

Exemplar case study

Reducing construction waste saves money

Client: South Ayrshire Council, Barassie Primary School and Belmont Academy
Contractor: Carillion



Barassie Primary School
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South Ayrshire Council (Scotland) set out to achieve ambitious results for waste recovery and recycled content in construction through a collaborative relationship with its principal contractor, Carillion.

Together, South Ayrshire Council and Carillion improved resource efficiency by:

- defining a vision and strategy for minimising waste production and maximising reuse;
- ordering materials with higher recycled content;
- ensuring engagement between the entire supply chain;
- outlining waste commitments to segregating waste and preparing a standardised Site Waste Management Plan (SWMP) to apply to all projects; and
- performing regular onsite waste audits, to ensure waste reduction and segregation.

Savings

- Costs of waste reduced by £127, 000.
- 366 tonnes of waste diverted from landfill.

Key benefits

- significant cost savings;
- reduction in waste leaving site;
- a clean and efficient site;
- improvement in quality of procurement practices; and
- reduction in the client's carbon footprint.

Table 1: Quantified savings

Quantified saving	Barassie Primary	Belmont Academy
Disposal cost reduction (waste reduction and segregation)	£13,000	£43,000
Value of materials saved through waste reduction	£10,000	£61,000
Total quantified saving*	£23,000	£104,000

*This does not include non-quantified savings that may have been achieved from the diversion of strip-out waste from landfill, takeback schemes and reduced haulage.

Project details

The schools were procured as part of South Ayrshire Council's PPP contract for 5 new schools. South Ayrshire Council set demanding targets for waste recovery and a minimum recycled content target of 10%. Wastage rates were assessed at monthly project sustainability group meetings. Estimated construction cost for the two selected schools was £33 million. Construction started for Belmont Academy and Barassie Primary School in early 2007, and both achieved practical completion by December 2008.

Quantified benefits

When developing the brief, South Ayrshire Council set out to select a contractor with a proven record in waste management, sustainable development and an integrated supply chain to facilitate the incorporation of Recycled Content, in line with Scottish Government requirements to meet a minimum of 10% recycled content. Carillion was chosen as the principal contractor due to their focus on good practice waste management.

- **Actual waste sent to landfill of Barassie Primary School was 20 tonnes.** Standard practice waste to landfill for this project would be 84 tonnes (according to analysis using the WRAP Net Waste Tool). Therefore, diverting 64 tonnes from landfill beyond standard practice.
- **Actual waste sent to landfill of Belmont Academy was 338 tonnes.** Standard practice waste to landfill for this project would be 640 tonnes (according to analysis using the WRAP Net Waste Tool). Therefore, diverting 302 tonnes from landfill went beyond standard practice.
- **Modelled total of disposal cost savings £56,000** through waste reduction and segregation.
- **Cost of waste disposal against construction cost reduced to 0.25% for Barassie Primary School and 0.15% for Belmont Academy** (construction waste only). Standard practice (non-segregated) would be 0.47% and 0.35% respectively (based on Net Waste Tool analysis of standard practice waste arisings).
- **3.3% of recycled materials above the baseline.** South Ayrshire Council's drive to maximise the use of recycled content saw the incorporation of a further 3.3% of recycled materials.
- **Cost benefit analysis estimated potential savings of £94,500.** Using WRAP's Net Waste Tool, a cost benefit analysis was undertaken to identify savings generated (£127,000) against the cost of waste reduction (£33,500) such as training, development of the SWMP and storage of materials.

"When we segregated waste into separate skips I realised the amount of material that potentially could have been saved and utilised on site"

Fergus Shaw, Carillion Building Scotland, Project Manager

"Trust me, our subcontractors on site had a wake up call when they realised the effect excessive waste would have on their bottom line"

Alan Wilson, Carillion Building Scotland, Operations Director

Additional benefits

- Entrenchment of waste management processes within the supply chain.
- Empowered supply chain decision making, whilst maintaining a rigorous waste audit reporting system.
- Developed an ongoing takeback scheme with plasterboard manufacturer to reduce waste.
- Increased community engagement and closer links with WRAP.
- South Ayrshire Council's policy on waste and sustainability formed an essential component during the contractors' pre-qualification and bidding processes ensuring waste management as a core focus for both projects.
- Enforced project team feedback through Technical Requests sheets and Authoritative Requirements created a communication channel through the supply chain to improve efficiency of waste management on site.



Belmont Academy after construction
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Lessons learned

South Ayrshire Council plans to continue its current practices and implement the following initiatives to improve future performance:

- **Adopt good practice in waste reduction and recovering using WRAP guidance and tools** – At the outset of the project South Ayrshire Council familiarised itself with the Recycled Content Toolkit, now the Net Waste Tool. In future all key stakeholders, most notably architects, will use WRAP's tools and guidance, specifically the Designing Out Waste guide to reach good practice.

- **Setting Key Performance Indicators (KPI's)** – By setting out KPI's at the start of the project South Ayrshire Council was able to challenge Carillion's capabilities, and furthermore specify targets for waste and recycled content throughout the project timeline. A good example was the review of elimination of packaging, take back schemes and providing proof of materials recovery facility (MRF) recovery figures.

- **Agree Waste Streams** – It was vital to achieve early agreement of reporting waste stream figures between the client, contractor and waste contractor. It was agreed waste streams were to be split as per WRAP's Net Waste Tool and weighed in tonnes.

- **Regular Waste Audits** – Undertake site audits of waste reports, to assess contractor against their ongoing KPI's.

- **Motivate the Supply Chain** – An integral part of any project in the future will be the contractors' responsibility to motivate the supply chain by cascading the aims of South Ayrshire Council's vision and strategy. The contractor will also be responsible for assessing each subcontractor against waste performance targets.

- **Sustainability Forum for Community Planning Partnership** – Allowed feedback to be given and raise awareness of good practice. In May 2008 Carillion provided a presentation to community members highlighting the benefits of working with WRAP on reducing waste.

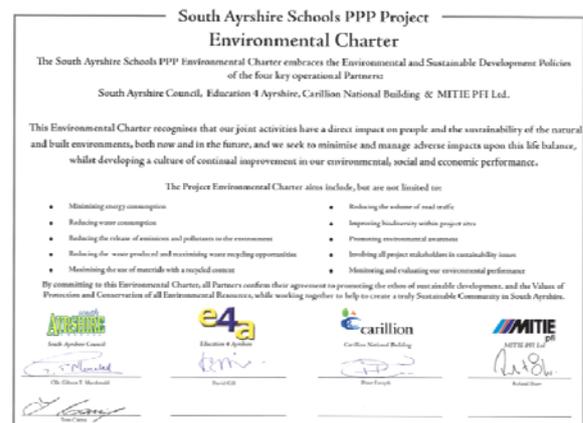
- **Community plan** – Reducing construction waste will be central to South Ayrshire Council's sustainability commitment due to increased cost burden of landfill tax.

- **Waste Operative** – Carillion maintained a continuously clean site by employing a site operative charged with responsibility of directing site workers to the appropriate bins and to ensure each site was well maintained and clear of clutter.

Environmental Charter for the Supply Chain

At the outset of the project, South Ayrshire Council prepared the South Ayrshire Schools PPP Project Environmental Charter. The Charter embraced the following important factors relating to waste:

- minimising waste produced and maximising waste recycling opportunities; and
- maximising the use of materials with recycled content.



South Ayrshire Council School's Environmental Charter

Table 2: Waste Sent to Landfill (W2L) Benchmarks

WRAP Waste generation benchmarks	Barassie W2L	Belmont W2L
Baseline Practice	84 T	640 T
Good Practice	22 T	160 T
Achieved	20 T	338 T

Benchmarks calculated from project material quantities using WRAP's Net Waste Tool

Table 3: Waste recovery

WRAP Waste generation benchmarks *	Barassie	Belmont
Total actual Waste to Landfill (A)	20 T	338 T
Total estimated Waste Arisings (B)	102 T	1,009 T
Waste Recovered (B-A = C)	82 T	671 T
Waste Recovered (C/B)*100	80%	67%



Belmont Academy
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Design stage - waste prevention

The Charter and Sustainable Action Plan were set out as the framework for all parties within the supply chain to adhere to. These were demonstrated especially during the design stage in the following examples:

Value engineering workshops

South Ayrshire Council supported and encouraged every opportunity where resource efficiency could be maximised. Carillion used value engineering workshops as an enabler to increase resource efficiency. A good example of this was designing-out 50mm of the ground floor slab without compromising its overall tensile strength. This exercise led to a saving of roughly £30,500 and 43 tonnes of concrete at Belmont Academy.

Community engagement

In order to meet expectations and to reduce likely variations later on in the construction phase, South Ayrshire Council staged regular engagement sessions with local stakeholders.

Recycled content

South Ayrshire Council set a minimum 10% target recycled content by value for all projects. Carillion used the WRAP Net Waste Tool to identify the best opportunities to increase levels of recycled content.

By targeting and achieving a higher percentage of recycled content, South Ayrshire Council used a significant amount of additional recycled materials above average practice.

Barassie Primary School achieved 13.2% recycled content against a standard baseline 11.7% and good practice at 13.3%.

Belmont Academy achieved 18.4% recycled content against a standard baseline 14.5% and good practice at 19.1%.

Construction stage - waste reduction

Waste segregation

Carillion played an integral part in setting out the site waste segregation strategy. Each site was provided with an assistant in charge of maintaining overall cleanliness of the site and to coordinate various wastes to the correct bins. Carillion also allocated 'Waste Champions' within their in-house subcontractor teams.

Take back schemes

Another significant step in reducing overall waste sent to landfill was through Carillion successfully negotiating a waste return agreement with the plasterboard manufacturer.

Benefit of multiple projects

During the procurement of Belmont Academy and Barassie Primary School, Carillion were also in the process of constructing three other schools simultaneously under the PPP contract. This enabled South Ayrshire Council to compare waste stream audit information against each project. Each project was then assessed based on its size and the type of build, which enabled better informed decision making. A particular example was the re-use of excavated soils used as fill material elsewhere. Efficiencies were also achieved by developing a one size fits all Site Waste Management Plan for each of the PPP schools projects.

carillion Carillion Building

CONSTRUCTION CONFEDERATION

SEGREGATION OF WASTE

WHAT?
Segregating wastes into hazardous, non-hazardous and inert waste types for disposal can help minimise costs and maximise the opportunities for recovery and recycling of wastes. Look out on waste containers for these standard signs, which are being introduced across the UK to encourage and improve the segregation of waste.

WHY?

- Avoid prosecution:** It is illegal to mix hazardous waste with other waste types which are to be sent directly to landfill. You could be fined up to £20,000 and imprisoned for up to 2 years.
- Avoid environmental harm:** Incorrectly disposing of hazardous waste could cause water pollution and damage habitats. Landfills and waste treatment centres are specially designed to be able to handle specific wastes without causing environmental harm.
- Reduce Costs:** Segregating wastes can minimise landfill tax and can also allow certain types of waste to be recycled and reused on site.

DO

- Look out for the standard signs shown here and whenever possible segregate wastes into the different types
- Use enclosed or covered skips
- Ask your line manager for advice if you are unsure about correct waste segregation on site

DON'T

- DON'T overfill skips
- DON'T mix different types of waste
- DON'T put liquids and flammable wastes into skips

Legend:

- Wood
- Metal
- Inert
- Mixed
- Hazardous
- Packaging (Plastic • Cardboard • Timber)
- Gypsum

With thanks to members of the CC Environmental Forum

ISSUE 1

Example of a Carillion poster

Cost Benefit Analysis (modelled figures)

Following completion of the schools, WRAP undertook a Cost Benefit Analysis (CBA) using the Net Waste Tool, to estimate the savings from waste reduction. The CBA calculated the project's waste arisings at baseline (typical practice) and compared this with the actual waste data. The difference between the two is the saving. What became clear was efficiencies were discovered in the cost of developing Site Waste Management Plans, agreeing site logistics with sub contractors and when delivering training to project members.

The estimated cost of achieving waste savings for both schools was £33,500.

Table 4: Waste Savings and Costs

(A) Waste savings achievable	£127,000
(B) Costs to achieve savings	£33,500
(A-B) Net benefit	£94,500
Net Benefit is equivalent to 0.31% of total construction value	

Conclusion

South Ayrshire Council is committed to waste reduction and working with contractors and developers to do so, as is evident from the production of the internal sustainable design guide and the proposed supplementary planning guidance.

WRAP would like to thank South Ayrshire Council and Carillion for providing time and data, and assisting in the production of this case study.

For more information, visit the procurement pages on our web site at www.wrap.org.uk/construction.

You can access:

- a range of other exemplar and cost benefit case studies;
- information on procurement guidance and model wording;
- information on products which contain higher recycled content;
- the Net Waste Tool and Designing out Waste tools (free online tools for quantifying waste arisings on construction projects);
- WRAP's Site Waste Management Plan Template; and
- guidance on designing out waste.

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