



Growth that doesn't cost the earth

Best practice guide

to improving waste management
on construction sites

A programme from



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Investing in a Smart, Sustainable and Inclusive Future

About this guide

This guide is part of the Training Pack for waste prevention on construction projects. It provides specific, best practice advice to help with the prevention and reduction of waste as well as recycling of materials on construction sites. In the construction industry site waste may be managed by a third party or parties may be responsible for managing their own waste; this guide is aimed at both groups. The Training Pack also includes the Waste Prevention Presentation and Opportunities Checklist.

Resource Efficient Scotland is a Scottish Government programme delivered by Zero Waste Scotland. It helps organisations in the private, third and public sectors to reduce costs by reducing energy, water and raw materials use and managing waste efficiently.

The Resource Efficient Scotland programme offers free advice and technical support and shares best practices and new technologies. Embedding resource efficiency within Scottish organisations makes a significant contribution to the achievement of the Scottish Government's strategic economic objectives, climate change, energy efficiency and zero waste targets.

We offer free on-site support, delivered by our team of implementation advisors and technical specialists, will help you to identify cost saving opportunities for your business.

For more details call Resource Efficient Scotland today on 0808 808 2268, email enquiries@resourceefficientscotland.com or visit the website at resourceefficientscotland.com to start saving.

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How to use this guide

This guide is to be used on-site by site staff and supervisors, all of whom can influence effective waste management on-site by employing best practice. It is designed to meet the needs of two core groups of site construction workers, and includes examples of how these two groups can work together. The groups are described as:

Group 1:

Those who produce waste and have direct responsibility for managing the waste, for example the supervisor from the contractor who will set the tone for waste management at the site and have responsibility for delivering against budget and the clients KPIs; and

Group 2:

Those who produce waste but do not have responsibility for it, for example sub-contractors who may only be on-site for a few days to fulfil a specific role and will use the wider sites waste management facilities and comply with the site rules.

Key to symbols in this document:




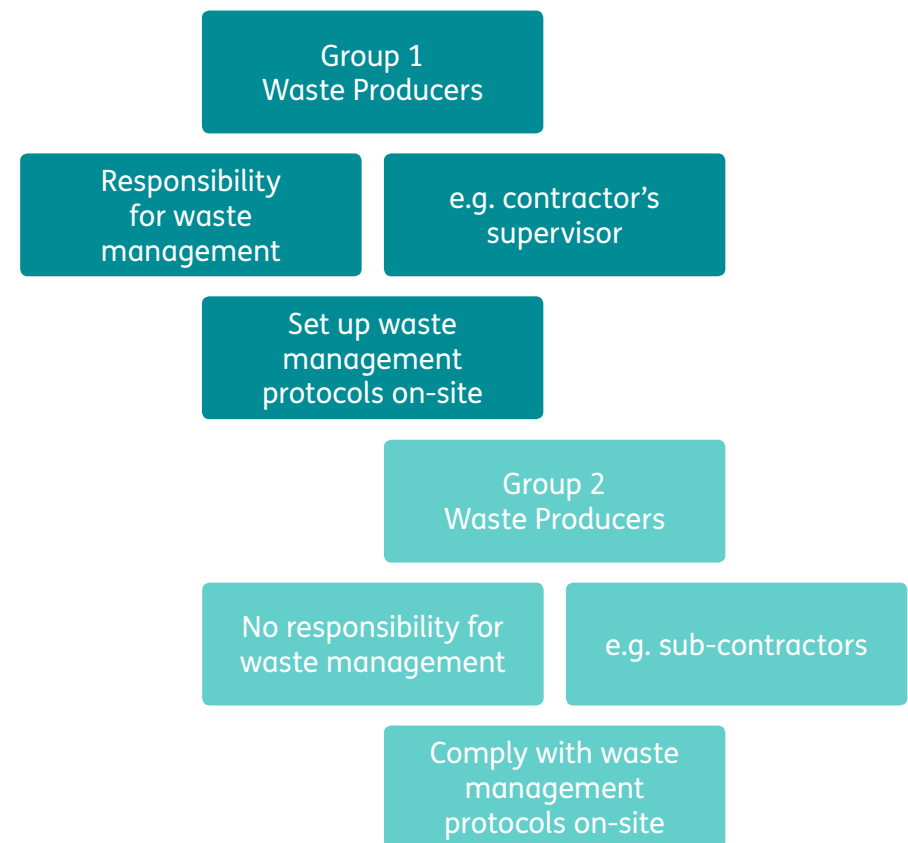
-  Likely applicable to Group 1.
-  Primarily aimed at Group 2.
-  Relevant to both Groups 1 and 2: opportunities for working together.

Figure 2: Effective waste management influencers



The value of best practice

Simple changes on-site to reduce, re-use and recycle your construction waste can bring many benefits, as outlined opposite. The examples and exemplar case studies in this guide can help you to quickly understand why waste is created and how to manage it.

The true cost of waste in a construction project is often underestimated. When material and labour costs are factored in, costs can exceed £1,300/tonne. It is also estimated that 13% of raw materials ordered are discarded unused. This leaves significant potential to improve purchasing efficiency through waste prevention and re-use.

Managing and monitoring different waste streams on a construction site requires careful planning. Understanding how wastes occur in the first place will help you prevent and manage them more cost-effectively.

Waste streams vary according to the phase of construction, the method and the type of building making it important to adapt waste management practices to suit the specific site and phase of construction.

Most waste is produced on-site through: over-ordering; damage by mishandling materials; off-cuts; inadequate storage of materials; and unnecessary packaging of construction materials, e.g. plastics and cardboard.

Implementing best practice on your sites can save you money, along with many other benefits:

- **Income generation** from collecting materials for re-use
- **Reduced costs** by purchasing less material and maximising skip space
- **Less accidents** on-site through correct materials storage and a tidy site
- **Regulatory compliance** with Duty of Care requirements
- **Conservation** of natural resources
- **Reduced CO₂ emissions**
- **Increased environmental performance**
- **Enriched corporate social responsibility**
- **Enhanced community benefits**

A case study example

The Resource Efficient House, built by Resource Efficient Scotland in partnership with Tigh Grian Ltd., was a ground-breaking project that illustrated how careful design and best practice activities can positively impact both construction affordability and environmental credibility.

If replicated, the construction methods used would go some way to reducing Scotland's construction waste to landfill, whilst reaping financial gains for house builders. Key highlights from the Resource Efficient House included:

- **Use of modular design:** This enabled greater control over costs, waste arising and supply chain certification.
- **Reduced waste arisings:** The house produced less than five tonnes of construction waste (excluding excavation waste) compared to the average of 13 tonnes waste generated on an average 3 bed detached house.
- **High recycling rates:** The site achieved an overall recycling rate of 96.83%, and 100% of excavation waste was recycled.
- **Reduced waste to landfill:** Exemplar waste management on-site resulted in less than one tonne of construction waste going to landfill.
- **Exceptional building standards:** The House met the enhanced 2016 Scottish Building Standards and exceeded the gold performance under Section 7, achieving Platinum level - net zero carbon.
- **Energy performance:** The House achieved an EPC rating of A. The average rating for a home in Scotland is band D (60).



The Resource Efficient House

Actions to take pre-construction

Designing out waste

The design stage is an important influencing factor as to why waste is produced in construction projects. Ensuring design decisions not only prevent waste from being produced in the first place, but also positively improve the recycled content and future recyclability of a project, is crucial.

The Zero Waste Scotland [Designing Out Construction Waste](#) guide covers this topic in detail and focuses on the five key designing out waste principles:

- Designing for waste-efficient procurement;
- Designing for materials optimisation;
- Designing for off-site construction;
- Designing for re-use and recovery; and
- Designing for deconstruction and flexibility.

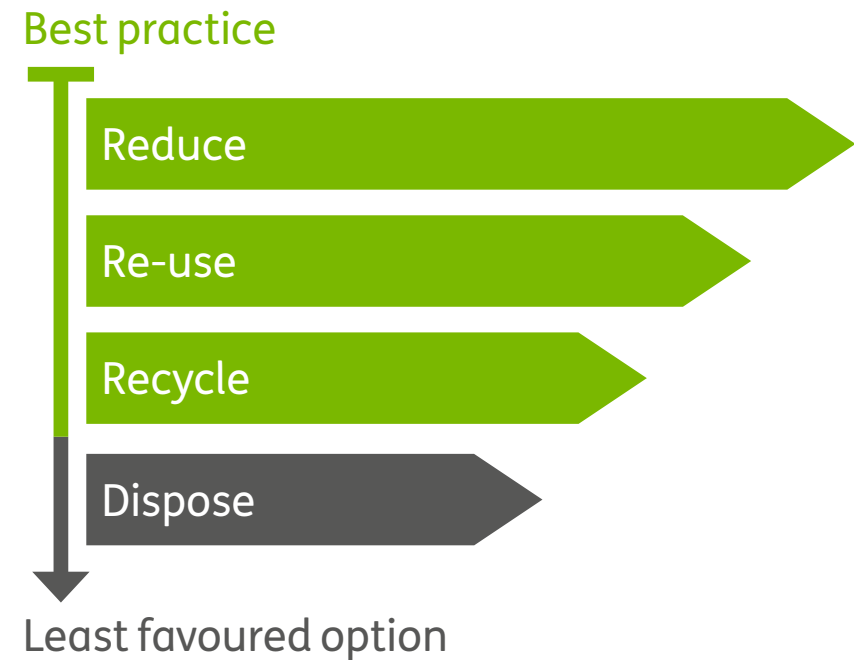
Construction projects should always plan and design to avoid waste being produced on-site, however where this is not possible, it is important to follow the waste hierarchy (Figure 3) by exploring the next tiers down:

Reduce the amount of waste you create, using waste prevention measures.

Re-use materials to avoid waste being created.

Recycle materials from site where materials cannot be re-used.

Figure 3: The waste hierarchy



Waste minimisation through procurement

Resource Efficient Scotland's guide for **Procuring Resource Efficient Construction Projects** identifies how small and medium-sized enterprises (SMEs) should best work with clients or owners of construction projects. The guidance highlights steps that can be implemented during the procurement of contractors to help assign ownership of waste within the supply chain and minimise construction waste. Contractual agreements set up between the client, designers, main contractors and sub-contractors working on the project can impact on the production of waste.

This guidance, along with the **Maximising re-use of construction materials** guidance also published as part of this Training Pack, highlights opportunities for contractors to work intelligently to improve waste prevention, re-use waste management practice and be more cost-effective to the benefit of a project. By adopting these approaches, contractors are more likely to differentiate themselves and therefore potentially increase their scores in tender opportunities.

Prospective contractors could be required in their tenders to indicate the likely waste recovery targets and KPIs that can be achieved on the project given the stage of the design. The reason for this is two-fold. Firstly, if the design incorporates good practice levels of waste minimisation, there will be less potential for waste generation on-site and therefore a lower target rate should be adopted accordingly. Secondly, the contractor is better suited than the client to propose recovery rates based on their working practices.



Site Waste Management Plans

The best practice identified in this guide is designed to complement the Site Waste Management Plan (SWMP) developed for the site; it does not replace the need for a SWMP. Using an SWMP in a construction project is best practice and provides you with a powerful process to improve waste management.

There are three main aims of a SWMP:

- Improving the resource efficiency and profitability of your projects;
- Increasing the waste and materials awareness of your staff (both site-based and management); and
- Helping to discharge duty of care obligations.

Preparing an Outline SWMP at the preliminary design stage encourages the review of current waste reduction and recovery practice levels, highlighting areas where good and best practice in waste minimisation and management can be achieved.

The Outline SWMP also facilitates the identification and implementation of waste minimisation at detailed design and re-use and recycling opportunities during the construction, which will reduce the quantities of reconstruction, demolition and excavation waste sent to landfill.

Further details on developing and using SWMPs, including a free tool, are available through the [Resource Efficient Scotland](https://resourceefficientscotland.com/content/site-waste-management-plans-swmp-free-tool) website¹.

¹ resourceefficientscotland.com/content/site-waste-management-plans-swmp-free-tool



Waste management and disposal best practice

The following pages present examples that can be considered and / or implemented on-site by those who are responsible for the management and disposal of waste, both for their own activity and that of sub-contractors on-site.



General best practice

Site logistics

- ☀ Throughout the project, consider what materials and wastes will be generated and ensure that waste facilities are appropriate for each phase of the development.
- ☀ Avoid the creation of waste by carrying out works in the correct order to minimise the need for remedial actions.
- ☀ Consider the number of waste containers and storage areas, and their locations, to ensure it is easy for site staff to use the waste facilities.
- ☀ Make sure to put a waste container near to all re-use and/or recycling containers to prevent recycling containers being used for general waste.
- ☀ Determine how to move materials / recyclables and waste around the site. How will they get into the correct containers? Who is responsible?
- ☀ Towards project completion (2-4 weeks prior to the end date), consider undertaking a full site waste audit to help understand how waste types and quantities might change during final site clean-up.
- ☀ Prior to completion, consider how excess materials segregated for on-site re-use will be managed. Can they be donated to local community projects for re-use or is recycling of source segregated materials more viable? When procuring suppliers, consider the use of 'take back' schemes and where this is offered, ensure there is a dedicated, well labelled container.



Well-labelled waste and recycling containers

On-site training

- ☀️ Ensure the site induction to staff and sub-contractors includes awareness of good waste management and the specific measures used at the site.
- ☀️ Use regular tool box talks to make sure that everyone who comes to site knows how to reduce, re-use and recycle at the site. Use Zero Waste Scotland visualisation tools to support the illustration of common opportunities.
- ☀️ Ideally images should be used in training sessions and training materials, particularly where staff and sub-contractors may not have English as their first language.
- ☀️ Set aside time to explain the waste programme to all sub-contractors at the site to ensure that their staff participate.
- ☀️ Bring up waste management at every job site meeting including progress meeting, coordination meetings and safety committee meetings. Reminders are important. Provide feedback to workers.
- ☀️ Tracking progress and promoting this at site meetings can help to motivate staff to reach your goals. Create site and public notice boards to promote the waste programme, and show KPIs and progress against these. This could also assist with [Considerate Constructor](#) objectives.



Induction and training

Celebrate and promote success

- ☀ Highlight success in the program to managers, sub-contractors, clients, on-site staff and the public. This could include signs to show tonnes recycled and tonnes diverted from landfill each week and could assist with **Considerate Constructor** objectives.
- ☀ Consider incentivising staff for re-using material by sharing the financial savings made at the site.

Monitor

- ☀ Review site practice and check the containers to ensure that the proper materials are going into them. If problems exist, find the person or people responsible and instruct them on how to properly participate.
- ☀ Photographs of damaged material could be kept to aid discussions and help prevent re-occurrence.
- ☀ Review wastage rates – track the volume of materials coming on to the site and do periodic comparisons with what waste is leaving site to highlight poor performance and high wastage.



Checking container contents

Reducing waste

The best environmental and cost-effective solution is to reduce the amount of waste created. The following pages provide suggestions for maximising waste prevention on-site.

Plan deliveries

- ☀️ 'Just-in-time' delivery strategies can reduce waste created by improper storage and weather damage.
- ☀️ Arrange deliveries of materials to align with project construction stages. This will help avoid materials being stored on-site longer than necessary and reduce the risk of damage.

Material storage

- ☀️ To avoid deterioration of materials, keep protective packaging on and ensure storage areas are secure and weatherproof.
- ☀️ Materials that have been damaged and wasted due to inadequate storage should be used as an examples in toolbox talks to highlight the importance of best practice to site workers. Photographs or damaged material could be kept to aid discussions and help prevent re-occurrence.
- ☀️ When bad weather is forecast, pay extra attention to securing and protecting materials.

Avoid excess

- ☀️ Do not order significantly more concrete and mortar than can be realistically used before setting.
- ☀️ Set and crush excess concrete and use in paths and as road aggregate.
- ☀️ Use mortar silos wherever possible.
- ☀️ Can other uses be found for excess concrete? For example, make temporary kerb-stones to help manage traffic on-site.

Damaged materials

- ☀️ Reject materials which have been damaged during transit and request they be returned to the supplier. This will prevent damaged materials, which are not fit for purpose, becoming your responsibility.

Minimise materials movement

- ☀️ Plan where bulk materials are stored to minimise transportation around the site.
- ☀️ Move materials around the site as little as possible – breakage is more likely to happen during movement causing materials to be unusable.

Eliminate excess packaging

- ☀ For materials not vulnerable to weather damage, reject excessive packaging and request its return to the supplier e.g. glazing racks, collation trays, plastic shrink wrapping, transport strapping, etc.
- ☀ Check contracts with suppliers and the supplier's haulier for return of packaging. It is often the case that the supplier contract will include a clause for return of packaging but this is not included in the contract with their haulier. These issues should be identified and resolved as early as possible to prevent problems on-site.
- ☀ Consider suppliers that offer reusable packaging schemes.

Return materials to supplier

- ☀ Your suppliers may be able to take back their packaging – just ask. Reject and request the return to the supplier of:
 - Oversized packaging and void fillers.
 - Unnecessary packaging of bulk items e.g. where plastic shrink wrapping is used in addition to metal / plastic strapping such as pallets of bricks or external hollow piping.
 - Transport protection and strapping.



Reject excessive packaging

Re-using materials

Where material use and waste generation cannot be reduced, re-use should be considered as the next step. This may be on-site or through a third party. The following pages present examples for re-using waste for both those responsible for the management and disposal of waste and others on-site.

Deconstruction

- ☀️ Fix materials associated with temporary works (e.g. safety / security doors, timber hoarding, hand rails, etc.) so they can be dismantled and re-used many times.
- ☀️ Use mechanical fasteners such as bolts, screws and nails instead of sealants and adhesives.
- ☀️ Purpose-made reusable products for temporary applications (e.g. steel mesh fence panels) may have a higher initial cost, but will be cheaper in the long term.
- ☀️ Dismantling buildings rather than knocking them down increases the amount that can be salvaged undamaged.

Plan in re-use

- ☀️ Pouring concrete can be phased to allow re-use of shuttering on the remaining sections.
- ☀️ Collect off-cuts and use these first instead of new materials.

- ☀️ Ensure off-cuts are stored appropriately so they are not damaged or degraded before they can be re-used.
- ☀️ Consider options to balance cut and fill quantities on-site. This would require coordination between phases of the project to ensure that material is available in the right quantities and at the right time.

Make best use of materials

- ☀️ Return, sell or donate unused and salvaged materials.
- ☀️ Engage with local charities and schools as they may be willing to support with this, for example materials could be used in classroom lessons or for landscaping works. Engage on-site staff in this process and make it personal to them to ensure 'buy in'.
- ☀️ Repair items (e.g. pallets) so they can be re-used or returned to the supplier.
- ☀️ Mix unused paints together and use as an undercoat or for site hoardings.
- ☀️ Use local re-use networks such as [The Community Resources Network Scotland \(CRNS\)](#) and the [Community RePaint Network](#) to find outlets for materials re-use. You can also use the [Construction Material Exchange](#) hosted on the Resource Efficient Scotland website.

Recycling waste

If waste cannot be reduced or re-used it should be segregated for recycling wherever possible. The most important step for recycling of construction waste is on-site separation. Initially, this will take some extra effort and training of construction personnel but once separation habits are established, on-site separation can be done at little or no additional cost and will save you money.

Material segregation

- ☀ Sort different waste materials on-site.
- ☀ Use waste containers of appropriate sizes to facilitate waste segregation and locate containers (e.g. skips or wheelie bins) close to working areas.
- ☀ Clearly label waste containers on-site to promote effective segregation. Use consistent labelling across all sites to prevent confusion. Labels should contain images or materials icons to assist staff and sub-contractors who may not have English as their first language.
- ☀ Train staff on practical ways to manage and handle materials to maximise their re-use, recycling and recovery potential.
- ☀ Keep hazardous wastes out of mixed waste skips. This reduces waste gate fees and increases the value of materials.
- ☀ If on-site sorting is not possible consider sending your mixed waste to a Materials Recovery Facility (MRF) instead of a landfill site – the gate fees are often less.



Segregate materials

Engage with waste contractor

- ☀ Ask your waste contractor how they can help you to recycle, and shop around for the service that suits your site best. Skips for segregated materials can lead to cost savings and higher waste recovery rates compared to mixed skips, which are the most expensive option.
- ☀ It is always preferable to segregate at source, but where this is not possible discuss options with your waste contractor.
- ☀ Where space on-site is limited ask your waste contractor if they can sort your waste for recycling at their facility.

Staff / sub-contractor training

- ☀ Implement good housekeeping throughout the site to promote good waste segregation and re-use opportunities.
- ☀ Specify the materials that can be recycled / recovered on-site and how this should be done through toolbox talks. Use actual site example and photographs to demonstrate correct segregation.
- ☀ Recruit senior staff members to act as ‘recycling champions’ to check bins for appropriate segregation and promote correct recycling practices
- ☀ Labelling of components, particularly plastics, to identify the material used, will also make recycling more effective.

- ☀ Engage with staff and make the message personal to them to ensure their ‘buy in’, for example encourage them to suggest charities or schools that may need assistance.
- ☀ Instances of materials being disposed incorrectly should be highlighted to site workers and used as examples in tool box talks to eliminate future occurrences. Site photographs can help communicate non-conforming practices to site personnel in order that these can be corrected and prevented.

Storage of materials

- ☀ Keep materials for recycling clean, dry and separate from other materials or waste. For example – prevent plasterboard getting wet – it becomes acidic and difficult to recycle.

Additional considerations

- ☀ Undertake ‘soft strip’ prior to demolition to avoid contamination of the aggregates with timber, plasterboard and other unsuitable materials. Send demolition materials off site for processing into recycled aggregate.
- ☀ Crush and screen soil and stones to provide aggregate – the amount of aggregate purchased can be significantly reduced by buying a mini crusher-screener. This enables old bricks, blocks and concrete to be processed into recycled aggregate for use under new roads and paths.

Get in touch

For more details about construction support through Resource Efficient Scotland, contact the help desk on 0808 808 2268 to start saving.

For our range of tools and guides for the Scottish construction sector visit:

resourceefficientscotland.com/construction

For upcoming events visit:

resourceefficientscotland.com/events-list