Linking demolition and new build – a step by step guide

The efficient use of materials in regeneration projects

Overview (Sections 1-4)
WRAP works in partnership to encourage and enable businesses and consumers to be more efficient in their use of materials and recycle more things more often. This helps to minimise landfill, reduce carbon emissions and improve our environment.
1.0 Introduction

This guide is a resource for all parties interested in implementing requirements for the efficient use of materials in regeneration projects. It incorporates good practice:

- in demolition: through the use of the ICE Demolition Protocol and Site waste Management Plans;
- in new build construction: through WRAP’s recycled content, waste minimisation and site waste management guidance; and
- between the demolition and new build phases: through on-site reclamation and recycling of materials.

1.1 Efficient use of materials in regeneration

Regeneration projects, in the context of this guide, are those where existing buildings and infrastructure contribute materials to the new build stage.

The efficient use of materials can lead to time and cost savings, reductions in material sent to landfill and extraction of primary resources and reduce carbon emissions.

Introducing good practice in the efficient use of materials involves:

- effective design;
- efficient procurement; and
- recycling of site arisings.

Overview of materials resource efficiency in regeneration

The efficient use of materials can lead to time and cost savings and reduce carbon emissions.

Figure 3
The aim of this guide is to encourage greater resource efficiency in regeneration projects.
The guide seeks to encourage, and improve on, existing good practice minimising waste arisings.

This materials flow chart illustrates:

- **Materials from the demolition transported off-site for recycling or disposal.** The guide seeks to encourage, and improve on, existing good practice, maximising the amount of material recovered from both the demolition and new build phases, and minimising waste arisings. It draws upon the good practice set in the ICE Demolition Protocol (DP) and Site Waste Management Plans (SWMPs). Summaries of these documents are presented in Section 14, Additional resources.

- **Materials from the demolition being recycled and stockpiled on-site for use in the new build.** The guide encourages on-site recycling and stockpiling, where possible, as the most efficient use of material.

- **Recycled (and primary) materials being transported onto site for use in the new construction.** The guide encourages the use of products and materials recovered on-site from the demolition. It draws on WRAP’s Recycled Content Quick Wins (QW) resources.

**1.2 Aims**

The aim of this guide is to encourage greater resource efficiency in regeneration projects by optimising the quantity of:

- material recovered from demolition, for reclamation and recycling;
- recovered materials retained on-site for use in new build construction; and
- recycled content used in new build construction.

In order to achieve these aims the following procedures must be implemented at an early stage of the project:

- setting Key Performance Indicators to promote and monitor good practice;
- introducing minimum requirements into policy, objectives, tender invitation and contract documents;
- incorporating efficient use of materials into demolition and construction planning and new build design; and
- measurement of performance.

**Case study**

**Netherne Village, Croydon**

This 38 hectare development used 26,500 tonnes of demolition arisings and construction waste to produce Type 1 aggregate, 6F2 capping, pipe bedding and sand bedding. This saved the project approximately £148,323 in material costs.
The efficiency cycle

The efficient use of materials in regeneration projects: Overview

Figure 5
1.3 Incorporating existing good practice

The guide draws upon the ICE Demolition Protocol, Site Waste Management Plans and the WRAP Recycled Contents Quick Wins approach and integrates them into a clear and common framework.

The ICE Demolition Protocol (DP) aims to provide a link between the materials arising from demolition and their subsequent recovery into the new build project. This process requires the design team to identify the materials which can be obtained from the demolition of the existing building (by undertaking a pre-demolition audit), and the project specifiers to make a decision on how much of this material can be included and used in the new build.

Site Waste Management Plans (SWMPs) are a mechanism for recording, minimising and managing the types and quantities of waste arising from construction projects. They use a number of categories in order to help identify and segregate construction wastes. These are:

- reused on-site – including materials reclaimed from the demolition process;
- recycled for use on-site – including demolition materials processed on-site;
- reused off-site – including reclaimed materials used on other construction projects;
- recycled for use off-site – including materials processed for use on other construction sites;
- sent to a recycling facility – including materials sent to Materials Recovery Facilities (MRF) to be reclaimed or recycled;
- sent to a WML (Waste Management Licensing) exempt facility – including materials sent to WML exempt facilities as an alternative to landfill disposal; and
- disposed to landfill.

Undertaking a pre-demolition audit which utilises the SWMP categories enables the integration of the DP and SWMP approaches at the demolition phase. Introducing the pre-demolition audit in the early stages of the project allows segregation and processing of the waste to be planned, ultimately reducing the amount of waste sent to landfill and increasing the reclamation and recycling of materials.

WRAP Recycled Content Quick Wins (QW) substitute materials and products with higher recycled content for conventional building materials, without affecting performance or cost. The QW analysis is undertaken by the project designers and implemented and monitored by the construction team.

The materials identified for retention on site (reused and recycled) in the pre-demolition audit will form an integral part of the recycled content of the new-build. This enables the DP and QW to be integrated on the new build.
Incorporating the good practice outlined in this guide will deliver economic, environmental and competitive benefits.
2.0 The business case

There are powerful business drivers for introducing the efficient use of materials in regeneration. Incorporating the good practice outlined in this guide will deliver economic, environmental and competitive benefits.

The initial costs of implementation are minimal, particularly if an organisation already has procedures such as Site Waste Management Plans, the ICE Demolition Protocol or the WRAP Quick Wins approach in place. The benefits that can be achieved greatly outweigh these initial costs.

The benefits:

Clients who adopt the efficient use of materials in regeneration can:

- improve Corporate Social Responsibility;
- obtain buildings and infrastructure constructed to higher environmental standards; and
- expect financial savings.

Contractors who adopt the efficient use of materials in regeneration can achieve an advantage over their competitors through:

- potential cost savings;
- improved environmental performance; and
- added value bids.

2.1 Economic benefits

Implementation of the efficient use of materials in regeneration projects is likely to have economic benefits, including:

- lowering costs through the use of recovered demolition materials (or, at worst, cost neutral);
- avoiding waste disposal charges and Landfill Tax by recovering materials from the demolition works and effectively minimising and managing waste arisings in the construction works; and
- reducing the transport costs associated with disposal of waste and the import of primary materials, by reclaiming and recycling materials on-site.

Case study

Langley Park Homes

At Langley Park Homes, a 107 acre housing development in Kent, the contractor reclaimed roof tiles and recycled concrete demolition arisings.

Benefits:

- £480k cost savings; and
- 3.5% saving in project costs.
Adopting the principles of the guide leads to significant environmental benefits.
2.2 Environmental benefits
Adopting the principles of the guide leads to significant environmental benefits, including:

- using recovered material reduces the pressure on natural resources;
- using reclaimed and recycled materials reduces landfill; and
- retaining materials reduces carbon emissions caused by transportation and limits local noise and congestion.

At the corporate level, adopting the principles of the guide:

- demonstrates a commitment to sustainability that improves the likelihood of receiving planning approval for projects;
- reduces the organisation’s carbon footprint;
- engenders a culture of material efficiency in all project activities; and
- provides evidence of environmental policies being put into practice.

2.3 Social benefits
Introducing the recommendations of this guide can have social benefits for the local community, including:

- creating local, sustainable and skilled jobs. Providing employment encourages support from the local community;
- reducing road haulage improves congestion, road safety and air pollution in the vicinity of the site. Recycling 5,000 tonnes of materials on-site avoids 250 local lorry movements; and
- retaining existing architectural elements and materials maintains community continuity and promotes acceptance of new construction.

2.4 Policy and legislation
In addition to the Corporate Social Responsibility benefits, implementing the principles of the guide can help meet legislative and corporate policy requirements.

For example:

- Regional Spatial Strategies and Local Development Plans increasingly seek ‘the use of waste as a resource’ (Planning Policy Statement 1).
- Planning Authorities are beginning to request material resource strategies in planning applications.
- The Sustainable Buildings Task Group advocates the setting of requirements for recycled content.
- The Strategic Forum for Construction has set a target to halve construction waste to landfill by 2012.
- The Minerals Policy Statement 1 advocates ‘the use, where practicable, of alternative aggregates in preference to primary aggregates’.

Case study
Channel Tunnel Rail Link
In addition to considerable financial savings (>£1M), on-site recycling avoided approximately 8000 lorry journeys to and from the site’s central London location.
3.0 Who needs to take action?

Understanding who needs to take action, and why, is vital to implementing these guidelines.

All parties:
Developing an understanding of the guidance will assist in their early adoption, thus maximising the benefits that can be achieved.

Policy makers and planners:
Incorporating efficient use of materials into policy will embed the need for compliance thus ensuring the benefits are achieved.

Clients/Developers:
Setting project objectives and requirements at an early stage in the regeneration project to ensure resource efficiency is given due consideration in the project.

Consulting architects, engineers, designers and project planners:
Implementing the guidance to ensure the client’s objectives are met in the most efficient manner and that the benefits are realised through the supply chain. Commission a pre-demolition audit as part of the design process.

Contractors, demolition contractors:
Demonstrating an ability to respond to the planning and design requirements and implement resource efficiency in practice to gain competitive advantage.
4.0 The approach

The approach to the efficient use of materials outlined in the guide links demolition and new build phases in regeneration projects. The approach is based on a hierarchy of actions, beginning with policy makers and working through the project to final review and feedback. The chart below provides a simplified overview of the process and the actions to be taken by the various parties.

### The MRER approach

<table>
<thead>
<tr>
<th>Policy</th>
<th>Clients and other policy setters</th>
<th>Set overall policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feasibility</td>
<td>CLIENT</td>
<td>Set project policy and outline KPI targets</td>
</tr>
<tr>
<td>Outline design</td>
<td>CLIENT</td>
<td>Set project materials resource efficiency objectives</td>
</tr>
<tr>
<td></td>
<td>CONSULTANT</td>
<td>Review of outline design pre-demolition audit</td>
</tr>
<tr>
<td>Detailed design</td>
<td>CONSULTANT</td>
<td>Review of detailed design</td>
</tr>
<tr>
<td></td>
<td>CONTRACTOR</td>
<td>Set requirements in tenders and planning submission</td>
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<tr>
<td></td>
<td></td>
<td>Calculate KPI targets</td>
</tr>
<tr>
<td>Demolition</td>
<td>CONTRACTOR</td>
<td>Tender invitation and responses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assessment of feasibility of MRER objectives and KPI targets</td>
</tr>
<tr>
<td>New build</td>
<td></td>
<td>Planning of demolition to meet materials resource efficiency objectives and KPIs</td>
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<tr>
<td>Close out</td>
<td></td>
<td>Evidence of materials resource efficiency performance</td>
</tr>
</tbody>
</table>

Figure 6
The approach to the efficient use of materials outlined in the guide links demolition and new build phases in regeneration projects.
## The MRER approach

<table>
<thead>
<tr>
<th>Timeline phase</th>
<th>Efficient use of materials in regeneration</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>Use Key Performance Indicators, including the:</td>
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<tr>
<td></td>
<td>◾ Demolition Recovery Index (DRI), to optimise the performance of the demolition;</td>
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<tr>
<td></td>
<td>◾ Retained Materials (RM), to optimise the amount of recovered materials retained on-site for use in the new build; and</td>
</tr>
<tr>
<td></td>
<td>◾ Recycled (and Reclaimed) Content (RC), to optimise the incorporation of reclaimed and recycled materials into the new build.</td>
</tr>
<tr>
<td>Policy</td>
<td>Set overall materials resource efficiency policies for organisations and / or projects.</td>
</tr>
<tr>
<td>Feasibility</td>
<td>Set objectives and outline KPI requirements at the inception of individual projects.</td>
</tr>
<tr>
<td>Design</td>
<td>Incorporate materials resource efficiency in the design, including:</td>
</tr>
<tr>
<td></td>
<td>◾ Reviewing the existing building and infrastructure by:</td>
</tr>
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<td></td>
<td>◾ commissioning a pre-demolition audit;</td>
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<td></td>
<td>◾ undertaking a Quick Win (QW) assessment for the new build (which includes consideration of materials that could be provided from the demolition); and</td>
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<tr>
<td></td>
<td>◾ using the results from the review and assessment to set KPI requirements for traditional procurement or output targets for Design &amp; Build / PFI procurement.</td>
</tr>
<tr>
<td></td>
<td>This process of identifying demolition and waste arisings, and their subsequent segregation and processing possibilities, meets the requirements of the DP and SWMPs.</td>
</tr>
<tr>
<td></td>
<td>◾ Undertaking the design of the new build with consideration to minimise waste and ensure the efficient use of materials.</td>
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<tr>
<td></td>
<td>◾ In the traditional procurement route include materials resource efficiency in the tender, planning and contract documents, including the project:</td>
</tr>
<tr>
<td></td>
<td>◾ objectives; and</td>
</tr>
<tr>
<td></td>
<td>◾ KPI requirements.</td>
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<tr>
<td></td>
<td>In other routes, respond to materials resource efficiency objectives and KPIs as requested in project briefs and tender documents.</td>
</tr>
<tr>
<td>Demolition</td>
<td>Undertake the demolition to meet materials resource efficiency objectives and KPIs, including:</td>
</tr>
<tr>
<td></td>
<td>◾ planning demolition to maximise recovery of materials; and</td>
</tr>
<tr>
<td></td>
<td>◾ measuring production of materials against SWMP categories and reporting KPI results.</td>
</tr>
<tr>
<td>New build</td>
<td>Execute the new build construction to meet materials resource efficiency requirements and KPIs, including:</td>
</tr>
<tr>
<td></td>
<td>◾ recycled content analysis to determine QW;</td>
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<td></td>
<td>◾ procuring materials to achieve QW requirements;</td>
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<tr>
<td></td>
<td>◾ effective management of waste arisings, in line with SWMP requirements;</td>
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<tr>
<td></td>
<td>◾ monitoring performance; and</td>
</tr>
<tr>
<td></td>
<td>◾ reporting on the KPIs.</td>
</tr>
<tr>
<td>Close-out</td>
<td>Contribute to project close-out review of materials resource efficiency performance.</td>
</tr>
</tbody>
</table>
This is one of a series of booklets which together form WRAP’s guide: The efficient use of materials in regeneration projects. While this booklet is designed to be used separately it may refer to sections in the main guide.