Working together for a world without waste

Exemplar case study

Fife Council finds savings through refurbishment

Cardenden Primary School, Lochgelly, was a £3.5 million refurbishment project completed in August 2010.

Fife Council diverted 98% of the waste arising from landfill, and saved on waste disposal and material purchase costs through choosing refurbishment over complete demolition.

These savings were achieved by:

- retaining and refurbishing large sections of the school;
- reusing aggregate materials on site where possible;
- segregating waste on site to reduce uplift costs;
- making sure materials taken off-site to the depot were recycled; and
- providing training to the project team.

Not only did the refurbishment allow the opportunity to significantly improve the facilities for school staff and pupils, it also achieved:

- greater awareness of the benefits of reducing waste;
- a three month reduction in project timescales; and
- retention of a greater building footprint for the pupils and staff.

"Refurbishing the school has allowed us to significantly improve the facilities whilst identifying cost and waste savings".

Steve Anderson, Contracts Manager, Building Services, Fife Council

Refurbishment resulted in savings of £134,480 (40% of the construction value).

Additional savings were achieved by implementing an effective Site Waste Management Plan and improving segregation on site.

Table 1: Cost savings through reuse

	Saving
Net cost savings from refurbishment	£67,780
Disposal cost reduction	£66,700
Total saving	**£134,480**

Tender requirements

Fife Council is a signatory to the Halving Waste to Landfill Commitment. Fife Council worked with all departments within the Local Authority to deliver on the commitment by incorporating requirements into procurement and setting targets for waste.

Fife Council placed requirements on its own direct labour force as well as the subcontractors involved in the project, including to:

- maximise the segregation of waste on site;
- demonstrate that waste to landfill had been halved; and
- procure timber from sustainable sources.

Design stage – waste prevention

The school was closed unexpectedly due to structural problems in October 2008. Fife Council Building Services and Property Services joined forces and were awarded main contractor status for the project. A design team was set up to assess the options available for the school. The decision was made to demolish the existing two storey block (which was the main area of structural concern) and refurbish and extend the single storey block. Refurbishment also allowed energy efficiency to be greatly improved and included underfloor heating, high levels of insulation and a rainwater harvesting system that is used to flush WCs.

Several design decisions were taken to prevent waste:

- the decision to refurbish the school rather than rebuild;
- use of a timber-framed structure for the extension;
- retention of the existing roof with the addition of insulation and waterproofing;
- retention of plant room and retrofitting of solar thermal systems;
- restoring existing dining, stage and gym halls; and
- reuse of 452m^3 crushed aggregate on site as infill from the demolition of the two storey building.

Construction stage – waste reduction and recovery

Careful waste planning

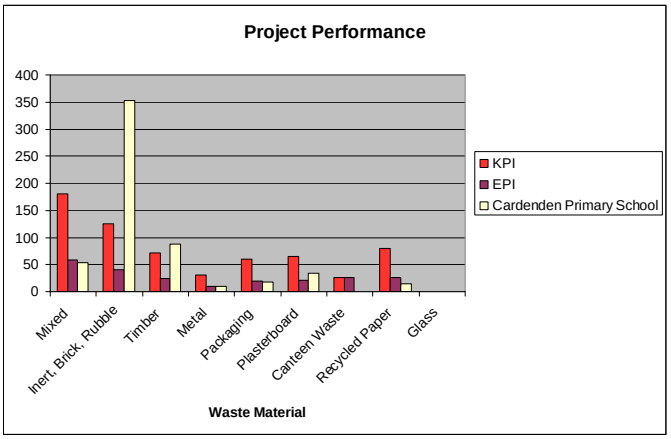
As part of this project, Fife Council trialled the use of a new Site Waste Management Plan (SWMP) making use of Building Research Establishment Key Performance Indicators (KPIs) and Environmental Performance Indicators (EPIs) to assess effectiveness on site.

The SWMP identified expected wastes and volumes, and ensured that appropriate facilities and contractors were in place. Waste planning included:

- developing a segregation strategy for the site;
- maximising the use of Environmental Services as the waste management provider to segregate waste on site and at the depots;
- ensuring the correct skips were in place on site when needed (e.g. wood, plastic, plasterboard);
- appointing a Waste Champion at the start of the project to monitor wastage; and
- making use of an early warning system within the SWMP to highlight areas where unexpected levels of waste may arise.

The KPIs were based on the volume of waste per £100,000 project value whereas the EPIs were based on the volume of waste per 100m^2 gross floor area using a new build education project. Whilst the refurbishment element of this project generated higher levels of inert and timber waste than would be expected of a new build project this data provided tangible benchmarks for the team. This encouraged consistency in segregation throughout the project and contributed to the cost savings that were achieved.

Graph 1: KPIs & EPIs for Cardenden Primary School



In addition, specific requirements were included for materials procurement for the site, such as:

- providing control samples for windows and ironmongery;
- just in time deliveries;
- sustainably sourced timber; and
- using local suppliers.

Ensuring good practice on site

Fife Council Building Services undertook an intensive programme of training for site managers and agents. This provided staff with an understanding of best practice Site Waste Management Planning and requirements for implementation on site. Waste procedures were communicated during site induction and additional tool box talks provided by the site manager to site workers.

Daily checks were made by the site agent as well as regular inspections from the sustainability co-ordinator for building services. This ensured that high levels of housekeeping were maintained with clearly allocated areas for material storage and waste management.

The team paid special attention to the waste generated, ensuring that all the waste contractors provided accurate data on a regular basis and this corresponded with that recorded on site. The site agent was regularly informed through the SWMP.

This was particularly important as a number of different waste contractors were used. Prior to the project a number of the waste contractor facilities were visited to enable a better understanding of how the waste streams were managed offsite. This enabled the team to closely monitor waste on site and also maximise the levels of recycling that took place.

Waste and cost savings

The refurbishment achieved excellent savings on both waste and cost.

Diversion from landfill

All aggregate material was either reused onsite or removed offsite for reuse. The remainder of the waste was segregated onsite as either mixed waste, timber, metal, plasterboard, plastic or paper/cardboard packaging. Mixed waste was removed offsite and segregated at a Materials Recycling Facility. As a result, 923 tonnes of waste were diverted from landfill through the waste strategies implemented.

Materials cost savings

The cost savings from reusing and refurbishing existing elements were estimated by comparing the project's Bill of Quantities to that for a 'notional' project using new materials. Savings were calculated based on the difference between the cost for new components and the actual cost for re-use of the existing components.

Table 2: Key construction cost savings

Key actions	Cost of new (£)	Cost of reuse (£)	Savings (£)
Remedial works to existing shell	80,240	55,200	**28,040**
Restoration of floors	46,200	13,398	**18,640**
Retention of plant room	10,000	0	**10,000**
Refurbishment of roof	111,240	100,138	**11,102**

Other savings were calculated using WRAP's Net Waste Tool to determine the disposal costs which would have been incurred if the material was not reused on site.

Disposal cost savings

Table 3: Major disposal cost savings

	Disposal cost if sent to landfill
Crushed material removed from site	£37,410
Crushed material remaining on site	£21,328
Subsoil	£34,706
Other segregated waste streams (timber, metal, plasterboard, paper)	£8,558
Total (minus implementation costs)	**£66,706**

Lessons learnt

The refurbishment of Cardenden Primary School was an exemplar project for Fife Council. A number of key lessons were learnt from the works.

Decision making at the design stage

The formation of a design team, including Education, Property, Building Services and the architect was fundamental to the decisions reached to prevent waste and increase reuse and recovery.

Negotiate rates with the waste management contractors

The waste champion (Procurement Officer, Building Services) negotiated the rates for waste collection and maximised the levels of segregation. This forward planning helped to reduce disposal costs.

Raise awareness

Making the design team and site team aware of the requirements for the reuse, recovery and recycling of waste significantly improved buy-in and an understanding of the project requirements.

Monitor waste arising closely

Through the utilisation of a closely monitored SWMP, the waste quantities, costs and percentage of recycling could be assessed regularly. The SWMP also allowed Fife Council to demonstrate the successes of the savings achieved as the project progressed. They intend to rollout a simplified version of SWMP template to other construction projects in the future.

Acknowledgements

WRAP would like to thank Fife Council 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;
- procurement guidance and model wording;
- 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.

Waste & Resources Action Programme
The Old Academy
21 Horse Fair
Banbury, Oxon
OX16 0AH
Tel: 01295 819 900
Fax: 01295 819 911
E-mail: info@wrap.org.uk
Helpline freephone
0808 100 2040