

With the construction industry sending 17% of its total waste produced to landfill each year and spiralling landfill costs the UK government has set a target to achieve zero waste to landfill by 2020.

To support the industry and reduce our environmental impact and costs to the business, Network Rail Infrastructure Projects has committed to lead the industry in achieving zero waste to landfill by 2019.

This sustainability best practice case study sets out how the Thameslink Programme has reduced waste and reduced cost to support the zero waste to landfill challenge.



The UK construction industry waste challenge

The UK construction industry produces around 120 million tonnes of waste per year of which 20 million tonnes are sent to landfill unused (WRAP). Due to the large amount of waste generated by the industry the UK government has identified that reducing the volume of waste produced and disposed of needs to be significantly improved to conserve our natural resources and prevent damage to our environment. A study by WRAP also demonstrates that a reduction of waste by 5 million tonnes over 4 years generated £400million of savings to the industry. To meet the current UK waste challenge the government is aiming for zero waste to landfill by 2020 and all organisations, including Network Rail (NR), has a role to play in delivering this.

Reducing waste in Network Rail Infrastructure Projects

Infrastructure Projects (IP) is delivering the biggest investment in the railway since the Victorian era. All our work from designing and building iconic new stations, signalling upgrades, electrification, track renewals and bridges produces waste. The waste we produce has a significant impact on both our environment and the costs to our business. Over 2015 to 2016 IP alone produced approximately 2.3 million tonnes of waste and diverted on average 75% of all waste produced from landfill. With landfill tax rates at £84.40 per tonne it makes good business sense to reduce the amount of waste we produce and dispose.

To support NR's Sustainable Development Strategy (2013-2024), NR IPs Control Period 5 business plan objectives and Sustainability Charter IP has committed to '*lead the industry in zero waste to landfill by 2019*'.

A sustainable Thameslink Programme

The Thameslink Programme (TLP) will transform travel north to south through London. When Thameslink completes in 2018 journeys and connections will be improved giving customers better travel options to more destinations than ever before and modern track and trains will make journeys more reliable.

Sustainability is right at the heart of the Thameslink Programme and our vision is to 'deliver transport benefits to budget that represents value for money and creates an overall positive impact on the community and the environment'. To do this we're working to ensure that not only do we achieve the highest standards in sustainability, but we uphold this principle on all fronts.

As part of our vision the TLP has committed to "*reduce waste generated and disposed of on TLP*" through "*reducing waste during the design process*" and "*diverting at least 90% of our waste from landfill using the waste hierarchy*". Between 2012 and 2016 the TLP successfully diverted on average 99% of its waste from landfill, a total of 569,000 tonnes. Through reducing our waste we have generated approximately £12,000,000 cost savings to our business.

How Thameslink reduced waste and reduced cost

Using our role as client to raise the bar

As client we have the power to set and raise the performance of our programme and our supply chain to reduce waste. Each action that we take as a client has the potential to drive a positive change across our business, supply chain and the industry.

To play our part as client we benchmarked ourselves against the industry average waste recovering benchmarks of 80% (for demolition and construction) and committed to go above this by setting a target to divert a minimum of 90% of waste from landfill. As well as setting challenging targets we also publicly signed up to the WRAP Halving Waste to Landfill Commitment alongside 800 other signatories where we committed to;

"...playing our part in halving the amount of construction, demolition and excavation waste going to landfill by 2012. We will work to adopt and implement standards for good practice in reducing waste, recycling more, and increasing the use of recycled and recovered materials"

Embedding our waste requirements across our management system and supply chain

As a client it was important that our design, construction teams and our supply chain were fully aware of our waste requirements. To achieve this we embedded our waste objective, targets and key performance indicators (KPIs) into our ISO14001 Environmental Management System and cascaded these requirements to our supply chain via our procurement and contract process.

Challenging the design and construction process

We also held a series of Designing Out Waste workshops at the design phase with our programme teams and suppliers using the WRAP (Waste and Resources Action Programme) Designing out Waste toolkit. The objective of these workshops was to collaboratively challenge the design and construction process to identify where we could reduce waste in design and construction through;

- Reuse and recovery of materials – reuse of recycled or re-salvaged materials
- Offsite construction – use of prefabrication
- Material optimisation – minimising excavation or standardising components
- Waste efficient procurement – to reduce waste in the supply chain
- Deconstruction and flexibility – allowing for recovery of materials

Waste hierarchy is key

Compliance to the waste hierarchy is at the core of our communications. Whilst compliance was driven primarily through legal compliance at the early stages of TLP through regular training and engagement of our teams and suppliers it is now part of what we do day to day.

The value of Site Waste Management Plans

As part of our ISO14001 management system and contract requirements we required all our projects and suppliers to produce Site Waste Management Plans (SWMP) during the design and construction phases. Even after the revocation of the Site Waste Management Plan 2008 regulations we continued to stipulate this requirement as we recognised the value these plans provided. SWMPs were reviewed every 6 months and were regularly audited by our internal sustainability team and external ISO14001 auditors. As part of project close out we also checked final documents were fully compliant (e.g. full waste monitoring forms, waste transfer notes, waste quantities, predicted and actual costs) regularly captured lessons learnt and cost savings to inform better waste management across the programme.

The importance of monitoring delivery

As part of our commitment to reducing waste we regularly undertook waste inspections and audits of our projects and suppliers and monitored how our suppliers were assuring their waste management contractors and suppliers. We tracked our delivery through our monthly waste KPIs and regularly challenged our waste returns to be fully confident we were meeting the diversion levels we reported.

Reducing waste in stations and civils

All our major station and civils projects such as Blackfriars, Farringdon, London Bridge and Bermondsey Dive Under identified actions to reduce waste during design and construction. Specific actions included;

Modular and pre-fabrication – At Blackfriars and London Bridge we used modular and pre-fabricated components for bridge decks, platforms units, lifts, escalators and station furniture and standardised components for station glazing. Modular and pre-fabrication reduces material use and waste, reduces risk of pollution, minimises impacts on our neighbours through quieter construction and less road congestion from deliveries. It also provided a number of economic benefits such as improved product quality, reduced installation programme, reduced materials double handling and improved site logistics.

Reducing packaging – At Farringdon we arranged for our PPE suppliers to remove packaging from all our orders and take back pallets and at Borough Viaduct we recycled hard hats thus reducing waste to landfill, costs and saving space on site.

Re-use of demolition materials– at Farringdon we re-used on site demolition materials for the construction of the piling mat and delivery ramp. This reduced the need to import 8,500 tonnes of material to site saving £70,000 and removed 850 lorries from congested London roads, reducing CO2 emissions by 30 tonnes and minimising disruption to our neighbours. At London Bridge we crushed insert waste arising throughout the demolition works for re-use within the stations and at neighbouring TLP projects such as Bermondsey Dive Under to reduce disposal.

Recycling hazardous waste – hazardous waste is typically disposed of to landfill however on TLP we always look for ways to avoid sending waste to landfill. At Borough Viaduct we used high density polystyrene as lightweight fill for the vaults so we agreed with the supplier to take the polystyrene back for re-manufacturing into insulation products thus reducing waste, carbon emissions, impacts from transportation and cost. At Farringdon and London Bridge we recycled aerosols through a specialist Aerosol Piercing Unit enabling aerosol cans to be recycled like any other metal thus diverting waste from landfill.

Recycling plasterboard – At London Bridge we use plasterboard to fit out the station accommodation, which is a difficult material to dispose of as all gypsum based wastes must be disposed of to landfill thus increasing our impacts and costs. By working with our suppliers we were able to return our plasterboard waste products for recycling and re-use into a variety of products that are sold again to construction projects. To date we have saved over £6,000 in landfill costs.

Segregating waste – all our projects segregated waste on site as part of standard activities, however for complex and space constrained sites we maximised off-site segregation and recycling. At London Bridge we used dedicated off-site storage areas for storage of construction materials supported by just in time deliveries to reduce volume of material held on site. This was supported by returning surplus materials to the storage area for reuse during construction.

A solution to soil waste!

Recycling soils – 200,000 tonnes of excavated soils at London Bridge were tested and segregated on site into inert, hazardous, non-hazardous and special non-hazardous waste to prevent mixing of waste and costly waste disposal to landfill.

All soils were treated at a soil treatment facility according to their type, for example through soil stabilisation or bioremediation.

Treated soils were then transported along the River Thames by barge and incorporated into other land reclamation projects.

The project successfully reused 100% of non-hazardous and hazardous waste. Each barge carrying 1000 tonnes removed 50 lorries from congested London roads and reduced carbon emissions by 60%.



Prefabricated platforms being delivered by barge to Blackfriars



Prefabricated canopies at London Bridge Station



Use of demolition material as a piling mat at Farringdon

Reducing waste in Railway Systems

All our railway systems projects, which involve the design and construction of new train stabling facilities including sidings, accommodation buildings, carriage washing machines, controlled emission toilets and walkways, identified actions to reduce waste in design and construction. Specific actions included;

Modular and pre-fabrication – at Bedford we used Hering Bau modular precast concrete platform and reclaimed steel tubular piled foundations, which provided a number of benefits such as; reducing the volume of concrete used (320 tonnes) and volume of material requiring excavation (115m³), saved 15 lorry movements and reduced transport related carbon emissions, reduced the construction programme, disruption to the local community and improved safety on site through limiting possessions.

Reduced track gradient – At Peterborough we increased the gradient of the track in the sidings to reduce the volume excavated material and therefore waste. This led to a saving of 500m³ of excavated material, 1.5 tonnes of CO₂ and £10,000 in disposal costs. At Horsham we reduced the need for excavation and subsequent fill materials site by also reducing track level and layout alterations. This identified opportunities to reuse 950 tonnes of material on and off-site generating £16,000 of savings.

Reducing material in design – we made simple design changes such as reducing the size of the concrete bases for our Relocatable Equipment Building and extending our existing signal structures rather than installing new cantilevers and supporting foundations. By reducing material in design we reduced both waste and costs and minimised disruption to our community through reduced noise, lighting, deliveries, time on site.

Re-using materials on site - At Peterborough we reused 1,305 tonnes of soil and stones to raise levels around new TOC accommodation saving £10,000 and reducing transport related CO₂ emissions. At Brighton we reused 100% of on-site materials use as bedding material along troughing routes, track works and to build up the ground level for roadways, access tracks and authorised walking routes saving over 450 tonnes and £43,000 in waste disposal costs.

Reusing NR NSC serviceable spares – At Peterborough and Bedford we re-used serviceable spares such as concrete sleepers and rail from NR's National Supply Chain. At Peterborough the reuse of 3,400 concrete sleepers saved £92,000 and helped avoid 209 tonnes of embodied carbon. At Bedford the reuse of 2186 sleepers and 567 metres of rail saved over £75,000 and avoided 250 tonnes of waste.

Community wood recycling – Across our depots and stabling portfolio we donated all our waste wood that was not re-used on site to a Community Wood Recycling Project (a local not for profit social enterprise) which provides employment and training to long term employed and socially disadvantaged people.

Donating materials – At Blackfriars and Farringdon we donated redundant materials to the London Wildlife Trust for use in conservation and community projects.

Signalling innovation is on point!

Recycled points markers - For our signalling projects we replaced traditional cast iron points markers with a product made from 100% recycled milk bottle tops

The benefits included reducing the use of virgin materials, recycling waste, reduced installation time from 20 minutes per marker to 7-8 minutes and reduced cost from £65 per marker to £38.

The recycled markers also offered greater durability, did not compromise product quality or performance and offered a lifespan of 40yrs.

Re-use of wood shuttering – At Brighton we re-used 80% of wood shuttering from previous TLP project sites. Typically our wood shuttering was re-used up to 4 times across the project saving costs and disposal to landfill



Recycled points marker



Prefabricated Platforms at Bedford Station

Business and environmental benefits of reducing waste

- Minimises consumption of virgin materials thus conserving our natural resources
- Reduces volume of waste produced and requiring disposal to landfill
- Reduces our carbon emissions from transportation of materials and waste
- Reduces our impact on our neighbours such as decreased noise, improved air quality and reduced road congestion
- Enables Network Rail to meet its legal, planning and corporate sustainability commitments
- Reduces Network Rails material, waste disposal, transportation and construction costs

With Thanks

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- Blackfriars Station project team and Jacobs, Tony Gee and Balfour Beatty
- Farringdon Station project team and Atkins and Costain
- Borough Viaduct project team and Skanska
- Track project team and Balfour Beatty Rail
- Signalling project team and Siemens
- Outer Areas project team and Carillion
- WRAP



Balfour Beatty

SKANSKA



SIEMENS



JACOBS ATKINS

Further information

For further information on the Thameslink programme and the Considerate Constructors Scheme please see below

Thameslink Programme <http://www.thameslinkprogramme.co.uk/>

Thameslink Sustainable Development Policy <http://www.thameslinkprogramme.co.uk/approach>

WRAP <http://www.wrap.org.uk/?qclid=CPC8zrK00s0CFa0W0wodQwgLyA>

Network Rail Sustainable Development Strategy

<http://www.networkrail.co.uk/browse%20documents/strategicbusinessplan/cp5/supporting%20documents/transforming%20network%20rail/sustainable%20development%20strategy.pdf>