

Designing out Waste on a new build hospital project

Plymouth Hospital



Image courtesy Fosters+Partners

The best opportunities to reduce materials use and waste in construction occur at the design stage. This case study describes how the design team used the Designing out Waste process developed by WRAP to identify and prioritise waste saving opportunities on a new build hospital project in Devon.

Top waste saving opportunities

- Reuse of excavated topsoil for soft landscaping.
- Pre-engineered doorsets.

Implementing these opportunities could:

- reduce total project costs by £123,076;
- reduce waste by 2,045 tonnes; and
- avoid 340 lorry movements.

Project details

Fosters+Partners is designing a new private hospital in Plymouth for Circle Health based on a unified design concept to be used for a series of similar projects across the UK. The building has three distinct functional areas (ancillary/clinical, offices/main entrance and patient accommodation).

Designing out Waste process

The project team and client worked together to apply the key principles and identify design opportunities that could be implemented in the project. They used WRAP's three-step Designing out Waste process by undertaking:

1. a facilitated workshop where all possible design changes to reduce waste were explored and prioritised in terms of their likely impact on waste reduction and ease of implementation;
2. detailed analysis of the cost, waste and carbon savings of a shortlist of preferred design changes; and
3. selection of design changes to implement in the project.

The analysis in Step 2 involved comparing the suggested design changes against the existing design to quantify savings in:

- construction cost;
- quantity of site waste;
- cost of waste disposal;
- value of materials wasted; and
- impact on number of lorry movements.

Designing out Waste principles

WRAP's design guide, *Designing out Waste: a design team guide for buildings*, sets out five key principles that design teams can apply at the project level to reduce waste:

- Design for Reuse and Recovery;
- Design for Off Site Construction;
- Design for Material Optimisation;
- Design for Waste Efficient Procurement; and
- Design for Deconstruction and Flexibility.

Application of these principles at the design stage of a construction project can result in significant savings in cost, waste and carbon.

Opportunities to reduce waste

From the list of 18 potential alternative design opportunities identified at the design review workshop, two were selected for further investigation and subjected to quantitative analysis. The Net Waste Tool provided wastage rates and bulking factors. The design team also agreed to consider the use of pre-engineered operating theatres (although insufficient cost and environmental data were available to allow detailed analysis).

Reuse of excavated soil

Instead of transporting all the excavated topsoil off site and importing fresh topsoil and compost for landscaping, some of the excavated soil could be treated and reused on site for soft landscaping. Treatment would involve mixing with compost and applying weedkiller. The reduction in total project cost would depend on how much of the excavated topsoil taken off site was sold rather than disposed of to landfill. If a third is reused and none of the rest is sold, the saving would be over £107,000 (net cost savings would increase with the more that is sold). In addition, the amount of waste would be reduced by over 2000 tonnes and there would be 340 fewer lorry movements. The latter would reduce both local nuisance impacts and carbon emissions from transportation.

Pre-engineered doorsets

The design incorporates 318 doors of two different types. The use of pre-engineered doorsets (door leaf including all ironmongery components and architraves) delivered to site on a just-in-time basis rather than the traditional method of fitting doors on site would save over £15,000 and reduce waste by just over a tonne. Other potential benefits include higher quality, less damage, reduced labour costs and less trades required on site.

Want to know more?

Full details of the Plymouth Hospital project including the results of the quantitative analysis are available in a separate technical report.

For more information on Designing out Waste and the design review process see *Designing out Waste: a design team guide for buildings*.

Both are available from the WRAP website www.wrap.org.uk/designingoutwaste WRAP's Net Waste Tool is available online at www.wrap.org.uk/nwtool

Potential savings from alternative designs for the Plymouth Hospital project

Design solution	Total project cost	Waste (tonnes)	No. of lorry movements †	Waste disposal cost	Value of materials wasted
Reuse of excavated soil (none of rest sold)	£107,310	2,044	340	£51,100	N/A
Pre-engineered doorsets	£15,766	1	0	£27	£7,244
Total	£123,076	2,045	340	£51,127	£7,244

† Based on 15 m³ lorry movements.

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