Loughborough University

Construction & Site Waste Management Strategy

Executive Summary:
The Construction and Site Waste Management Strategy sets out the University's approach to management of construction waste in response both to existing legislation and the rescinding of specific construction waste management regulations. Legislation forms the basis for external drivers, whilst the internal drivers are Environmental, Financial, Reputation and Aesthetics. The strategy sets out the responsibility for construction waste management and how the waste hierarchy can be applied. Three levels of construction work are identified and these are covered in two processes which support this strategy, the Small Works Waste Process and the Construction Site Waste Management Process.

Contents:

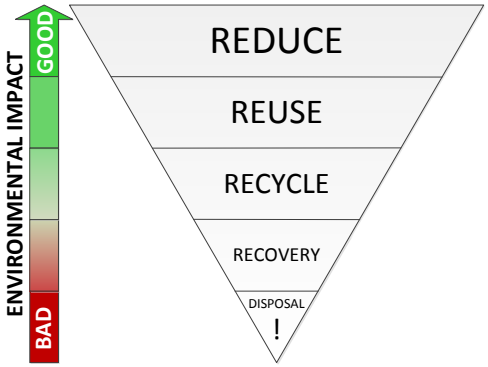
1.0 Introduction

Each year Loughborough University generates in the region of 2000 tonnes of waste, excluding construction waste. Construction waste however can be anywhere between 2-15 times this amount and how we manage and mitigate the impact of this is, therefore, of great importance. This strategy sets out our approach.

2.0 Drivers for waste management (responsibilities)

2.1 External Drivers

Management of waste is no longer a choice between recycling or landfill, in fact it's no longer a matter of choice. The University's policies and procedures are driven by numerous pieces of legislation but in particular there is now a **legal responsibility**, under the Waste Regulations (England and Wales) 2011, to apply the waste hierarchy. The waste hierarchy requires the University to Reduce, Reuse, Recycle and Recover before considering Disposal to landfill as an option.



To **REDUCE** the amount of waste we produce.
To **REUSE** resources or pass them to others to do so.
To **RECYCLE** by segregating materials which cannot be reused.
To **RECOVER** energy from materials which can't be recycled.
To **LANDFILL** resources only as a last resort.

Figure1: The Waste Hierarchy

In 2008 the Site Waste Management Plan (SWMP) Regulations were introduced which required construction works over £300K in value to have in place a Waste Management Plan, with the aim of reducing construction waste. In 2013 these Regulations were rescinded but Loughborough University is maintaining the principles of these regulations as a requirement for its contracts in order to meet the requirements of the Waste Hierarchy. We will do this through our processes and procedures whilst also considering the impact of smaller works. This strategy sets out the principles for doing so.

2.2 Internal Drivers

The internal drivers for managing construction waste are equally important and they include:

- Environmental – we live on a planet with a finite amount of resources and therefore it is essential that we use these efficiently. Ensuring we adhere to the waste hierarchy helps us achieve this and mitigate the University's significant environmental impact from construction, refurbishment and maintenance of the estate.
- Financial – wasted resources in construction can be costly as can the disposal costs. Managing the construction design, avoiding wastage and the correct segregation of wastes can all help reduce this financial element of construction and refurbishment.
- Reputation – inappropriate waste management reflects on the University's social responsibilities as both a leading local employer and a leading academic institution. Incorrect waste management can result in prosecutions where the reputational damage can far outweigh any fines incurred.
- Aesthetics – the University is proud of its campus and therefore managing the waste produced in a safe, tidy and professional manner helps us present our campus in the right way irrespective of the level of works taking place.

2.3 Responsibility for Management of Construction Waste

The University's Environmental Manager has responsibility for managing the University's waste streams including overseeing the management of construction waste. Operationally construction waste is the responsibility of the Project Co-ordinator / Manager (PC/M), who is required to ensure that the contractors they appoint and manage are complying with the University's requirements. For CDM notifiable projects the PC/M will be supported by the University appointed Principal Designer (PD) but are required to ensure the PD is delivering against the agreed processes.

However ALL contractors have a responsibility for adhering to the procedures provided and irrespective of these procedures are required to adhere to ALL environmental legislation whether mentioned or not.

3.0 Applying the Waste Hierarchy to Construction Works

3.1 Reduce – Designing out waste

The University, our designers and contractors have an important role to play in waste minimisation. The primary action, where possible, being to avoid waste generation in the first instance. Some key elements to consider are:

Building Form

- Consideration of building form and shape to minimise use of materials
- Sizing of buildings and spaces to eliminate un necessary elements
- Compatibility to market supply of materials

Flexibility

- Consider whole life approach to flexibility and adaptability
- Design for dismantling rather than demolition

Demolition

- Consider demolition to allow for reclamation and reuse
- Minimise waste generated from temporary works requirements.

Specification

- Avoid over specification- lean design
- Consider end of life reuse and recycling
- Use caution with composite materials that are difficult to recycle
- Specify materials with a recycled content
- Minimise variations in components

Opportunity Matrix:

Opportunities to reduce waste should be targeted towards the easy wins within a project. Where used the SWMP process will record where these decisions have been made for the project to demonstrate that. Appendix 1 provides further guidance on designing out waste.

3.2 Reuse

The University has built up a reputation for ensuring resources are reused and this should extend to its construction and refurbishment projects. With proper planning maximum reuse of materials can be made whilst also saving unwanted disposal costs. The Universities Environmental Manager will work closely with the PC/M and contractors to ensure resources are reused where there is an opportunity to do so. The University has built up a relationship with a number of local charities in order to support this and has donated items such as furniture and synthetic pitches as part of previous projects.

3.3 Recycle

The further down the waste hierarchy we go the more responsibility there will be on the contractor.

- On minor works the level of onsite segregation will be determined by the volume of waste likely to be generated. The Small Works Waste Process provides further details on the University's requirements.

- On major works it is fully expected that all key waste streams will be segregated on site and the Construction Site Waste Management Process provides further details on the University's requirements. Opportunities to reuse building fabric as hardcore should be considered.

3.4 Recover

Incineration of waste is an emotive subject but the University accepts this as an environmental option where energy recovery forms part of the process. General waste can be processed into RDF or SRF for energy recovery. It should however only come after all efforts have been made to Reduce, Reuse and Recycle.

The University is committed to reducing the amount of waste we send to landfill but accept that there will often be a small percentage of waste that is impractical to prevent from going down this route.

4.0 Levels of Site Waste Management

4.1 Basic construction works

Often the most basic of construction works will involve little waste with little opportunity for minimisation. Guidance on the requirements for these works will be included in the Small Works Waste Process.

4.2 Minor construction works

These are classed as works which are not notifiable under the CDM Regulations. Guidance on the requirements for these works will also be included in the Small Works Waste Process, but there will be greater expectations and requirements for these works.

4.3 Major construction works

These are classed as works which are notifiable under the CDM Regulations, irrespective of value Guidance on the requirements for these works are detailed in the Construction Site Waste Management Process, which will be managed by the appointed CDM-C.

Record of Changes
Date, reason for and author of changes to the Strategy:
19/01/16 – changed 2.3 to reflect changes in CDM works and responsibilities

Appendix 1: Designing out waste - Materials list and key considerations:

The following are general considerations where waste reductions can be made. Many of the areas will not be relevant to projects, or indeed practical or appropriate. A balance must be reached that does not compromise the functionality, robustness and overall design of the scheme to an unacceptable level.

Design for Reuse and Recovery

Landscaping

- Use on site demolition and excavated material within landscape design as: drainage base; and mound features.
- Reuse or recycle tarmac and asphalt (provided there is on site storage) for paths, car parking, construction storage space and hard standing for plant, etc.
- Retain top soil, treat it on site with compost (or other remediation) and use for green roofs, soft landscaping, etc.
- Manufacture top soil using surplus excavated soil blended with compost.
- Reuse bricks, concrete paving blocks and excavated rock for landscaping finishes feature, etc.
- Use existing soft landscape that can't be retained (trees, shrubs) as:
    - compost;
    - soft landscape top mulch;
    - external furniture; and
    - large features (e.g. tree stumps for benches).
- Reuse existing landscape items by repairing rather than throwing away (e.g. existing fencing, benches etc).

Concrete

- Recycle aggregates (either on site or off site) in concrete mix, as fill etc.
- Incorporate cement substitutes PFA or GGBS as appropriate.
- Recycle concrete elements as aggregates and use them as a thermal heat store (thermal mass used as fabric energy storage to reduce the operational energy requirement).

Packaging

- Reuse packaging by returning to supplier/manufacturer or using it for other purposes (e.g. timber packaging pallets can be chipped and used for landscaping top mulch).

Foundations

- Reuse existing foundations.
- Extract and reuse existing H-pile foundations.

Timber

- Reuse timber sprung floors.
- Reuse good quality timber for flooring.
- Reuse timber for cladding, fencing and other landscaping uses.
- Separate, de-nail and chip all timber arising from demolition and use either for composting, top mulch or take off site for energy generation.
- Reuse timber to construct landscape features (e.g. street furniture).

Bricks, Slates, Roofing tiles and Blocks

- Reuse bricks, blocks etc for masonry, internal partitions and fair faced cladding.
- Reuse slate for roofing and landscaping.

Good Demolition Practice

- Reuse dismantled elements, columns, beams portal frames curtain walling either on site or off site.
- Reuse water tanks on site for useable space within the design brief.
- Encourage the client to adopt a 'soft strip' demolition process.
- All found fixtures and fittings to be saved and donated to charities for reuse, or sold for reuse.
- Other floor finishes, carpet etc to be set aside for reuse, donated to charity or sold for reuse.
- Good quality doors set aside for reuse.

Contractor's site establishment

- Reuse existing buildings on site for contractor's site establishment.
- Use temporary site establishment buildings that can be reused.

Design for Off Site Construction

Modular Design

- Design with modularisation in mind.
- Modularise cladding (e.g. unitised certain walking systems, masonry precast panels).
- Use door sets rather than doors.
- Use modular solutions for:
    - classroom units/wall with all fixtures and fittings;
    - services, plant room etc;
    - laboratory units, work stations etc; and
    - shuttering.
- Use timber panels as modular frame – used to construct up to nine storey buildings.

Volumetric

- Use prefabricated solutions for:
    - toilet and shower blocks etc;
    - changing rooms;
    - bedrooms with en-suite wc;
    - modular tea/coffee point stations for office spaces;
    - plant rooms.

Precast concrete

- Use precast concrete solutions for:
    - stairs and stair wells;
    - flooring units;
    - cladding panels; and
    - lift cores.

Steel Construction

- Use steel frame design.

- Use prefabricated steel stairs.
- Use bi-steel for lift cores and core units.
- Use H-pile foundation to enable future reuse.

Design for Materials Optimisation

Concrete

- Use post-tensioned floor slabs instead of reinforced slab.- Caution!
- Use reusable/modular shuttering for slabs cores etc. e.g. PERI system with integral handrails.

Design

- Simplify plan shape and building form.
- Minimise external surface area to internal volume.
- Question and reduce if possible the car parking provision.
- Combine functions of materials (e.g. pin boards also used for their acoustic properties).

Services

- Rigorously plan M&E plant and distribution routes to reduce access requirements and facilitate future maintenance.
- Rigorously plan M&E layout and distribution routes to reduce builders works by consolidating risers, ducts, etc.
- Enable consolidation of trades to reduce M&E penetrations in already finished surfaces.
- Avoid or reduce the extent of surface water attenuation systems and pipework by reducing run-off collection areas and consider other methods:
    - use of a green roof;
    - reduce surface areas for vehicles by use of grasscrete;
    - greater use of soakaways.

Detail design

- Review the necessity for all finishes (e.g. assess if fair faced structure and other elements suffice).
- Optimise tile layout any size to reduce cutting and offcuts.
- Use new thin insulations to reduce depth of wall thickness and maximise overall building net/gross areas.
- For odd plan shapes consider the use of formless materials for finishes rather than formed materials (e.g. latex screed rather that vinyl tiles).
- Use full height doors or doors with fan lights above (i.e. to ceiling) to avoid cutting plasterboard sheets.
- Ensure door details have full returns to avoid plasterboard and angle beads forming opening returns.
- Use thicker plasterboard sheet rather than doubling up on board.
- Ensure sound insulation is not over-specified for the required purpose of the room/building, so avoiding unnecessary use of materials.

Avoidance of excavation

- Use rotary pile foundations rather than replacement piles.
- Optimise building position and levels to minimise excavation required.
- Question the need for basements.

Standardisation and dimensional co-ordination

- Use 3D modelling to avoid clashes/conflicts of services/structure etc. and thus reduce construction errors and consequent rework.
- Co-ordinate structure and services so that both can be combined for off site or near site thus avoiding the need to cut chases on site and other builders work.
- Co-ordinate structural grid and planning grids etc. to avoid offcuts:
    - external finishes;
    - internal finishes;
    - internal partition layouts with ceiling and floor grids.
- Use 3D modelling to assess all finishes layouts and options to reduces on site waste such as:
    - sheet vs. tiles vs. formless materials;
    - plasterboard layout.
- Standardise light fittings and lamps.
- Standardise windows, doors and glazing areas.

Design for Waste Efficient Procurement

Supply Chain

- Employ waste specialist consultant/contractor with expert knowledge in waste minimisation.
- Discuss methods of waste minimisation with suppliers/manufacturers of wall lining systems.
- Discuss methods of waste minimisation with potential subcontractors and suppliers at an early stage.
- Discuss options for packaging reduction with subcontractors and suppliers.
- Discuss future flexibility with plasterboard manufacturers.

Specification

- Simplify the contract specification to reduce number of plasterboard types.
- Specify responsibly sourced materials that reduce waste.
- Specify adequate protection to fragile materials to minimise damage on site.

Contract/Contractor

- Involve the contractor from early design stages to identify methods of waste minimisation in relation to procurement routes.
- Consider financial incentives and penalties to reduce waste.
- Involve the contractor from early design stages to identify methods of waste minimisation in relation to procurement routes.
- Require the contractor to produce a SWMP at an early stage that includes a site storage and logistics plan.
- Require all tendering contractors to provide information on how they plan to reduce waste through the supply chain and site activities.
- Require Just In Time (JIT) delivery.
- Use ‘consolidation centre’ to facilitate JIT delivery.
- Select procurement route that minimises packaging.
- Use ordering procedures that avoid waste (e.g. no over ordering, take back schemes for both material surplus and offcuts).
- Plan the work sequence to reduce on site waste.

- Include within the tender documents, the requirement to sign off ‘the waste per work package’ – waste must not exceed a contractual agreed limit.

Design for Deconstruction and Flexibility

Materials

- Use lime mortar or other mortars so that bricks/blocks can be easily dismantled.
- Use mechanical fixings that facilitate deconstruction.
- Avoid gluing and composite materials.
- Specify materials that can be reused rather than recycled.
- Use landscaping materials that can be easily taken up and reused (e.g. grasscrete).
- Use structural elements that can be easily disassembled.
- Design foundations that can be retracted from the ground and reused after the service life of the building ceases.

Logistics

- Design deconstruction at an early stage.
- Discuss with suppliers if components can be returned.