
BURO HAPPOLD

Land South of Warren Lane, Long Ashton

Site Waste Management Plan

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Glossary

Term	Definition
BRE	Building Research Establishment
BREEAM	Building Research Establishment Environmental Assessment Method
C&D	Construction and Demolition
GIA	Gross Internal Area
KPI	Key Performance Indicator
MRF	Materials Recovery Facility
SWMP	Site Waste Management Plan

1 Introduction

This document forms part of a planning application for the Land South of Warren Lane, Long Ashton, development (henceforth referred to as the 'proposed development'). It aims to ensure that construction and demolition (C&D) waste from the development is minimised and handled in an environmentally sustainable manner. To align with good environmental practice, it is advised that the recommendations included in this document are adopted, even though they do not constitute a legal requirement.

This report sets out a Site Waste Management Plan (SWMP) and a framework for the proposed development. The report documents actions taken to design out waste before construction begins and also makes recommendations on how waste can be reduced at the construction stage. These recommendations will be further developed by the Principal Contractor and designated Waste Management Company over subsequent design and construction phases.

The principal aims of this SWMP are to:

- Document any initial waste reduction recommendations or design interventions taken to date. Also it aims to provide information on how waste management initiatives will be implemented throughout the construction of the project in order to minimise waste generation and increase the recovery of construction waste; and
- Enable the waste management recommendations within this report to be incorporated into a site-specific plan. The responsibility for developing the SWMP will fall with the Principal Contractor, who should appoint a waste champion to ensure the commitments in the plan are met.

The following tasks have been completed to enable the production of this SWMP:

- Creation of a framework SWMP at design stage;
- Estimation of baseline waste generation rates;
- Review of actions which have been or will be considered at design stage in order to design out waste;
- Review of actions which can be taken at construction stage to reduce waste generation and increase segregation; and
- Revised estimates of waste generation based on the waste minimisation actions.

2 Project Description

Client name: Long Ashton Land Company

Principal contractor: TBC on appointment

SWMP prepared by: Buro Happold Engineering

Project description:

Up to 35 dwellings, allotments and associated access, parking, drainage infrastructure and landscaping.

The development site is located in the land to the south of Warren Lane, Long Ashton, located at about 7km SW Bristol (England, United Kingdom). Figure 2-1 shows the site area, boundaries and an illustrative layout of dwellings.



Figure 2-1 Illustrative layout of site

3 Waste Management Policies and Guidance

3.1 National policy and guidance

- **The Waste Framework Directive (2008/98/EC)** – This revised Directive sets out the position regarding waste and how to dispose of it. It introduced the waste hierarchy (see Figure L2.1), which is widely used as the basis of development for sustainable waste management strategies.
- **The Landfill Directive (1999/31/EC)** - The Directive's overall aim is *"to prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, and on the global environment, including the greenhouse effect, as well as any resulting risk to human health, from the landfilling of waste, during the whole lifecycle of the landfill"*.
- **Our Waste, Our Resources: A Strategy for England (Defra, 2018)** - This document was published in the wake of the Government's 25 Year Environment Plan (Defra, 2018). The strategy sets out plans to double resource productivity and eliminate avoidable wastes of all kinds by 2050. It includes details of how waste will be minimised and managed to reduce damage to the environment. The strategy gives a policy direction in line with the 25 Year Environment Plan (Defra, 2018), with a particular focus on moving away from a traditional linear economic model towards a more sustainable and efficient circular model.
- **National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2019)** - A revised version of the National Planning Policy Framework (NPPF) was issued in February 2019. The document notes that the purpose of the planning system is to contribute to the achievement of sustainable development and states that efforts must be made to minimise waste generation and increase re-use and recycling. Relevant targets from this document include the following:
 - To work towards achieving a 65% recycling rate for MSW by 2035;
 - To work towards sending 10% or less of MSW to landfill by 2035; and
 - To eliminate all avoidable waste by 2050.
- **Environmental Permitting Regulations (England and Wales) 2016** – The Environmental Permitting Regulations introduce a single environmental permitting and compliance regime to apply in England and Wales. This regime streamlines and combines Waste Management Licensing Regulations 1994 (as amended) and The Control of Pollution (Amendment Act) 1989 to create a single environmental permit with a common approach to permit applications, maintenance, surrender and enforcement.
- **The Site Waste Management Plans Regulations 2008** - Site Waste Management Plans (SWMP) are no longer a requirement for construction and demolition projects in England, however it is good practice to produce a SWMP to mitigate construction and demolition waste.
- **Hazardous Waste (England and Wales) (Amendment) Regulations 2016 SI** – The Hazardous Waste Regulations, which came into force in 2005, provide requirements for controlling and tracking the movement of hazardous waste and bans mixing different types of hazardous waste.

3.2 Regional and local policies and guidance

- **Somerset Waste Core Strategy (Somerset County Council, 2013)** - The Waste Core Strategy outlines the County Council's approach to planning for sustainable waste management in Somerset until the year 2028. It covers all forms of waste including construction and demolition waste. The policies relating to C&D waste include:
 - Policy WCS1: Waste prevention
Opportunities should be taken to minimise construction and demolition waste disposal. A site waste management plan is required for the construction of 10 or more dwellings or where the floor space to be created is greater than 1000m². By setting out waste management principles during the planning stages is expected to result in less wastage during construction.
 - Policy WCS2: Recycling and reuse
After waste prevention, the principle of maximising recycling and reuse should be applied to C&D waste. With a target to recover at least 70% of C&D waste in line with the revised European Waste Framework Directive.

4 Waste types and quantities

Based on the basic information presented at the outline planning application stage, the expected site waste quantities predicted as a result of the development were determined.

4.1 Demolition Stage

The existing site is currently undeveloped. Therefore, a demolition stage is not within the scope of this SWMP.

4.2 Excavation stage

A desk study has been carried out by GroundSure EnviroInsight which found no soil contamination. Based on this, it has been assumed that best practices will be followed and that the majority of the soil excavated will be reused on-site. Thus, the volumes of soil waste that will be produced are assumed to be negligible. This may change if further earthworks reveal any soil contamination.

4.3 Construction Stage

This section provides outline estimations of likely construction waste generation. A summary of the construction waste generation rate and subsequent waste generation is shown in Table 4-1. This information is based on the following:

- The latest set of general arrangement plans received from the architects;
- Building Research Establishment (BRE) waste benchmarking data (updated June 2012), published based on information obtained through the SMART Waste Plan¹;

Maximum Gross Internal Areas (GIAs) have been used to provide an estimate of construction waste generation, these GIAs have been derived from latest plans and area schedules. It should be noted that the current proposed scheme may be subject to minor changes in future planning and design stages, although minor alterations to the area schedule are unlikely to result in significant changes to construction waste generation quantities.

Table 4-1 Estimated construction waste generation from the proposed development

Land use	Total GIA (m2)	Average generation rate (tonnes/100m2)	Construction waste generated (tonnes)
Residential	2,965	16.8	498

Table 4-2 shows the likely average composition of construction waste that will originate from the proposed development, this is also illustrated in Figure 4-1. Construction waste is likely to contain significant quantities of reusable and recyclable materials that can be segregated (i.e. soil, concrete, bricks), leading to a potential recycling rate of up to 80% even without consideration of minimisation techniques.

¹ BRE, 2012 SMARTWaste: BRE benchmark data

Table 4-2 Construction waste composition and quantities from the proposed development

Materia breakdown	Residential (tonnes)
Asphalt and tar	9
Binders	3
Bricks	99
Canteen/office/adhoc	9
Concrete	111
Electrical and electronic equipment	1
Floor coverings (soft)	0
Furniture	1
Gypsum	26
Hazardous	1
Inert	131
Insulation	11
Liquids	1
Metals	9
Oils	0
Other	0
Packaging	28
Plastics	10
Tiles and ceramics	6
Timber	42
Total	498

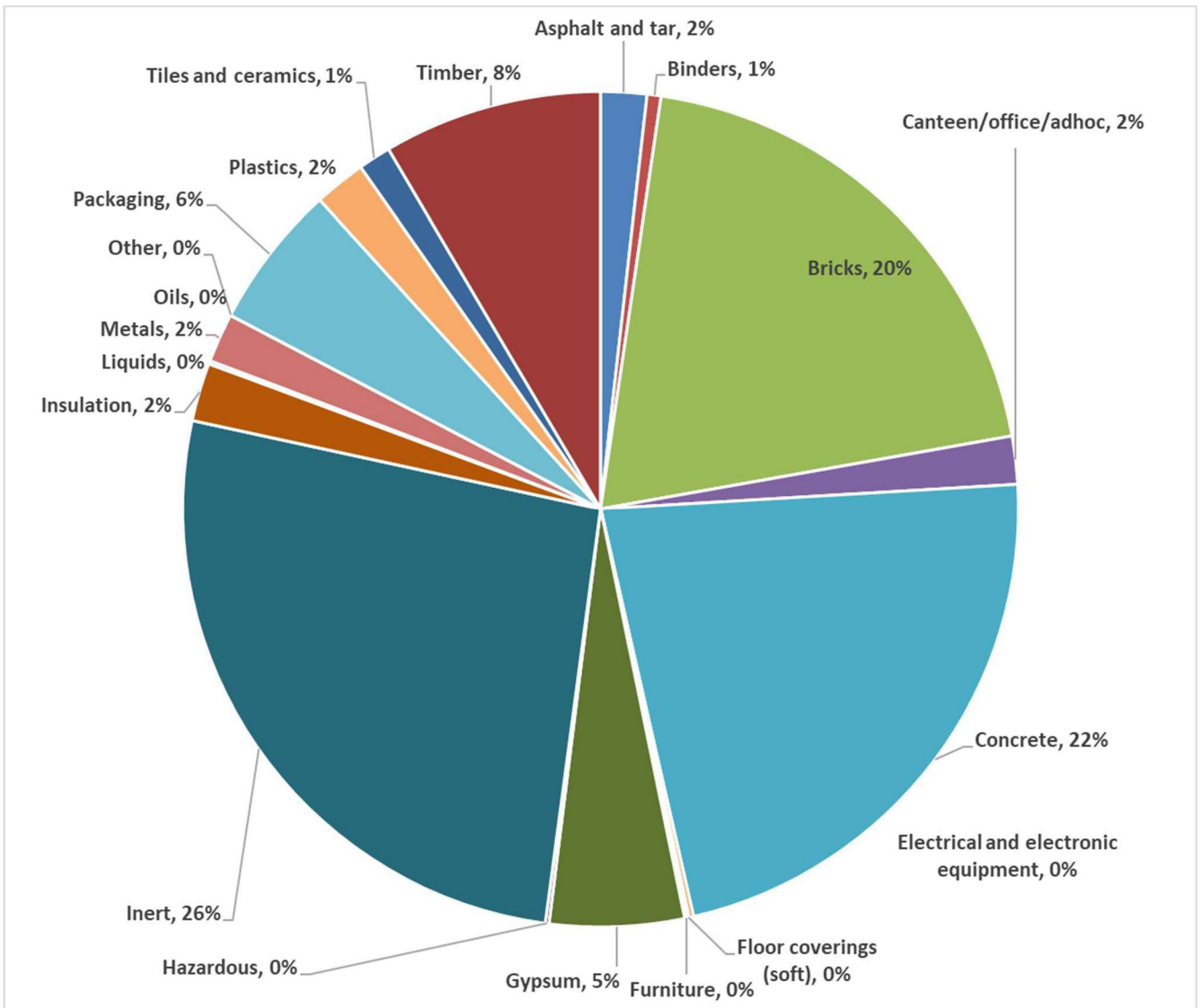


Figure 4-1 Proposed development construction waste composition

5 Waste reduction through design

European, national and regional policy places strong focus on sustainable management of waste arising, rather than relying on landfill. A number of measures can be implemented at design stage to ensure that the quantities of waste sent to landfill are minimised.

5.1 Designing Out Waste

The development should consider the waste hierarchy shown in Figure 5-1, as well as a circular economy approach as mentioned in many of the guidance and policy documents. Both the hierarchy and circular economy approach consider the design process as key in reduction of waste. Opportunities to design out waste will be investigated and potentially integrated as the project develops.



Figure 5-1 Waste hierarchy

5.1.1 Measures Considered by Designers

The following measures will be considered to design out waste:

- Where possible, elements of the development will be fabricated and constructed off-site; and
- The size and design of new building elements will be optimised in order to eliminate unnecessary elements and reduce off-cuts resulting from the construction process.

5.1.2 Other Design Considerations

Additional waste minimisation design measures should also be considered during subsequent design stages and, where possible, be incorporated into the project design. Options include the following:

Design solutions

- Consider matching design sizes to standard sizes of material supply in order to reduce off-cut waste; and
- Maintain high quality control standards and process monitoring to ensure rejected batches of material are kept to a minimum.

Logistics

- The development of a logistics plan for the project will ensure that due consideration is given to material requirements throughout the construction phase. This will enable efficient management of the delivery and storage of materials and will ensure that the most effective logistic methods are adopted;
- Adopt 'just-in-time' delivery protocols to reduce the space required for storage within the site. This will also minimise the risk of site congestion and material spoiling during bad weather; and
- Investigate the use of construction consolidation centres that provide effective supply chain management solutions, enabling the safe and efficient flow of construction materials and equipment from supplier to site.

Materials procurement

- Specific information relating to sustainable waste management should be incorporated into tender documents for third party contractors. When appointing a waste management company to handle the transportation, recovery and disposal of waste, contractual obligations should be implemented to ensure that these sustainable waste management measures are carried out;
- Construction materials should meet local planning authority sustainability recommendations in order that the development can attain BRE Environmental Assessment Method (BREEAM) accreditation;
- Reduce the amount of surplus materials by ordering the correct amount of materials at the right time;
- Material storage areas should be safe, secure and weatherproof to prevent damage and theft;
- Consider assigning the role of supply chain manager so that relationships and partnerships can be developed with suppliers who are able to implement waste minimisation at source;
- Set up agreements with suppliers to take back surplus materials and packaging;
- Engage with the supply chain to source products and materials that use minimal packaging and segregate packaging for re-use; and
- Aim to maximise the use of reclaimed or recycled materials.

5.2 Potential Waste Reduction through Design Measures

As discussed in Section 5.1, a number of measures can be explored which will help to reduce waste generation at design stage. It is anticipated that some of these measures will be further discussed and agreed upon between the different stakeholders as the design stage advances. The design actions indicated in Table 5-1 include some standard actions that can be easily incorporated during the design process. The design team have been consulted to understand which actions have been considered/implemented for planning. They advised that there is an aspiration to

explore and implement most of the actions presented in Table 5-1. However, these will need to be further explored and confirmed in the next stages of design. Table 5-1 also shows a high-level, provisional waste reduction saving that each action may bring about, were they are to be implemented. The potential waste savings have been estimated based on previous project experience. These are considered to be conservative and achievable in most cases, although there is scope for the percentages to be revised as the project advances.

Table 5-1 Potential waste minimisation actions to be adopted at design stage

Measure	Maximum potential savings	Assumed project-specific savings
Construction specific measures		
Offsite fabrication - Can any of the components and or buildings of the development be made off site? For example pre cast concrete, timber frames etc.	10% of specific material	7%
Building form - Has the form and shape of the building been considered minimising the use of materials on site (i.e. refurbishment rather than demolition and rebuild)? Was this considered during the design?	5%	0%
Attention to standard sizes of material supply matched to design sizes – dimensional coordination. In an effort to reduce off cut waste onsite has the design process considered the standard size of building components?	5%	5%
Has the design team received adequate training by materials suppliers?	5%	1%
Sustainability of materials - Has consideration been given to the sustainability of materials used (i.e. such as timber framework)?	5%	1%
Are there any specific waste minimisation key performance indicators (KPI) via tendering contracts for next stage of design process? (such as bonuses for reaching waste minimisation targets, just-in time ordering, requirements to use materials with recyclable packaging etc)	5%	1%
Have all efforts been made to prevent the major alteration of design at later stages by following a design approval process?	5%	5%
Other potential measures		
Segregation and recycling of materials on-site	10%	5%
Reuse of excavated material on-site	0-95%	50%

The potential design actions indicated in Table 5-1 have been applied to specific waste materials and used to forecast the maximum achievable amount of construction waste that could be 'designed out' as part of the design stage. This will help guide the design team on what actions would contribute the most towards waste reduction. A summary of the potential waste reduction forecasts is shown in Table 5-2.

Table 5-2 Potential construction, excavation and demolition waste savings due to design mitigation measures

Material	Waste generated without design mitigations (tonnes)	Potential reduction %	Average reduction (tonnes)	Revised waste generation (tonnes)
Construction material	498	20%	100	398

6 On-site waste reduction

Sustainable waste management techniques will be considered throughout the site preparation and construction stages. A nominated waste champion will oversee the implementation plan and will ensure the project adopts the following sustainable waste management principles.

6.1 Materials Management On-Site

- The principal contractor will establish a system prior to construction commencing to ensure that the correct quantities of materials are ordered. This will reduce the volume of unused materials going to landfill;
- Dedicated areas will be created that allow for the correct storage of new building materials. This will reduce the risk of contamination/spoiling;
- Timely ordering of materials will reduce the time that materials are stored on site. This will also reduce the risk of spoiling;
- Provision of clearly marked segregated bins/skips for construction materials to avoid cross-contamination and to facilitate recycling; and
- All waste generated will be stored in designated areas that are isolated from surface drainage. Waste containers will be covered to prevent dust and litter being blown out and rainwater accumulating. Containers will be inspected regularly and replaced when full.

6.2 Waste Segregation On-Site

Waste will be segregated on-site wherever reasonably possible. However, when this is not viable, mixed materials will be stored and sent to a local Materials Recovery Facility (MRF). The following recommendations should be considered to minimise the amount of waste produced and increase the proportion of waste that is segregated:

- Ideally, a specific area should be allocated and labelled to facilitate the segregation of waste materials for potential re-use, recycling and recovery;
- Efforts should be made to recover and recycle packaging waste in accordance with packaging legislation;
- Different waste streams should be segregated. As a minimum, containers/skips for hazardous/non-hazardous waste and plasterboard waste should be provided on-site. Some examples are shown in Figure 6-1;
- Recycling and waste skips will be kept clean and clearly marked to reduce contamination of materials. The labelling shall use 'Waste Stream Colour Codes';
- Training will be provided for all site personnel, informing them of the correct disposal routes for materials. A site waste champion will be appointed to oversee correct segregation/disposal and keep a record of all resources generated on-site. It is recommended that a designated senior person is appointed as site waste champion;
- Green waste associated with landscaping works will be managed by the contractor carrying out said works. This waste will not be considered within the scope of this document; and

- It is recommended that waste produced by workers in site offices and welfare facilities is handled by a separate waste contractor to the one removing construction waste from the site. It is expected that these sources will generate minimal quantities of waste. It is recommended that this waste is segregated for reuse and recycling.



Figure 6-1 Examples of segregation skips and waste stream segregation by colour-coded signs

6.3 Site Waste Management Responsibilities

The principal contractor will be responsible for waste management upon appointment. The SWMP will be reviewed and, if necessary, updated approximately every six months or in the event that a major change occurs (such as material supplier, waste contractor, etc.). All waste removal dockets or consignment notes must be collected and stored on-site. It is strongly recommended that waste generation rates are included in the monthly environmental report, to allow the project team to track how the project is progressing against waste targets.

On completion of the development, a report shall be produced by the principal contractor that will detail total waste produced and actual recycling rate achieved. This will be added to this document and filed in a separate section.

The full SWMP will also include information and copies of data recording forms detailing the information recorded when any waste material leaves the site. In addition, the following aspects of site waste management should be audited:

- Delivery recording arrangements;
- Materials handling and storage;
- Use of materials (including surplus materials);
- Auditing of disposal areas (i.e. skip auditing); and
- Site staff awareness of waste management procedures.

Prospective waste management companies tendering for waste management work shall be audited and interviewed before any agreement is made between the client and waste management company. The waste management

company will be subject to ongoing audits as part of the process to ensure they are still meeting the required standards as the project progresses.

7 C&D waste recovery and savings

7.1 Construction waste recovery and savings

Further savings could potentially be achieved throughout the construction stage if targets for waste recovery and segregation are set. The potential savings indicated in Table 7-1 have been derived from WRAP guidelines².

As a minimum, waste should be segregated as standard practice with an aim to achieve good practice diversion rates. In most cases, good practice methods are easily achievable, cost neutral and do not require a fundamental change in working practice.

Table 7-1 Standard, good and best practice recovery rates by material

Material	Possible recovery rate with segregation (standard practice)	Possible recovery rate with segregation (good practice)	Possible recovery rate with segregation (best practice)
Asphalt and tar	0%	0%	0%
Binders	0%	0%	0%
Bricks	75%	95%	100%
Canteen/office/adhoc	12%	50%	75%
Concrete	75%	95%	100%
Electrical and electronic equipment	0%	70%	95%
Floor coverings (soft)	0%	0%	0%
Furniture	15%	25%	50%
Gypsum	100%	100%	100%
Hazardous	0%	0%	0%
Inert	75%	95%	100%
Insulation	12%	50%	75%
Liquids	100%	100%	100%
Metals	95%	100%	100%
Oils	0%	0%	0%
Other	0%	0%	0%
Packaging	60%	85%	95%
Plastics	60%	80%	95%
Tiles and ceramics	75%	85%	100%
Timber	57%	90%	95%

² WRAP, *Practical solutions for sustainable construction: Achieving good practice Waste Minimisation and Management. Guidance for construction clients, design teams and contractors*

Table 7-2 Potential on-site savings at construction stage by adopting WRAP best practice guidance

Material	Possible recovery (Standard practice)	Possible recovery (Good practice)	Possible recovery (Best practice)
	tonnes	tonnes	tonnes
Asphalt and tar	0	0	0
Binders	0	0	0
Bricks	59	74	78
Canteen/office/adhoc	1	4	5
Concrete	66	84	88
Electrical and electronic equipment	0	0	1
Floor coverings (soft)	0	0	0
Furniture	0	0	0
Gypsum	20	20	20
Hazardous	0	0	0
Inert	77	98	103
Insulation	1	4	7
Liquids	1	1	1
Metals	7	7	7
Oils	0	0	0
Other	0	0	0
Packaging	13	19	21
Plastics	5	6	7
Tiles and ceramics	4	4	5
Timber	19	30	32
Total	273	352	376

If good practice methods are adhered to on-site, a further 352 tonnes of construction waste could be diverted from landfill. This figure could rise to 376 tonnes diverted from landfill if best practice methods were to be used on-site. Table 7-3 summarises the potential waste savings that could be achieved if good and best practices are followed.

Table 7-3 Summary of potential further waste savings

Construction waste generated after design mitigation measures have been implemented (tonnes)	Waste disposal quantities after segregation measures have been implemented (tonnes)		
	Standard practice	Good practice	Best Practice
398	125	46	22

7.2 Total potential waste savings

It is estimated that 498 tonnes of waste will be generated from the construction stages of the project. This total assumes that no design mitigation measures or waste recovery/diversion from landfill practices have been implemented.

If waste reduction measures through design are incorporated, then construction waste could be reduced by approximately 20% to 398 tonnes. Similarly, there is potential to re-use all excavation waste on-site.

Furthermore, if a best practice approach is taken during the construction phase, then 376 tonnes of waste could be diverted from landfill through reclamation and recycling, meaning that the total amount of construction waste left to be disposed of would be 22 tonnes.

8 Waste Management Responsibility

Responsibility for the various aspects of the SWMP is set out in Table 8-1. It should be noted that ownership roles are indicative and may vary as the project develops.

Table 8-1 Responsibilities and owners of SWMP aspects

Title	Responsible owner
<i>Administration and planning</i>	Client
<i>Action log</i>	Client
<i>Design measures</i>	Design Coordinator
<i>Responsibility for waste management</i>	Principal Contractor
<i>Forecasting key waste production</i>	Principal Contractor
<i>Planning re-use and recycling</i>	Principal Contractor
<i>Register of licences, permits and movements</i>	Principal Contractor
<i>Comparison of estimated and actual quantities</i>	Principal Contractor
<i>The costing of site waste management</i>	Principal Contractor
<i>Overall recycled content</i>	Principal Contractor
<i>Implementation</i>	Principal Contractor
<i>Final project declarations</i>	Principal Contractor

Buro Happold has highlighted potential design actions that can help to minimise waste generation from demolition, excavation works and construction. It is recognised that there is a possibility of more than one contractor working on-site. Each contractor will be expected to implement the measures set out in this document. The responsibility for supervising the process will, however, lie with the principal contractor. The responsibility to update and complete this document will also be passed on to the principal contractor. At a later date, this updated SWMP will be provided to the client in both digital and hard copies, with the hard copy enclosed in a folder.

The principal contractor must update the SWMP prior to commencing any site works and as works progress, and ensure that workers on-site are aware of the SWMP and co-operate with it. This will include providing suitable site inductions, information and training. All contractors will need to go through the site induction process. Contractors will need to engage their employees and sub-contractors to ensure that any waste management objectives in the SWMP are understood and that steps are taken to achieve the objectives. During the contractor consideration process, a review of the company's waste management procedures will be carried out to ensure that they align with the project's desired outcomes.

The SWMP must be kept at the site office and be available to any contractor carrying out work described in the plan. Once the development has finished, the principal contractor must keep the SWMP for two years after completion at their place of business or at the site of the project.

9 Conclusion

At this planning stage in the project, there are significant opportunities to reduce construction and demolition waste arising from the proposed development. The recommendations in this report should be adhered to, as they have the potential to significantly reduce the waste generated from the baseline estimate.

This report is a live document and it will be updated throughout the design and construction process. The next steps to take are as follows:

- Update the document in response to significant design changes which impact waste management;
- Ensure that ongoing design development refers to this report and integrates measures which look to design out waste;
- Integrate waste management requirements into tender documentation;
- When on-site, ensure that the SWMP is incorporated into all relevant aspects of site management;
- Retain a copy of this report and any updates to the SWMP on-site. All contractors should be made aware of its location. The original should be kept in the client offices. The waste measures stated in this report should be communicated during site inductions;
- A waste summary will be produced and added to the monthly environmental report. Upon completion of works on-site, a report shall be produced by the principal contractor that will detail total waste produced and actual recycling rate achieved;
- On completion, the principal contractor shall summarise all waste reports and compare the figures to the initial estimates in this report;
- Future recommendations to improve site waste management will be recorded and shared with the client, as well as other design and construction teams working on the development during the design stage; and
- When the work is complete, the SWMP file will be stored in the principal contractor's offices for a minimum of two years.

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