Marks & Spencer Sustainable Learning store

The Cheshire Oaks project team have developed an End of Life Plan to record how the building could be deconstructed and the potential uses for the dismantled materials.

Business benefits

- Zero waste to landfill from construction waste.
- The Glulam beam roof design enabled the need for an additional suspended ceiling to be avoided.
- Lime stabilising ground below the car park helped to reduce the concrete in the foundations by 25%.
- BREEAM 2006 Excellent achieved.

Project background

Since 2007 Marks & Spencer (M&S) has operated its Plan A programme which aims to make M&S the most sustainable retailer in the world. Plan A includes twenty one sustainability principles in relation to property. Cheshire Oaks is the third 'Sustainable Learning' store to be opened by M&S. With 145,000 sqft of retail selling space it is also their second largest store.

The predicted operational carbon footprint for Cheshire Oaks is 35% less than an M&S baseline store[1].

- The building is partly sunk into the ground with earth mounding around the perimeter. This increases the thermal mass of the walls and helps to keep stable temperatures in the store.
- Incoming fresh air is tempered through earth tubes before entering the building, and served through displacement columns. Warm air is retrieved at high level and recovered.
- A biomass boiler provides low carbon heat.
- Electric car charging points are provided.

Project details

Location	Ellesmere Port, UK
Client	Marks & Spencer
Contractor	Simons Group

M&S Cheshire Oaks **Photos courtesy of Simons Group**

Designing for deconstruction and flexibility

Each part of Cheshire Oaks was carefully designed in-line with the M&S Sustainable Construction Manual and the lessons learned from previous M&S Sustainable Learning stores. The Guide draws upon WRAP's Designing out Waste principles and highlights priority on materials that can easily be disassembled and reused. Measures adopted at Cheshire Oaks include:

- M&S have obtained whole life cost information from two independent consultants to ensure low replacement cost and carbon decisions were included in the design;
- off-site manufacture and assembly;
- exposed beam ceiling held together with large bolts that can be easily deconstructed;
- Hemclad® external wall panels, a modular wall system that can be disassembled;
- Fermacell board (100% Recycled content) for the interior wall lining; and
- An end of life plan (disassembly and recycling guide), which includes the quantities of each "resource" element and instructions on how to reuse, resell or recycle each element.

[1] *baseline store for operational performance is M&S Westfield*

Internal joinery

Materials quantity

- WRAP's principles of 'Designing out Waste' were adopted and design workshops were held.
- The Glulam beam roof design enabled the need for an additional suspended ceiling to be avoided.
- The use of precast Hemcrete ® wall panels helped reduce construction waste.
- Lime stabilising ground below the car park helped to reduce the quantity of concrete required in the foundations by 25%.

Materials wastage

- Zero construction waste was sent to landfill.
- Precast hemcrete with hemp batts was used rather than in situ. This method eliminated 10% wastage on site and saved programme time.
- Surplus materials were provided to the local community. For example, plywood and carcassing was collected by local charities and community groups and pipework was donated to a local rabbit sanctuary.
- 54,000 tonnes of quality soils and clay from the initial bulk excavation works were reused locally.

Recycled content

- High grade aggregates: 60%
- Pulverised Fuel Ash (PFA) cement replacement: 30% PFA in more than 70% of all insitu concrete
- Aluminium in the roof: 100%
- Drylining boards (Fermacell): 100%

Embodied carbon

M&S appointed a carbon manager who undertook a carbon footprint assessment using a 'cradle to grave' approach that considered the design, construction, in use and post use lifecycle stages. The study concluded the cradle to grave footprint of the store has lower embodied carbon than an equivalent peer store when carbon sequestration provided by the timber used in construction is included in the calculation.

Solutions that reduce the embodied carbon include:

- Glulam timber uses a fifth of the energy used in typical steel manufacturing and a tenth of that used in concrete.
- The use of glulam beams removed the need of a suspended ceiling.
- Hemclad®, hemp fibre external wall panels, provide a saving of 360 tonnes of embodied carbon in the construction of the walls.

Water use

- An 80,000 litre rainwater harvesting system is installed which is predicted to reduce mains water usage by up to 30%.

Embodied water

- A water rate of 1.84m^3/£100k was achieved and the project was part of the WRAP water case study.
- Water efficient taps and toilets were fitted in construction site cabins.
- Around 60,000 litres of site harvested rain and ground water was used for wheel washing and damping down, saving 4% of mains water use.

End of life potential

- Exposed beam ceiling which is held together by large bolts that can be easily deconstructed.
- Use of almost 8000m^2 of built up roof system which allows metal and insulation materials be separated and recycled at their end of life.
- Current recycling results from other sites and demolition projects were used to review which products are difficult or costly to recycle and the use of these was avoided.

Resource scarcity & security

- The timber used in Glulam beams for the roof structure, first floor secondary beams and the first floor structural decking were all 100% FSC® certified products with Full Chain of Custody Certification for the project (TT-PRO-003615:2012) obtained under license by Simons Construction (FSC C106846).

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

www.wrap.org.uk/construction

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