

New Street Station: Redevelopment Green Credentials

Lead Organisation: Network Rail



Partners:



Department
for Transport



The Project

Redevelopment of New Street Station, Birmingham – September 2015

Network Rail and its delivery partner Mace, backed by Birmingham City Council, Centro and the Department for Transport, wanted to transform the station into one that the people of Birmingham could be really proud of with sustainability credentials not previously achieved for a major train station of this kind.

The project team worked hard to gain green credentials for the project by working closely with the designers and regulatory bodies and through various recycling and energy monitoring initiatives.



Aims

The environmental aim was to convert a very dated and energy intensive system of heating, cooling and ventilation, which was poorly maintained and controlled, into a modern, green, sustainable development while adhering to stringent rail standards.

Challenges

Refurbishing a 1960s structure to meet modern day sustainability requirements brought some challenges.

The funding partners set the goal of achieving a BREEAM minimum rating of 'Very Good', so the team knew that this would not be a straightforward target to achieve against a background of complex refurbishment in a rail environment.

New Street is the busiest station outside London and the busiest interchange station in the UK with a train leaving the station every 37 seconds. All the work had to be done without causing disruption to the trains or the live railway station which the project surrounds.

Additionally, complying with current legislation for disabled access for a sub-surface station with additional lifts, escalators and increasing concourse capacity and retail facilities also significantly increases energy requirements. Therefore it was very important that when such an increase in energy occurs for the same building, low or zero carbon solutions must be explored as long as there is a viable case to satisfy the triple bottom line for a sound economic, environmental and social case as well as a safe one for the daily passengers through the station.



The Outcome

Results

The completed station incorporates:

- Low energy and high efficiency LED lighting
- 60% of the toilet flushing demand provided by rainwater harvesting system
- Efficient water spray taps for water conservation
- Energy efficient lifts and escalators
- Sub-metering for all water, heating and cooling to monitor energy consumption
- Natural daylight for the concourse and natural ventilation where possible to minimise energy consumption

- Responsibly and legally sourced materials including timber
- Use of alternative materials such as carpet tiles with the yarn made from recycled fishing nets
- Network Rail's first ever station to incorporate a standalone Combined Heat and Power (CHP) plant with the station electricity taken from the plant and waste heat transferred into a city district heating scheme

Waste Recycling

To create space for the new station concourse, over 7,500 tons of concrete was removed from a disused car park adjacent to the old station. All the waste concrete removed from this site has been taken to a waste recycling facility for use on other projects. 98% of the material from the demolished Stephenson Tower (now the site of the new John Lewis department store) has also been recycled.



The project is aiming to recycle/re-use an average of 95% of the non-hazardous waste material as a minimum, which they have currently exceeded in elements of the demolition works and general waste. They have been closely engaged with their supply chain regarding waste and the main waste contractor Weir Waste, recently using a new local state of the art facility to segregate and recycle construction waste.

Energy Monitoring

The redevelopment project has also installed a sub metering system which allows an accurate method of measuring water, electricity and carbon usage across the worksite on a day to day basis. This helps the project to monitor targets and reduce consumption throughout the works. This information has been shared around the works site and canteen areas.

BREEAM

BREEAM has become the principle measure used to describe a building's environmental performance and Network Rail is dedicated to ensuring best practice for sustainability measures where possible.

It has been a tough journey but the station has met its target to gain a BREEAM rating of 'Very Good' for the design stage. The project team is now monitoring construction activity to ensure that this rating is maintained throughout the build and in the finished station.

Procurement and Site Management

Network Rail and its partners have been working closely with many external bodies throughout the project, including The Carbon Trust, WRAP (Waste & Resource Action Programme) and NISP (National Industrial Symbiosis Programme).

The project has also created and implemented a bespoke Project materials procurement policy to ensure the supply chain sign up to legal and responsible sourcing of materials.

They also ensure the supply chain hold Environmental Management Certificates to ISO 14001 or BES 6001 or equivalent.

Keeping traffic off Birmingham's streets

Working around an operational railway can be a challenge in itself; however it also provides a very accessible resource that the project team uses to transport material into and from site, without having to use carbon intensive lorries around the busy city centre.

Every week the train makes two journeys into the construction site from a logistics depot in Bordesley, on the outskirts of the city, and is expected to keep 10,000 lorry journeys off Birmingham's roads throughout the life of the project.

Energy

The expansion of the station concourse and additional lifts and escalators will mean that nearly double the amount of power is needed. So, in 2009, Network Rail commissioned the lead design and engineering consultant Atkins to carry out a Low and Zero Carbon (LZC) study for the project.



Before pursuing renewable technology it is imperative that the building fabric is the first area to improve, but one disadvantage of using the existing 1960s façade is that it becomes very costly to improve with long payback times and therefore unviable. New areas of the façade were built to current Part L of the Building Regulations.

Network Rail worked closely with Atkins to make the main

concourse area naturally ventilated to minimise energy usage. Computational Fluid Dynamic (CFD) modelling was carried out to ensure the new atrium worked effectively in extracting warm air in the summer using the stack effect and the station concourse was not too cold in the winter. Some seating and waiting areas were to be installed with radiant heating panels as a result of the modelling.

Exploration of various renewable and low carbon technologies ranging from Ground Source Heat Pumps (GSHP), biomass boilers, and Photovoltaic (PV) to cover 2,000m² around the south of the

station façade was undertaken. Using an existing city centre location meant special constraints excluded the use of many technologies such as biomass and wind.

When PV's were discounted due to the John Lewis development on the South Side removing the proposed PV area, Network Rail actively pursued the option of a CHP scheme to provide the station with electric from gas and also looked at options of connecting into the local district heating network to the north of the station. This would reduce carbon emissions from site micro generation, as opposed to traditional power station generated grid electric, reduce transmission losses and use the waste by-product of heat that is normally lost in the cooling towers of old power stations. The preferred bidder Cofely was also very keen to use the subterranean network beneath the station to supply the south of the city and avoid disruption around the city centre.



The dilemma for Network Rail for using a CHP system was that the station demand profile was more electric intensive than heat: to a ratio of around 8:1. A heat partner was required to utilise surplus heat generated from the CHP plant and John Lewis was an ideal candidate being attached to the south of the station with its biggest store outside London. With John Lewis agreeing to sign up to a heat agreement with Cofely, a carefully co-ordinated agreement was created that acquired simultaneous signing of Energy Supply Contracts.

Once key partners and an outline scheme were identified, the major challenges of finding a location for a proposed 1.6MWe engine and planning the pipework routes through the station and John Lewis without disrupting a complex programme of works around the station redevelopment were addressed. Identifying the location of the plant to satisfy The Clean Air Act and avoiding a large chimney stack to satisfy local planning is just one of many obstacles the team have overcome in pursuing low carbon technologies.

Lighting and Controls

All lighting is being changed to low energy LEDs and lighting controls significantly improved to ensure lights are turned off in back of house areas for prolonged unoccupied periods and dimmed in public areas where passengers are not present. All lighting shall be centrally controlled and monitored via a Building Management System (BMS) based in the control room.

Water

The project aims to minimise the consumption of potable water by the use of dual flush cisterns in all toilets along with low flow sensor taps. All water consumption is also to be monitored via the BMS to allow close monitoring of consumption, something not regularly carried out at managed stations. A leak detection system will also produce an alarm in the control room if a leak is detected in the system.

The project has also constructed a large 100m³ rainwater collection tank that collects clean rainwater from the roof and façade to provide for more than 60% of the stations toilet flushing demand and irrigation for planting.

Other attenuation tanks have also been installed to prevent flooding from overwhelming the main local sewer during periods of intense rainfall due to the future effects of climate change and increased risk of flooding in the city.

Materials

Sourcing materials that have a low environmental impact has also been a key consideration. Processes introduced on the project at an early stage ensure suppliers and contractors responsibly source all materials to ISO 14001 or equivalent and legally source all timber to Forest Stewardship Council (FSC) and Programme for the Endorsement of Forest Certification (PEFC). The project actively researched alternative materials and sourced carpet tiles from Miliken of which the yarn is made from recycled fishing nets and the base from recycled off-cuts from car seats.

Land Use and Ecology

Despite the location for New Street having a low ecology site, Network Rail appointed suitably qualified ecologists to advise and report on enhancing and protecting the ecological value of the site. A key feature of the output was a 325m² green wall with over 25 different species along the Moor Street link to the east of the new station, creating a completely new welcoming route into the station and concealing a long dark and dirty retaining wall.

In the Future

There is still some work to be completed on platforms and monitoring will be key to maintaining the green credentials of New Street Station.

The Extra's

Awards and endorsements

- UK National Rail Industry Awards 2014 – Award in Environment & Sustainability for delivery of BREEAM Excellent rated 'Lampblock' Building on Platform 1b for Cross Country Trains Accommodation.
- Winner – Award for Excellence in Sustainability at the Greater Birmingham Chamber of Commerce Awards.

- Runner up - UK GreenBuild 2013
- Runner up – Environment & Energy Awards 2015
- Runner up – Sustainability Leaders Awards 2015
- Highly Commended Awards for work in Sustainability at the Network Rail Aspire Awards.

In addition, the redevelopment was short-listed for the Best Urban Regeneration Project in the People's Choice Award at the MIPIM, the world's biggest property trade fair in France, and the Contract of the Year award at the World Demolition Summit was given to Coleman & Company who removed over 7,500 tonnes of concrete to create the concourse.

Links and Downloads

[Network Rail – Birmingham New Street redevelopment](#)

[New Street: New Start](#)

[Mace – New Street Refurbishment](#)

Contact Details

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