Designing out Waste: Landscape opportunities

LESS WASTE, SHARPER DESIGN

Introduction
Design for Reuse and Recovery
Design for Off Site Construction
Design for Materials Optimisation
Design for Waste Efficient Procurement
Design for Deconstruction and Flexibility

forward
This guide presents a range of opportunities for Designing out Waste in landscape projects. It supplements two design team guides published by WRAP (Waste & Resources Action Programme), and should be read in conjunction with these.

- Designing out Waste: a design team guide for buildings
- Designing out Waste: a design team guide for civil engineering

These design team guides provide further information on the case for action, the principles of Designing out Waste, and a process which enables opportunities to be identified and implemented in a structured way.

These two documents, and other tools and guidance on Designing out Waste, are freely available at [www.wrap.org.uk/designingoutwaste](http://www.wrap.org.uk/designingoutwaste)

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Landscape architects have been advocates of reducing construction waste for many years and it is good that clients too now recognise the benefits. This guide to Designing out Waste clearly illustrates how design decisions can make a significant and positive difference, not only through reducing environmental impact but also by making the most of resources.

Jo Watkins, President, Landscape Institute
Designing out Waste in the construction of buildings, civil engineering and infrastructure projects, is rapidly becoming high on the sustainability agenda of the construction sector. Most projects also have many opportunities for Designing out Waste in the landscape, and with the often large quantities and high value of materials used significant cost savings and environmental benefits can be achieved.

This guide is intended primarily for landscape architects, but will also be a useful reference for all professionals who are involved in the planning, design and execution of landscape schemes.

It provides additional guidance from a landscape perspective and is intended to support greater interaction between the design team responsible for the built form and the design team responsible for the landscape context.

The Designing out Waste opportunities presented were identified by landscape architects from live projects and are therefore all proven and practical solutions for achieving waste reduction through design.
There are five key principles that design teams can use during the design process to reduce waste:
- Design for Reuse and Recovery;
- Design for Off Site Construction;
- Design for Materials Optimisation;
- Design for Waste Efficient Procurement; and
- Design for Deconstruction and Flexibility.

All opportunities for Designing out Waste fit within these five principles, and they can therefore act as useful prompts when identifying potential technical solutions to ensure that no opportunities are missed. The principles apply to all project types.

The following sections provide additional guidance on applying these principles to landscaping projects. The opportunity tables should be used as a point of reference when reviewing design opportunities.

The Design Team guides should be referred to for guidance on the three step Designing out Waste process, which ensures that opportunities are identified, investigated and implemented in a systematic way. As part of this the landscape architect should also ensure that the design solutions adopted are recorded in the project Site Waste Management Plan (SWMP)\(^1\).

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1. For guidance on SWMPs see [www.wrap.org.uk/swmp](http://www.wrap.org.uk/swmp)
Design for Reuse and Recovery

The reuse of materials from both the built form and landscape has the potential to reduce the environmental burdens resulting from construction.

In construction of the landscape, reuse may include material from the demolition of structures, recovery and reuse of materials from the existing hard landscape or recovery of materials from the soft landscape such as trees for compost and replanting.

Key questions

- Can materials from demolition of the buildings be recovered and reused in the landscape design?
- Can materials from the clearing of existing landscapes be recovered and reused in the landscape design?
- Where materials from the existing landscape are reused, can they be reused at their highest value, for example timber for walkways instead of shredding?
- Can excavation materials such as soil or rocks be reused for landscape construction or features?

Opportunity Description

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Description</th>
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</thead>
</table>
| Materials from demolition of buildings - bricks, slate, roofing tiles, concrete blocks | - Use materials as a drainage base, the fill for new landforms and mound features.  
- Reuse brick for paving, walls, features i.e. columns and paving inlays, landscape structures i.e. bin / cycle stores.  
- Reuse slate for decorative mulches, cladding / roofing of landscape structures.  
- Reuse roofing tiles for cladding / roofing of landscape structures.  
- Reuse concrete for sub base and landscape fill. |
**Design for Reuse and Recovery contd.**

<table>
<thead>
<tr>
<th>Opportunity</th>
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</table>
| Working with the existing site                        | ■ Undertake a soils audit and pre-demolition audit\(^2\) at the start of the project to identify types and quantities of potential materials for retention in-situ, reuse and recycling.  
■ Use the existing topography where possible to minimise the need for excavation. |
| Good demolition – site clearing practice              | ■ Set aside good quality and high value materials from the existing hard landscaping for reuse on site or sold for reuse.                      |
| Materials from clearing of existing hard landscaping | ■ Reuse tarmac and asphalt for landscape fill\(^3\).  
■ Reuse existing hard landscape materials (concrete paving, flagstones) for new hard landscape areas. |
| Materials from clearing of existing soft landscaping  | ■ Stockpile top soil for reuse.  
■ Produce compost from soft vegetation.                                                                                                         |
| Existing landscape elements – furniture, lighting, play equipment | ■ Reuse existing elements where appropriate.  
■ Set aside materials for sale or reuse.                                                                                                          |

\(^2\) For information on pre-demolition audits see [http://www.wrap.org.uk/construction/tools_and_guidance/regeneration.html](http://www.wrap.org.uk/construction/tools_and_guidance/regeneration.html)

\(^3\) For guidance on specifying, producing and using recycled aggregates see [www.aggregain.org.uk](http://www.aggregain.org.uk)
### Design for Reuse and Recovery contd.

<table>
<thead>
<tr>
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</table>
| Site excavation and soil remediation | - Reuse excavated rocks for drainage layers, landscape fill, planting features and play areas.  
                                           - Retain top soil and treat on site using compost or using other remediation techniques for more contaminated soils\(^4\) e.g. soil hospital.  
                                           - Manufacture top soil using excavated soil blended with quality compost for end use landscaping or sale.\(^5\) |
| Earthworks                         | - Use geosystems or vegetative reinforcement to enable steep embankment slopes without using concrete products.  
                                           - Use geosystems and hydraulically bound materials to enable the use of poor quality sub-soils in-situ.\(^6\) |
| Aggregates                         | - Use recycled aggregates or recycled glass as a replacement for natural aggregates, including decorative gravels.\(^7\) |
| Timber                             | - Reuse good quality timber for street furniture, bollards, signage and play elements.  
                                           - Reuse lower quality timber for composting, mulch or off site energy generation. |

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4. For guidance on remediation of contaminated land see [www.claire.co.uk](http://www.claire.co.uk)
5. For guidance on specifying, producing and using PAS100 quality compost in topsoil manufacture and growing media see [www.wrap.org.uk/composting](http://www.wrap.org.uk/composting)
6. For guidance on geosystems and hydraulically bound materials see [www.aggregain.org.uk/geosystems](http://www.aggregain.org.uk/geosystems)
7. For guidance on specifying, producing and using recycled aggregates see [www.aggregain.org.uk](http://www.aggregain.org.uk)

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Make the most of **Quality Compost in Landscaping and Brownfield Regeneration**

[www.wrap.org.uk/landscape](http://www.wrap.org.uk/landscape)
### Design for Reuse and Recovery contd.

<table>
<thead>
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</table>
| Packaging                            | - Specify reusable packaging for delivery of plants, hard and soft landscaping materials and request that suppliers collect packaging for reuse as part of the contract.  
- If reusable packaging isn’t available request packaging which can be reused or recycled onsite e.g. natural materials which can be used as mulch or bedding.  
- If suppliers only provide recyclable packaging, ask them to collect the packaging as part of the contract. |
| Contractors site establishment       | - Retain existing landscapes for as long as possible for the benefit of site and neighbourhood amenity.                                                                                                      |
Design for Off Site Construction

Off site construction is a well documented example of efficient construction and the benefits identified in the construction of buildings are just as applicable to construction of the landscape.

Design for Off Site Construction also reduces the amount of trades and activities taking place on site, which can reduce costs, speed up the project programme and improve health and safety.

### Key questions

- Can the hard landscape be designed with consideration to modular design?
- Can features such as timber walkways, furniture and play equipment be constructed off site?
- Can furniture, walls and retaining structures be precast / manufactured off site?

### Opportunity Description

- **Modular design**
  - Design hard landscapes with modularisation in mind e.g. timber walkways.
  - Use modular solutions for furniture and play equipment.

- **Precast solutions**
  - Design for precast manufacture of furniture, walls and retaining structures, water features, ramps and steps.

- **Volumetric**
  - Use pre-engineered or modular solutions for pathways, boardwalks and timber walkways, playgrounds and furniture.
Design for Materials Optimisation

Good practice in the context of materials optimisation means adopting a design approach that focuses on materials resource efficiency so less material is used in the design or less waste is produced in construction process without compromising the design concept.

In the landscape context materials optimisation can be achieved through the simplification and standardisation of materials specified and through dimensional coordination.

Key questions

- Can the hard landscape design, form and layout be simplified without compromising the design concept?
- Can the design of paths, walkways and other hard landscaping features be designed with reference to the specified material dimensions?
- Can the range of materials specified be simplified to encourage the reuse of off cuts during installation?

<table>
<thead>
<tr>
<th>Opportunity</th>
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</thead>
<tbody>
<tr>
<td>Design</td>
<td>Simplify landscape shape and form to suit materials.</td>
</tr>
<tr>
<td></td>
<td>Optimise layout to reduce cutting and generation of off cuts.</td>
</tr>
<tr>
<td>Standardisation and dimensional</td>
<td>Consider material dimensions when designing path widths and other hard</td>
</tr>
<tr>
<td>coordination</td>
<td>landscape features.</td>
</tr>
<tr>
<td></td>
<td>Standardise materials or reduce the number of different materials specified</td>
</tr>
<tr>
<td></td>
<td>where appropriate.</td>
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<tr>
<td>Site management</td>
<td>Discuss site management and staging in design team meetings to avoid clashes</td>
</tr>
<tr>
<td></td>
<td>/ conflicts which lead to the need for reworking and remodelling of the</td>
</tr>
<tr>
<td></td>
<td>landscape.</td>
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</tbody>
</table>

Introduction

Design for Reuse and Recovery

Design for Off Site Construction

Design for Materials Optimisation

Design for Waste Efficient Procurement

Design for Deconstruction and Flexibility

Designing out Waste: Opportunities in landscaping
Design for Waste Efficient Procurement

Designers have considerable influence on the construction process through specification, contractor scheduling, and setting contractual targets for suppliers and contractors.

For landscape designers this can include both the soft and hard landscape features and may involve the identification of cross benefits for the built form and landscape.

**Key questions**

- Has the design team identified where on site and supplier related waste arises?
- Have specialist contractors and suppliers been consulted on how to reduce waste in the supply chain?
- Have the project specifications and contracts been reviewed to select elements / materials / processes that reduce waste?

<table>
<thead>
<tr>
<th>Opportunity</th>
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</thead>
<tbody>
<tr>
<td>Supply chain</td>
<td>Discuss methods of waste minimisation with suppliers and manufacturers.</td>
</tr>
<tr>
<td></td>
<td>Discuss methods of packaging reduction and opportunities for reusable / returnable packaging with suppliers and manufacturers.</td>
</tr>
<tr>
<td></td>
<td>Use ordering procedures that avoid waste - monitor ordering to reduce over ordering and talk to suppliers and manufacturers about take back schemes for material surpluses and off cuts.</td>
</tr>
<tr>
<td>Specification</td>
<td>Specify materials which have recycled content.</td>
</tr>
<tr>
<td>Design team coordination</td>
<td>Plan the work sequence to reduce on site waste and maximise reuse of materials.</td>
</tr>
</tbody>
</table>

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8. Details of products with higher recycled content is available at [www.wrap.org.uk/recycledcontent](http://www.wrap.org.uk/recycledcontent)
**Design for Waste Efficient Procurement contd.**

<table>
<thead>
<tr>
<th>Opportunity</th>
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</thead>
<tbody>
<tr>
<td>Contractors</td>
<td>- Work with contractors from an early stage to identify methods of waste minimisation in procurement routes.</td>
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<tr>
<td></td>
<td>- Discuss methods of waste minimisation with potential subcontractors as part of the tender process.</td>
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<tr>
<td></td>
<td>- Consider setting contractual targets and providing financial incentives / penalties to reduce waste.</td>
</tr>
<tr>
<td>Logistics</td>
<td>- Specify delivery and storage practice to minimise damage on site.</td>
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<tr>
<td></td>
<td>- Use consolidation centres where available to facilitate just-in-time delivery of materials.</td>
</tr>
</tbody>
</table>

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9. Guidance and model wording to set requirements and targets in procurement documents is available at [www.wrap.org.uk/procurementrequirements](http://www.wrap.org.uk/procurementrequirements)

10. Guidance on logistics strategies and Material Logistics Planning can be found at [www.wrap.org.uk/constructionlogistics](http://www.wrap.org.uk/constructionlogistics)
**Design for Deconstruction and Flexibility**

In considering Design for Reuse and Recovery it is logical to also consider the means of future maintenance, modification and deconstruction.

The value of bespoke items in the landscape such as furniture, public art and playgrounds typically leads to reclamation and reuse but there are also opportunities to consider the fixings and mortar used to minimise damage to materials in repair and deconstruction.

Design should also consider enabling potential future changes of use to be undertaken without excessive waste being produced.

### Key questions

- Is the design adaptable during its life span?
- Can landscape elements and components be maintained, upgraded or replaced without creating waste?
- Does the design incorporate reusable / recyclable components and materials?
- Are the landscape elements easily disassembled?
- Can a building handbook or maintenance document be used to record how deconstruction and disassembly have been factored into the design?
- Have the project specifications and contracts been reviewed to select elements / materials / processes that reduce waste?

### Opportunity Description

<table>
<thead>
<tr>
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</thead>
</table>
| Design      | - Ensure that the design enables the site to be flexible and adaptable to potential (unknown) future needs.  
- Aim for a long design life, which makes best use of materials and enables a future legacy and heritage. |
## Design for Deconstruction and Flexibility contd.

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Description</th>
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<tbody>
<tr>
<td>Material</td>
<td>- Use mortar and fixings that enable easy dismantling without damage to materials.</td>
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<tr>
<td></td>
<td>- Avoid gluing and composite materials.</td>
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<tr>
<td></td>
<td>- Specify materials that can be reused.</td>
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<tr>
<td></td>
<td>- Avoid materials that cannot be easily recycled.</td>
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<tr>
<td></td>
<td>- Discuss with suppliers about the return of components for reuse or recycling.</td>
</tr>
<tr>
<td></td>
<td>- Use modular materials which can be reused or have flexibility for future modification.</td>
</tr>
<tr>
<td></td>
<td>- Use materials and components which enable ease of maintenance and repair.</td>
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</tbody>
</table>
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