UK-GBC ON-SITE LEARNING CASE STUDY - THE LIVING PLANET CENTRE, WWF

In November 2014, the UK Green Building Council (UK-GBC) invited a group of our members on our first On-site Learning Tour at the new WWF Headquarters, The Living Planet Centre. The purpose of the tour was to understand how the building was designed, constructed and operated, how the client’s objectives were met, the collaborations and innovations that occurred, and the lessons learnt.

PROJECT HIGHLIGHTS

- BREEAM Bespoke 2008: Outstanding achieved.
- 42% reduction in whole life carbon (using the BCO benchmark for a Central London office building) to 1,884 kgCO$_2$/m$^2$.
- Operational energy performance is below the BBP’s “Good Practice” levels.
- 99% of construction waste diverted from landfill.
- 100% of construction timber is FSC Certified with Chain of Custody.
- 95% of the building certified to BES6001 for Major Building Elements (excluding timber).
- 0% office waste to landfill. 70% of office waste recycled.
- 56% of staff are now using public transport compared to 21% before the move.
- Post occupancy survey results show that there is an increase in staff wellbeing & satisfaction.

PROJECT TEAM DETAILS

Client/Occupier: WWF
Architect: Hopkins Architects
Principal Contractor: Willmott Dixon
MEP Engineering: Atelier Ten
Structural Design: Expedition Engineering
Carbon Consultant: Sturgis Carbon Profiling
Facilities Management: Bouygues FM

*Use the hyperlinks to find out more about topics and resources through the Pinpoint platform*
The Living Planet Centre, WWF’s new UK head office located in Woking, Surrey, is an exemplar building for sustainable new build offices and demonstrates how far-reaching sustainability objectives set by the client act as drivers for the whole project team and beyond to engage and collaborate from a very early starting point.

WWF is the world’s leading independent conservation organisation which campaigns to conserve wildlife and habitats but also encompasses the wider implications of man’s activities on the environment.

In 2008, WWF concluded that Panda House, the 30,000 square feet headquarters in Godalming which it occupied for the last ten years, was unsuited to cope with the staffing needs of the organisation as well as being a poor example of a sustainable building. The office lease would expire in November 2013 which made a relocation probable, there were overheating problems in summer and no opportunities to showcase WWF work to the public, meaning the building no longer met wider organisational needs. Once the decision to relocate was made, funding for the new building came from a £5 million lead gift from the Rufford Foundation and the remainder was raised from a capital appeal with donations ring-fenced specifically for a new head office so as not to divert funds from WWF’s conservation work. The most optimal site was located in Woking, 15.5 km from Godalming.
WWF, as the client, set ambitious targets for its new HQ. WWF wanted an exceptional exemplar office that reflected its aims for a sustainable world and would form part of an ongoing public engagement strategy.

THE DRIVERS
WWF set out a clear vision, which included the following drivers. The drivers were influenced at multiple points in the building lifecycle stages by the whole project team:

1. BREEAM Outstanding (Design and In Use)
2. Towards Zero Carbon
3. Towards Zero Waste
4. Sustainable use of resources
5. Sustainable water management
6. Enhanced biodiversity
7. Promote health and wellbeing
8. Engage the local community to help inspire change

1. BREEAM Outstanding

WWF targeted BREEAM Outstanding which influenced the amount of collaboration throughout the project. The project attained a BREEAM Bespoke 2008: Outstanding, rated at 90.6%. BREEAM In Use: Outstanding is still being targeted and requires a performance gap analysis of the building.

2. Towards Zero Carbon

Eliminating carbon through passive design
Natural ventilation was used as much as possible with heating and cooling strategies connected to earth ducts under the car park which heat the air in winter and cool in summer. Additionally, an innovative product called Energain, manufactured from recycled aluminium and wax, was installed in the roof. This was a lightweight product but thermally heavy which is activated between 18-26C and “soaks up” excess heat in peak summer. A shading strategy was implemented using the surrounding trees and the brise soleil on the façade to reduce solar gain but maximise the glazing. Internal automated blinds are also used.

Daylighting was an important factor in the building for health and wellbeing reasons but increased the amount of glazing. The daylighting target was to achieve 300 lux at desks to allow normal activities without artificial light. Additional desk lamps increase the lux levels to 500. Office lighting is provided with fluorescent and LED lights set on motion sensors to save energy.

Energy efficiency in construction
At the construction stage, early connection to the grid was obtained to avoid use of on-site generators and to be able to use LED task lighting. Highly efficient site accommodation “eco-cabins” on a 24/7 timer switched off non-essential parts of the cabins outside of work hours. A 30 minute monitoring system of site energy and water was used allowing the contractor to review energy use and ensure that any peaks or outliers were explained and dealt with efficiently. Finally, off-site manufacture was undertaken wherever possible in particular the main fabric of the diagrid roof which produced almost no waste.

Energy efficiency during occupancy
Since the building has been occupied WWF is continuing to work with Bouygues to minimise energy.
consumption whilst maintaining a comfortable working environment. An Energy Management Plan, required to maintain BREEAM Outstanding certification, will highlight the initiatives taken to reach the energy target.

At the design stage, the predicted energy consumption was 26.7 kWh/m²/yr for heating, cooling, lighting and hot water plus 48.17 kWh/m²/yr for small power i.e. appliances, giving an energy target of 74.87 kWh/m²/yr. Energy and occupancy data from the first year is used to generate a base line and then benchmarked against the Better Building Partnership’s Real Estate Environmental Benchmark. Results show that the kWh consumption is below both the typical practice and the good practice BBP benchmarks. WWF has also set up an internal environmental performance working group to reduce their operational energy targets.

![Monthly Consumption Analysis against Better Building Partnership](image)

Living Planet Centre energy consumption

A seasonal commissioning pattern is also being developed. Spring and autumn months will use predominantly natural ventilation whereas summer and winter months will rely on the air handling units and the ground source heat pumps. Winter average energy consumption (October–March) is 11.03 kWh/m² and summer average (May–September) is 8.08 kWh/m².

The building management system (BMS) initially posed a problem and it took longer than expected to get the sub-metering to record on the BMS. Now fully functioning, it allows a mixed method of BMS and user control with a traffic light system on the perimeter windows indicating when users can open or close them and when they are controlled by the BMS.

**Renewable energy generation**

The building is 100% electric, approximately 20-30% of which is supplied by 410 Photo Voltaic (PV) panels and the remainder by the Thamesway Combined Heat and Power (CHP) plant. The PV will supply the building with sufficient energy to run at an unoccupied rate and any unused energy generated when the building is empty, i.e. at weekends, is to be resold to Thamesway at an agreed rate.

**Embodied carbon**

Sturgis Carbon Profiling made whole life carbon calculations at the scheme design stage based on CEN/TC350 methodology, covering the scope of Product Stage and Construction Stage and a baseline target of 1,884 kgCO₂e/m² was set. This is a 42% reduction from the BCO benchmark for a Central London office building and equivalent to 5,400 tonnes of CO₂e. The post-tender whole life carbon budget for the project was then reduced to 1,259 kgCO₂e/m².

Sturgis Carbon Profiling analysed the embodied carbon of all the materials used in the design and construction process, from cradle to gate plus transport to site, site emissions, as well as the operating emissions over a 60 year building lifespan. 271
building elements were assessed which totalled 931 tonnes of carbon (9%) for the whole project.

Decisions that impacted the embodied carbon included the durability of building elements due to the carbon cost of removing an element with only a 10 year lifespan and replacing it several times within the 60 years. The arched timber diagrid roof avoided a carbon intensive steel and concrete frame. Triple glazing was considered but the operational carbon savings over 60 years were insufficient to offset the embodied carbon it added. Void formers within the concrete slab could have reduced the embodied carbon further, however they were deemed too experimental for the structure. Following the initial carbon calculations, Willmott Dixon then made further improvements at the detailed design stage to below the 1,884 kgCO₂e/m² target.

3. Towards Zero Waste

Numerous sessions were carried out over the design phase with the Waste Resources Action Programme (WRAP) to reduce waste through good design. Where possible Willmott Dixon worked with subcontractors to alter the design in order to maximise the reduction of waste.

During construction, 99% of construction waste was diverted from landfill with a focus on reuse and recycling, take back schemes and a focus on reducing packaging. The remaining 1% constituted hazardous waste and was treated with the CL:AIRE process for contaminated land. Incentives were agreed with subcontractors not to just divert from landfill but to minimise the total amount of waste created. Skip targets for sub-contractors were set and if less skips were filled then economic incentives were rewarded to the subcontractors. Additionally, the use of off-site construction of many elements such as the roof maximising the efficient use of materials and minimising waste.

At occupancy, WWF has an operational waste strategy targeting zero waste to landfill. Waste that cannot be recycled or composted is sent to the Ardley Energy from Waste site. In one year, a sole incident of unrecyclable waste has occurred with demonstration animal skins which required a specific disposal process. Compost waste from the building produces biogas to generate electricity and residual waste is used as fertiliser. There is a digital workplace strategy in place to avoid paper consumption and storage space. Office generated waste is separated into compostable/recyclables/non recyclables and is monitored and measured through monthly collections. Recycled waste rates are high at 70%, which is approximately the same levels as achieved at Panda House.

A unique design feature of the building is that design for deconstruction principles have been implemented, with materials selected for their environmental properties in construction and deconstruction. The building can be taken down to a fully functioning concrete frame at the end of its 60 year lifespan and the deconstructed materials can be reused or recycled.

4. Sustainable Water Management

The Environment Agency used the development opportunity to improve the drainage flow rate requirement of the site back to greenfield site standards. To meet this, the site has innovative shallow attenuation tanks around the perimeter and sustainable urban drainage features. Excess rainwater from the roof is eventually fed into the wetlands at the building perimeter and then into Basingstoke Canal during periods of excessive rainfall. Sedum roofs are also installed on the bike sheds, external lift and bin storage. Rainwater was also harvested from site cabins at the build stage for general site maintenance. Grey water recycling, topped up with processed rainwater is used for flushing toilets and rainwater harvesting is used for irrigation. Dual flush toilets, water efficient hand basin mixers, zip taps and showers with timers and infrared sensors all help to achieve reductions over standard. Sub-metering at the kitchen points was also installed.

The water consumption of the building is now being monitored and current water consumption is broken down as:
- Mains – 194.25 m³/month
- Rainwater – 24.33 m³/month
- Greywater – 5.92 m³/month

Mains water consumption is predicted to decrease in Year 2 when initial problems with the drainage system have been resolved.
5. Sustainable use of resources

"Procuring with a preference" was the project’s mantra. Materials were rigorously investigated prior to tender and selected in accordance with strict performance criteria such as maximised carbon reductions, responsible sourcing and maximised recycled content. Willmott Dixon then had to fulfil or improve these specifications. Drivers such as BREEAM and the client’s objectives on Volatile Organic Compounds (VOCs) created further preferences. Take back schemes for some materials were also implemented.

100% of the timber used on the project, both temporary and permanent, throughout the entire building structure, has full Forest Stewardship Council (FSC) certification including full Chain of Custody. Issues arose from what the UK marketplace could achieve. Full FSC certification was not possible at the time using UK timber and so most of it came from Germany where the market is more prepared. Achieving 100% FSC Certification with full chain of custody means that all subcontractors must also be working in an FSC compliant environment including the joinery factories. To achieve this, the car park space was temporarily turned into a joinery factory and much of the timber was cut and assembled on site. The project almost risked losing 100% FSC Certification due to a screed board which was chosen for a low embodied carbon factor however it did not disclose that it contained 9% recycled cellulose. A full risk assessment was drawn up and then the elements were tracked down to prove it came from post-consumer reclaimed sources. An 80 page document was submitted to the FSC to achieve the final certification.

All concrete suppliers underwent a selection procedure with an assessment against a stringent specification:

- NSCS4 (National Structural Concrete Specification) Class 8.6.1.4 fair faced finish concrete
- 50% GGBS (Ground Granulated Blast Furnace Slag) replacement
- Recycled secondary aggregate
- Recycled aggregate sourced from within 30 km
- Large amount of availability content
- Responsibly sourced
- Affordable

The selection process meant that only one supplier could comply with all criteria.

Other procurement specifications were a 100% recycled content specification in aluminium and recycled content in steel reinforcing. As a result of the above, the project achieved BES6001 for the Major Building Elements certification (excluding timber) for 95% of the building and BRE Certification for Responsible Sourced Major Elements for 98.9% of the building. The remaining elements (3.8%) were certified under ISO 14001 for Major Building Elements (excluding timber).

At occupancy stage, WWF have continued to procure with a preference. The suite of furniture is assessed as coming from credibly certified forest sources with some items also certified to FSC standards with Chain of Custody. The carpet is 100% recycled nylon from industrial waste and sourced from Interface. Reused and recycled products were also used such as refurbished ICT equipment originally used at the London 2012 Olympic Games. The WWF Procurement policy includes sustainable sourcing of office material such as FSC paper/timber and EU label cleaning products.
6. Enhanced Biodiversity

WWF are keenly aware of the importance of biodiversity but had also taken note of UKGBC’s 2009 Task Group report. The site included local green spaces namely the Basingstoke Canal on one side of the building and Horsell Common, a site of special scientific interest (SSSI) on the other. Before work commenced on-site, ecological reports on the moor and woodland nearby were carried out as there were concerns about the existing bat population and the importance of the feeding route. This was addressed by installation of sympathetic external lighting and installation of three bat boxes along with five bird boxes (including boxes for swifts) and two bug boxes have been installed. Native plant species have been planted to enhance the perimeter edge and some exotic species on the podium and around the building have been established. Bird sightings are being counted and so far 47 bird species have been recorded. A log of insect and plant species is also being kept.

7. Promote Health and Wellbeing

In order to create an outstanding workspace, WWF knew that health and wellbeing was a key driver. In the previous offices, WWF commissioned a survey on building users to gauge user satisfaction levels of the building as well as expectations for the new building. Problems identified at this stage included that staff wanted to be proud of their workplace, the work of WWF was not reflected in the building, the old offices didn’t provide collaborative workspaces and a general culture of “cluttering” had invaded the space. Several ideas to change workplace habits were implemented at this stage such as new furniture and removal of partitions. Also at this stage, it became very apparent that director buy-in to non-cellular workspace was needed.

The building’s daylighting, ventilation, thermal comfort strategies etc. all contributed to creating a very different office experience. Additional aims were to reduce the amount of floor area required and Hopkins looked at new workspace initiatives to achieve this. The ratio of staff to desks was reviewed and open plan features, inspired by Hopkins’ own offices, but with private areas included. Modern office trends have been designed into the space to allow many different ways of working. The furniture, fixtures and equipment (FF&E) plan includes high density desk seating and a large number of breakout spaces at the very centre and at the perimeter of the building. The FF&E plan places as much importance on collaborative work spaces, flexible work stations, private working areas, breakout areas and communal areas. The building is also zoned so that certain spaces are located away from office noise as well as encouraging staff to move around the building and be active during their day with tactics such as placing zip taps and fresh water only in the kitchens.

The high ceilings and relatively low density of desks reduces ambient noise but there is enough background noise to avoid creating silent, uncomfortable spaces. Additionally, a sound system is installed that pipes birdsong sounds to the work areas. It is designed as an acoustic response to the
background noise and directs sound upwards in order for it to bounce and disperse evenly across the building, disguising its directionality. This generally brings down stress levels and creates a non-invasive background noise.

To support the FF&E plan, there are no personal offices and hot desking is used throughout the building (designed with only space for 60% of workforce at any one time), and staff are given “smart boxes” and lockers. This keeps the building free from clutter and this is enforced by the facilities management team with a clear desk policy and a lost property system.

WWF uses flexible work schedules which support the modern office features and allows their employees to work remotely. This has permitted a floorplate for 200 desks for an employee roll of 317.

Prior to the move, a filing audit was carried out. WWF had previously stored 1400 linear metres of files. This was reduced to less than 500 linear metres post audit. 2.2 linear metres per person were allocated in the new building which has proven ample. A digital office strategy is also in place to support this. It has meant that double height storage cupboards are no longer needed which enhances the working environment by keeping workspaces open and clear.

Provisions have been made to encourage as much sustainable travel as possible. This includes locating the building close to Woking train station as well as providing secure covered storage for 30 bikes, five showers and a drying room. An internal lift sharing website has provided an opportunity for those who still need to drive to work. There are no parking spaces reserved for WWF employees.

A post occupancy evaluation survey has been carried out with WWF staff. Results show that there is an increase in wellbeing and satisfaction, even when results are controlled for employee churn following the relocation.

8. Engage the local community to help inspire change

The site was an existing brownfield site as a car park servicing Woking town centre, which meant no additional carbon emissions due to a change of land use. Parking was a Woking Council prerequisite and a public consultation revealed that locals had concerns for ground level parking. In response, the building was designed on a raised platform to retain the car park beneath. Local residents also did not want a large, overt building so the overall height was kept to below the surrounding treeline, making the building very discreet in comparison to other Woking town centre buildings. Additionally, proximity to the town centre meant improved connectivity to public services, transport connections and amenities therefore reducing the travel carbon emissions of users. The survey shows that 56% of staff are now taking the train to work compared to 21% before the move.

The building has a special remit to be able to engage the local community and schools. In order to fulfil this objective, several spaces were designed into the building such as the public exhibition space, a learning zone, an auditorium and video conference facilities. Some of these facilities are also available to the community to use. Special signage has been created to give members of the public specific information about how the building works, such as the PV cells and the water use. Additional travel information is also available via the signage which contributes to the BREEAM accreditation and helps locals to navigate the public transport system.

WWF has also worked on numerous case studies shared through its website as well as engaging architects, engineers and contractors through regular building tours. Over 25,000 people have visited the Living Planet Centre in its first year of operation.
LESSONS LEARNED

1. Think holistically.
2. Site and context – use the site itself to help improve the building’s performance.
3. Look at how much space is really needed and work to decrease the footprint.
4. Think responsibly about materials.
5. How does the client perceive value? Are there other factors such as health and wellbeing?
6. Choose contractors who can understand the value and have the ability to deliver it.
7. Achieving sustainability objectives requires the whole team to be engaged, including subcontractors and facilities managers throughout the lifecycle.

CONCLUSION

The Living Planet Centre is an example of what can be achieved with a set of simple drivers and a fully engaged project team working in collaboration from a very early stage in the project. The final building fulfils WWF’s vision and delivers quantifiable sustainable outcomes but also has repercussions for how high clients set their ambitions and where they perceive value in the future.

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