operational cost, but the service can be procured and delivered under contract for a specified period. Such a contract can include the provision of skips, containers, vehicles and even operational premises by the service operator.

To calculate the haulage costs for a specific facility or operation, the first step is to determine the following:

- **Cost of facility** – the capital and revenue costs to build/ install and operate the storage and transfer facility including all civil engineering and infrastructure works plus vehicle, plant and staff costs as a cost per tonne (to be handled through the facility);

- **Direct haulage payload** – average payload of collection vehicle hauling directly to a treatment facility;
- **Bulk transfer haulage payload** – average payload of bulk transfer vehicle hauling from transfer facility to treatment facility; and
- **Haulage costs** – average cost of direct delivery to treatment facility or bulk transfer haulage as cost per mile or cost per tonne, depending on the contractual arrangement with the haulier

These values can then be used to compare the costs (in £ per tonne) of direct delivery and bulk transfer haulage to a treatment facility where:

$$\text{Cost of direct haulage/ delivery (£/t)} = \frac{\text{Distance (miles)} \times \text{Haulage cost per mile}}{\text{Direct haulage payload (in tonnes)}}$$

$$\text{Cost of transfer haulage (£/t)} = \frac{\text{Transfer facility cost (per tonne)} + [\text{Distance (miles)} \times \text{Haulage cost per mile}]}{\text{Transfer haulage payload (in tonnes)}}$$

While we have tried to make sure this report is accurate, we cannot accept responsibility or be held legally responsible for any loss or damage arising out of or in connection with this information being inaccurate, incomplete or misleading. This material is copyrighted. You can copy it free of charge as long as the material is accurate and not used in a misleading context. You must identify the source of the material and acknowledge our copyright. You must not use material to endorse or suggest we have endorsed a commercial product or service. For more details please see our terms and conditions on our website at [www.wrap.org.uk](http://www.wrap.org.uk)

[www.wrap.org.uk/hhfoodwastecollections](http://www.wrap.org.uk/hhfoodwastecollections)

