

# Designing out Waste on a major schools project

## Birmingham Schools



Image courtesy Archial Group

**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 (Waste & Resources Action Programme) to identify and prioritise waste saving opportunities on a schools project in Birmingham.**

### Top waste saving opportunities

- Recycling demolition material under sports pitches as drainage fill.
- Use of existing fencing instead of new plywood hoarding.
- Pre-engineering of caretakers' houses.

Implementing these opportunities would:

- reduce total project costs by £206,784;
- reduce waste by 7271 tonnes; and
- reduce embodied carbon by 1,004 tonnes.

### Project details

Archial Group is designing a new school for some 1500 pupils in the Aston area of Birmingham to combine the existing Holte Secondary School, Mayfield Special School and Lozells Primary School on one site. The project is part of the Birmingham Building Schools for the Future (BSF) programme.

### 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
- embodied carbon.

### 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

Four design changes were shortlisted as having a high impact on waste reduction and easy to implement. Three were analysed in further detail with the Net Waste Tool providing wastage rates and bulking factors. If adopted, the fourth (steel hoarding that could be reused on three further BSF projects) would provide further significant cost and environmental benefits.

### Recycling demolition material under sports pitches as fill

Recycling of demolition material under the sports pitches as drainage fill would eliminate the need to transport the material off site and import new material. This would reduce total project costs by over £167,000, reduce waste by 7,200 tonnes and reduce embodied carbon by almost 980 tonnes. The design change would also result in 720 fewer lorry movements, giving further reductions in carbon emissions.

### Use of existing fence, not new hoarding

In some areas the existing fence could be retained to keep the site secure without the need for temporary plywood hoarding. This would save over £37,000 in total project costs. Waste would be reduced by 60 tonnes and embodied carbon by 11 tonnes.

### Pre-engineering of caretakers' houses

Off site construction of two semi-detached houses for caretakers instead of conventional construction on site would result in a small saving in the total project costs of £2,000; both waste and embodied carbon would be reduced by 11 tonnes. Pre-engineering would have an additional benefit in that the programme for this part of the works would be shorter and thus increase flexibility on site.

### Want to know more?

Full details of the Birmingham Schools 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](http://www.wrap.org.uk/designingoutwaste) WRAP's Net Waste Tool is available online at [www.wrap.org.uk/nwtool](http://www.wrap.org.uk/nwtool)

## Potential savings from alternative designs for the Birmingham Schools project

Design solution	Total project cost	Waste (tonnes)	Embodied carbon (tonnes) *	Waste disposal cost	Value of materials wasted
Recycling of demolition material under sports pitches as fill	£167,213	7,200	977	£167,213	£67,080
Use of existing fence not hoarding	£37,539	60	16	£2,119	£31,170
Pre-engineering of caretakers' houses	£2,032	11	11	£344	£1,819
<b>Total</b>	<b>£206,784</b>	<b>7,271</b>	<b>1,004</b>	<b>£169,676</b>	<b>£100,069</b>

\* Resulting from reduced materials used and/or reduced waste created. Does not include carbon contributions from transport of materials and waste.

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