



**CROSSRAIL
SUSTAINABILITY
REPORT 2016**

Her Majesty Queen Elizabeth II
at Crossrail's Bond Street station
work site on 23 February 2016



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FOREWORD

It has been another extraordinary year on the Crossrail project.

The spring of 2015 marked the end of tunnelling – an engineering feat of enormous scale. Focus of the construction programme has since continued on building the new stations in central London, upgrading the existing railway infrastructure in the east and west and fitting out the new tunnels and stations with the physical infrastructure and systems required to operate the railway. This year, the name of the future service was revealed. In February 2016, we were honoured to host Her Majesty The Queen at Bond Street station where it was announced the railway we are delivering will be known as the Elizabeth line when the service opens in central London in 2018.

Across the project our focus on sustainability remains integral to decision making. Our impact during construction, through to the operational life of the railway, has been considered carefully from day one to ensure we can responsibly deliver a world-class railway.

Our economic impact has seen significant benefits to the UK. Ninety-six per cent of Crossrail-awarded contracts have been to UK-based companies, while 62 per cent of our Tier 1 contracts have been with small to medium-sized enterprises.

Crossrail has secured £103 million of funding for urban realm improvements across the route. Working with local boroughs to improve public space around stations and also with commercial developers to build new homes, offices and retail units at 12 sites, Crossrail is stimulating regeneration and economic growth.

We continue to strive to maximise the benefits of our environmental impact. Ninety-eight per cent of excavated material has been beneficially reused to create or restore recreational and agricultural sites across the UK such as Wallasea Island Wild Coast project and Ingrebourne Valley in Essex.

Energy reduction measures have continued to be implemented to maximise efficiencies in the operational life of the railway. This includes use of efficient lights, lifts and escalators within stations and design of new lightweight, energy efficient rolling stock that will carry more people. Minimising our impact on air quality has also been important and to help limit it we have fitted emission controls to 84 per cent of equipment used in the central section of the route.

Our social sustainability will hopefully leave a lasting legacy for the industry. Our Target Zero campaign is ensuring the highest health and safety standards are met on the project while helping to raise the bar across the construction industry.

We are helping equip the next generation workforce with the essential skills to deliver future projects. More than 570 apprentices across our supply chain are learning on the job, gaining invaluable experience. Our work through Young Crossrail is helping change perceptions of engineering at a young age, to promote and encourage careers in infrastructure, particularly among female students.

Importantly, we want the industry and future projects to learn from our experiences. In February 2016, we launched the Learning Legacy portal – a new online resource dedicated to sharing insight from Crossrail. Major projects such as HS2, Thames Tideway Tunnel and Crossrail 2 can benefit from our insight and carry the baton forward to raise industry standards. This new portal has had the support and guidance of the Infrastructure and Projects Association and numerous professional institutions to ensure the outputs are robust and will reach a wide audience.

Each day, we of course get closer to delivering the railway. TfL Rail, part of Transport for London, has been operating the service between Liverpool Street and Shenfield since May 2015. The mainline service is using existing stations and trains to deliver an improved service for passengers. The phased introduction of new rolling stock will commence in May 2017 and we look forward to the Elizabeth line launch – and the start of services running through the centre of London from December 2018.

At the end of this reporting period (March 2016), the project is 73 per cent complete and we remain on track to deliver a world-class railway safely, on time and within the funding envelope.

While there is still an incredible amount of work to do, the project is well on its way – London's newest railway is coming.

Andrew Wolstenholme OBE
CEO Crossrail Ltd



CROSSRAIL

MOVING LONDON FORWARD

Building London's new east to west railway sustainably

By 2030 the capital's population is set to reach 10 million. Its transport system must be ready to service this increasing demand. This project is a key part of the UK's plan to maintain London's place as a world-class city by supporting considerable growth and maintaining the highest standards in urban transportation.

Crossrail is delivering a new suburban railway for London and the South East. It will open as the Elizabeth line in phases from 2018 and be fully complete by 2019. The route will run over 100 kilometres through 40 stations from Reading and Heathrow in the west, through central London and to Shenfield and Abbey Wood in the east.

It will increase central London's rail capacity by 10 per cent, reduce journey times and bring an additional 1.5 million people within 45 minutes of London. The new railway has been designed to be safe, calm, spacious and accessible. New trains, over 200 metres long, will be able to carry up to 1,500 people – almost twice as many as current London Underground trains – creating a more comfortable experience.

The project is delivering 42 kilometres of tunnels, 10 new stations, improvements to 30 more and upgrades to existing rail infrastructure. It is also working with local Boroughs to improve public space around stations and with commercial developers to build new homes, offices and retail units above or near the new stations. This integrated approach is helping better knit new and upgraded infrastructure into its surroundings.

A total funding package of £14.8 billion is available for the delivery of London's newest railway. The railway is supporting jobs and regeneration. It is estimated that the Elizabeth line will generate at least £42 billion for the UK economy.

As Europe's largest infrastructure project, Crossrail presents an excellent opportunity to lead in delivering a sustainable railway, fit for the future. Sustainability has been at the heart of the project from day. Decision-making on the project has carefully considered the Crossrail economic, environmental and social impact.

This project will have a long-lasting impact on how people travel through the capital and South East and leave a lasting learning legacy for future projects and the wider industry.



VISION & VALUES

Crossrail's mission is to deliver a world-class railway that fast tracks the progress of London. Given the scale and importance of the project, we are committed to ensuring that sustainability underpins everything we do.

Crossrail is the first project of this scale in the UK to consider sustainability in its decision making from day one. Taking a holistic approach, it aims to minimise the negative impact on the environment and maximise economic and social benefits throughout the railway's construction and into its operation. Activities span all aspects of London life, impacting many communities along the route and this responsibility is taken very seriously. For example, during the project's 120-year design life 85 per cent of its carbon emissions will be expended in running the operational service. Energy efficiency has therefore been a core consideration in designing stations and rail infrastructure. The actions undertaken today will have long-lasting benefits for London, the South East and the UK.

The breadth of Crossrail's sustainable activities is diverse. It includes the beneficial reuse of excavated spoil; working with industry to ensure that plant and equipment used on site is energy efficient and minimising the impact on air quality; ethical sourcing requirements for procurement of construction materials; promotion of cycle and vehicle safety through compulsory training; safety equipment requirements for all lorries; and developing the skills of the future workforce through the apprenticeship programme.

CROSSRAIL VALUES

SAFETY:

We put safety first

INTEGRITY:

We keep our promises

INSPIRATION:

It's in our power to change things for the better

RESPECT:

We treat people as we'd like to be treated

COLLABORATION:

We're stronger together

CROSSRAIL'S SUSTAINABILITY VISION

To build Crossrail sustainably by:

- Seeking to minimise the impact on the environment and the community throughout construction
- Ensuring a diverse supply chain benefits from Crossrail work and that materials used on the project are sourced sustainably
- Providing a legacy of skills, learning, expertise and experience that can be handed on to the next generation of major infrastructure projects
- Moving a step closer to a more inclusive and safer construction industry

To design and deliver a world-class railway that can be operated sustainably by:

- Embedding energy saving and emissions reduction in the rolling stock and station designs
- Promoting safety, comfort and wider social and environmental benefits in the design of the stations, trains and public spaces
- Helping to secure London's place as a competitive world city

This holistic approach is supported by two key priorities within the Crossrail organisation:

Safety – This is Crossrail's number one value. It is based on the beliefs that all harm is preventable, that everyone working on the project has the right to go home unharmed every day and that everyone must work together to achieve this.

Innovation – This is embedded within the organisation. The Innovate18 programme promotes new thinking and new ideas, many of which have an impact on sustainability for Crossrail and future projects.

Crossrail's sustainability performance is told through the well understood themes of social, economic and environmental sustainability and is designed to meet the aspirations of our joint sponsors (Transport for London and Department for Transport), stakeholders and future passengers.



REPORT STRUCTURE AND SCOPE

This fifth annual sustainability report is a review of Crossrail's sustainability performance in the financial year April 2015 to March 2016. The report includes the entire Crossrail delivery programme which includes the Network Rail works being delivered in the outer sections of the route.

Crossrail's central section works include the construction of 42 kilometres of new tunnels, 10 new stations, public realm improvements and 12 commercial developments.

The works being delivered by Network Rail involve the reconfiguration and upgrade of route infrastructure on

the Heathrow spur and 90 kilometres of two existing Main Line railways to the west and east of London linking Reading to Shenfield and Abbey Wood.

The report has been designed to be comparable with the sustainability reports from previous years with regards to performance measurement, although data has been represented using different graphics. Data on Crossrail's performance is presented and supported by additional information in the form of a narrative to provide context. There are examples of highlights within the reporting year as well as cumulative performance data. Performance is continually analysed on the project and opportunities for improvement identified and implemented where possible.

The report is illustrated with case studies that identify best practice and highlight innovations which have benefited the project or the wider industry.

The main part of the report is devoted to detailing Crossrail's performance against a number of its key performance indicators. The report also includes a look forward to 2016-19, details of the organisational profile, stakeholder engagement, our other reporting obligations and board membership.



CROSSRAIL SUSTAINABILITY THEMES



Tfl sustainability framework

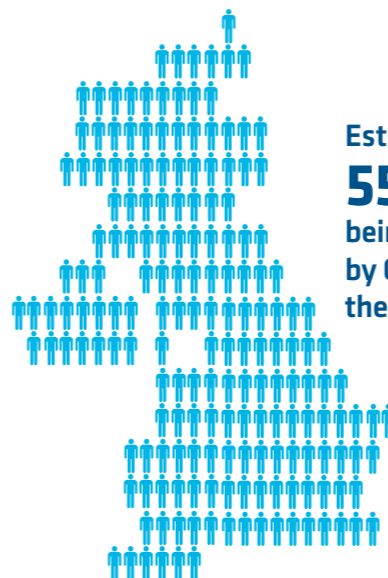
Crossrail sustainability themes

SUSTAINABILITY HIGHLIGHTS

ECONOMIC



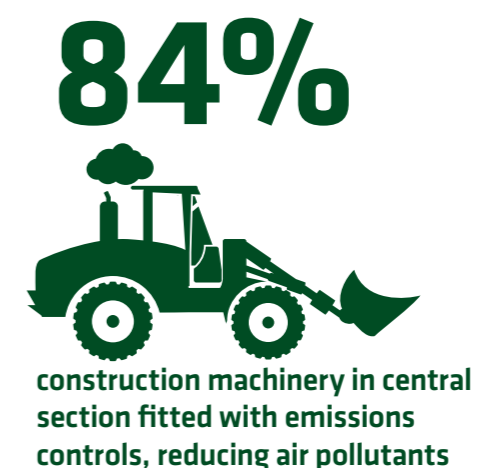
At least **£42bn** estimated to be generated for the UK economy



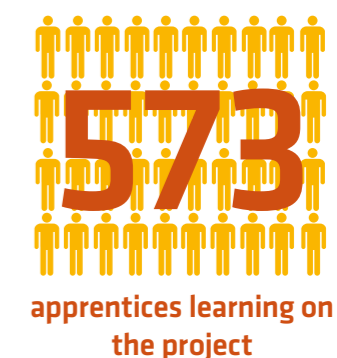
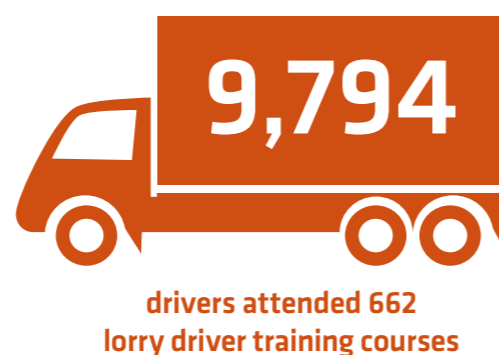
62% of suppliers based outside of London



ENVIRONMENT



SOCIAL



LOOK AHEAD

2016-17

Construction programme

The works to fit out the railway with the physical infrastructure and systems required will continue to be a major focus for the construction delivery programme. Station construction at new and upgraded stations will continue alongside these works.

Handing over the railway

Progressive handovers to Transport for London, its infrastructure managers and train operator, will be undertaken in order to help run the assets efficiently.

Economic sustainability

Employment and skills

Consolidate the project's legacy, in particular through ongoing support for apprenticeships, the new Build London Brokerage and targeted opportunities for women, ex-armed services personnel and the long-term unemployed.

Over-site development

The focus for 2016-17 will be finalising development agreements with partners and signing up new partners to take schemes forward.

Environmental sustainability

Biodiversity

Complete the DEFRA biodiversity accounting project to determine whether 'no net loss' can be demonstrated and continue to seek ways to incorporate biodiversity enhancements in restoration schemes.

Construction waste

Report accurately on rates of reuse, recycling and energy recovery, and the volume of waste associated with railway fit-out so that opportunities to reduce the quantity can be identified and implemented.

Air quality

Continue to tackle emissions control on non-road mobile machinery and provide guidance to the Greater London Authority in the implementation of the London low emission zone.

Energy efficiency

Continue to focus on minimising operational energy requirements. Testing and commissioning of the railway towards the end of 2017 will provide a more robust evaluation of these requirements. Work will also continue with Bombardier to ensure delivery of energy efficient rolling stock.

Network Rail works

In 2016-17, Network Rail will commission further carbon footprint assessments on Abbey Wood station and six other modular stations. The results of this study should be available by the end of 2016.

Archaeology

The archaeological fieldwork programme will conclude in the next year and the programme will culminate in a temporary exhibition at the Museum of London Docklands, planned to open in 2017. A further eight books in the Crossrail archaeology series will be published.

Social sustainability

Health and safety

Continue to promote the Target Zero ethos across the project by focusing on improving proactive health and safety initiatives. Develop a best practice guide and support the British Occupational Hygiene Society's Breathe Freely initiative and its workplace management standard.

Art programme

The 120 metre-long glazed canopy and artwork for Paddington station will be fabricated and installed in 2017.

Innovate18

Discussions with other major infrastructure projects will continue to implement the migration of the Innovate18 programme as an industry-wide model. An official launch of is planned for the autumn, 2016.

Tunnelling and Underground Construction Academy

The Academy is evolving to include a training facility for rail operations and maintenance. The training will continue to be driven by industry needs.

Learning Legacy

Learning Legacy papers will be published and disseminated. Crossrail will continue to work with the Major Projects Association, HS2 and Thames Tideway as part of the Major Projects Knowledge Hub working group to develop a standard for learning legacy programmes across the industry.





PHASED INTRODUCTION OF THE NEW SERVICE

The TfL Rail service between Shenfield and Liverpool Street commenced operation in May 2015.

The service is operating using the existing trains and infrastructure. Introduction of TfL Rail has led to higher performance with the operator, MTR Corporation, now in the fifth highest performing train operator out of 20 across the country. As the project approaches each new service introduction phase, MTR will provide trained drivers (over 400 drivers by 2019) and station staff to support the expansion of services.

LOOK AHEAD

May 2017 – The first new train enters passenger service between Liverpool Street Main Line and Shenfield.

May 2018 – TfL Rail service opens between Paddington (Main Line) and Heathrow, replacing the existing Heathrow Connect service and part of the Great Western inner suburban service.

December 2018 – The Elizabeth line opens between Paddington and Abbey Wood, Liverpool Street to Shenfield, Paddington Main Line to Heathrow. The new Elizabeth line branding will also be rolled out and applied to stations, trains, uniforms and maps.

May 2019 – The Elizabeth line through service extends from Shenfield to Paddington.

December 2019 – The Elizabeth line is fully open, extending to Reading.



LEARNING LEGACY

On 26 February 2016 Crossrail launched its Learning Legacy website portal – a new online resource which shares insight from the project.

With over £400 billion of infrastructure projects identified in the Government's National Infrastructure Plan, the Learning Legacy seeks to collate knowledge and share good practice on a wide range of topics for the benefit of future projects and the wider construction industry.

This open resource includes technical papers, peer-reviewed case studies and procedures.

The resource is already populated with over 100 documents detailing the early learnings from the Crossrail programme. New material will be published every six months during the remainder of the project.

 learninglegacy.crossrail.co.uk

“ The creation of a learning environment is vital to improving project performance, and we see Crossrail's Learning Legacy as an impressive example of best practice. ”

Tony Meggs, Chief Executive, Infrastructure and Projects Authority

“ Passing on the lessons and good practice that we have learned at Crossrail is an absolutely essential part of raising the bar in the delivery of major projects ”

Andrew Wolstenholme, Crossrail Chief Executive



SUSTAINABLE CHOICES IN RAILWAY DESIGN

As the construction programme progresses, the new railway and stations are taking shape. The design choices across the project will ensure a sustainable future service as well as benefits that extend beyond the railway to recreational and agricultural sites across the South East.

Energy requirements have been reduced through prioritising natural light in stations, designing the vertical track profile to aid acceleration and deceleration, developing LED lighting for station and tunnel environments and specifying lightweight, energy efficient rolling stock and responsive escalators and lifts. Some of the commercial developments above stations will benefit from technology to extract ground heat, built into the fabric of the stations below.

Environmental impacts have been minimised by reusing 98% of excavated material from tunnels to build a nature reserve, restore land for recreational and agricultural use and by designing green features into stations and ventilation shaft structures. Sedum roofs will protect and enhance biodiversity and improve energy efficiency through its insulation properties and solar photovoltaic panels will reduce grid energy requirements.


Having incorporated these and other measures, the Elizabeth line's new stations will have achieved a rating of very good on the established building industry environmental rating scale BREEAM (Building Research Establishment Environmental Assessment Methodology).


Use of refurbished historic structures such as Connaught Tunnel in east London as part of the route and incorporating the frontage of the existing Whitechapel station helps to reuse resources more efficiently and preserve local character.


Sedum roof at Whitechapel will enhance biodiversity 

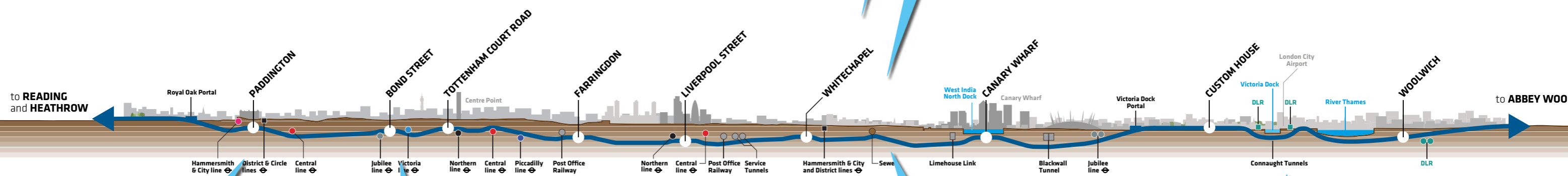
Retained station entrance at Whitechapel reduces waste and preserves local character 

The green roof on the ventilation shaft at Mile End will help protect biodiversity 

98% of spoil from tunnels was beneficially used to build nature reserves and restore land for recreational and agricultural use 

At Old Oak Common depot rainwater will be recycled for use in train washing; thermal piles and solar photovoltaic panels will reduce energy requirements 

Concrete with low cement content has reduced the carbon and energy used to build the stations 




The open void combined with the 120 metre canopy at Paddington allows natural light into the station 

Technology to extract ground heat around underground structures will reduce future energy requirements 


A solar photovoltaic array on the ventilation shaft will supply electricity to Whitechapel station 

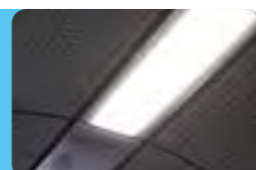
Retained infrastructure at Connaught Tunnel reduces resource use 

Escalators are responsive to passenger flows, to reduce power usage 

Terrazzo, made from waste stone, provides a sustainable floor surface for many stations 

Profiles of track reduce power required to speed up and slow down in and out of stations 

Lightweight lifts that use the energy they create when braking will reduce energy required by 20% 

LED lighting and controls in stations reduces energy requirements by 38% compared with fluorescent lighting 

Lightweight, efficient rolling stock reduces energy requirements 



ECONOMIC SUSTAINABILITY

ECONOMIC SUSTAINABILITY

Crossrail aims to contribute to a strong, stable economy, and generate economic benefits across the UK.

At least **£42 billion** estimated to be generated

55,000 jobs supported

96% of work awarded to businesses in the UK

62% of suppliers based outside London

62% of Tier 1 suppliers are small and medium-sized enterprise

1.5 million additional people to access central London within 45 minutes when the railway fully opens

3 million square feet of high quality office, retail and residential space at 12 sites

More than **1 million** square feet of improved public space across 40 sites

Delivery of **57,000** homes will be supported by the project

ECONOMIC PROGRESS: MAXIMISE COMPETITIVENESS AND PRODUCTIVITY OF THE ECONOMY

Indicator 1 – Location of businesses awarded Crossrail-related contracts

Crossrail has continued to monitor its critical construction contracts which are those that are awarded directly by Crossrail Limited. At the end of the reporting year, 96 per cent of these contracts were awarded to businesses within the UK and of those, 62 per cent were to suppliers based outside of London.

The project has reached the stage where Tier 1 procurement is almost complete. No major Tier 1 contracts were awarded by Crossrail in 2015. One major contract remains to be procured in 2016 for the construction of the Plumstead Maintenance Facility.

Procurement still continues by Crossrail's principal contractors, currently delivering the stations and tunnels fit-out works. To deliver these works, they are undertaking procurement and installation of complex mechanical and electrical equipment which requires new specialist expertise.

Crossrail continued to engage with the supplier community during the year. Project representatives met suppliers at events organised by the Electrical Contractors Association, the Federation of Small Businesses and Enterprise Nation. The project hosted three webinars, enabling accessible knowledge sharing without the need to travel. Provision of the webinars is particularly important to smaller businesses who may find time away from the office challenging. The associated multimedia content is placed on Crossrail's website as part of the project's online engagement.

Information was also shared with the teams developing the supply chain for High Speed 2. This is part of a broader approach to share the techniques and knowledge developed on one major UK project with another, to benefit future projects. Ongoing engagement with MPs included a meeting at the House of Commons to demonstrate how suppliers in their local constituencies are benefiting from Crossrail.

Indicator 2 – Delivery of whole-life value

The project's whole-life value has three principal elements: whole-life cost, value for money and benefit realisation.

Where a change has a material impact on the future operating cost of the railway, the impact is considered through Crossrail's change management control procedure, ensuring whole-life cost is assessed and value for money is achieved. Any change that impacts capital expenditure or future operating costs is assessed to demonstrate value for money aligned with government policy and guidance.

£1:£1.97

For every £1 spent Crossrail will bring £1.97 of transport benefit.

£1:£3

Benefit cost ratio increases to £3 for every £1 spent when considering wider economic benefits.

Forecast by the Department for Transport 2011

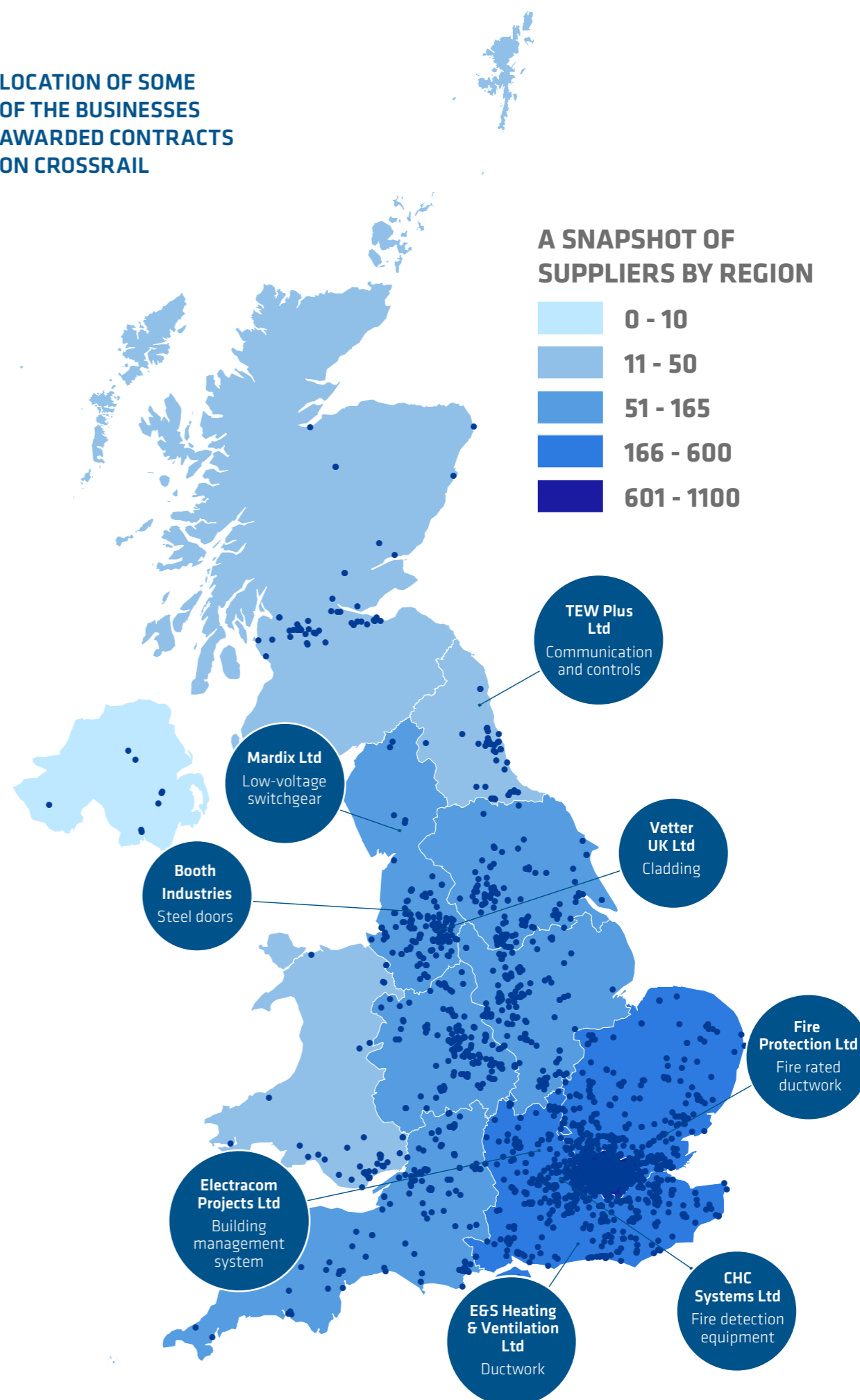
Indicator 3 – Number and size of businesses awarded Crossrail-related contracts

It has been important to attract a wide and diverse base of potential bidders for Crossrail work and ensure businesses in the UK, irrespective of size and location, are aware of the opportunities available. Crossrail works with all of its major contractors to keep track of the location and size of companies that bid for project work. Since the start of the project, UK companies have been engaged on the programme with many winning multiple contracts. Many of these contracts are awarded to small and medium-sized enterprises (SMEs). The railway systems and mechanical and electrical work stream of the construction programme has seen a further increase in the proportion of SMEs on the programme.

Highlights

- 96% of work has been won by UK companies
- 62% of these companies based outside London
- 62% of Tier 1 suppliers are SMEs
- 71% of Tier 2 suppliers are SMEs

LOCATION OF SOME OF THE BUSINESSES AWARDED CONTRACTS ON CROSSRAIL



“ There is no doubt that our association with the Crossrail project and the enhanced reputation that bodes well for future opportunities for our business. ”

BOOTH INDUSTRIES

Founded 1873
Based in Lancashire
100+ employees

Booth Industries has a unique market position as a provider of performance certified steel doors, a key component of a safe operating railway.

Providing turnkey packages from design through to commission, Booth serves a number of markets worldwide including offshore oil and gas, defence, petrochemical, pharmaceutical, transport and infrastructure.

The company has won numerous contracts on Crossrail, including cross passage tunnel doors and bespoke engineered doors for Canary Wharf, Bond Street, Tottenham Court Road and Liverpool Street stations and the Pudding Mill Lane portal totalling approximately £6 million. The company has also developed a brand new high performance insulated fire door specifically for Crossrail.

Booth states that they have gained numerous benefits from working on the project which has allowed them to increase the number of people they employ and develop their supply chain.



CompeteFor

CompeteFor is a free service that enables UK businesses to compete for contract opportunities linked to major public and private sector buying organisations.

Designed to be a fair and transparent procurement process it does not favour suppliers of any particular size and maximises the opportunities available to SMEs.

Over two years of construction remain and will continue to present opportunities for a diverse supply chain of businesses of all sizes. Crossrail will continue its commitment to encourage use of the CompeteFor service by its contractors.

Over-site development and urban realm improvements

Crossrail is the first major rail project in the UK to integrate the designs of its stations, urban realm and over-site developments, ensuring the new physical infrastructure weaves seamlessly into its surroundings, enhancing the experience for people. The profits from the property developments form part of the funding package – reducing costs to the taxpayer.

In addition to the railway infrastructure, Crossrail is supporting the delivery of:

- Three million square feet of high quality office, retail and residential space planned at 12 key sites above or near the new stations
- £130 million of urban realm improvements
- More than one million square feet of improved public space surrounding stations on the route

Independent research by property consultants, Bilfinger GVA, concluded that the project will also unlock or accelerate the supply of some 57,000 homes and 3.25 million square metres of commercial space. This is expected to add £5.5 billion to property values in London.

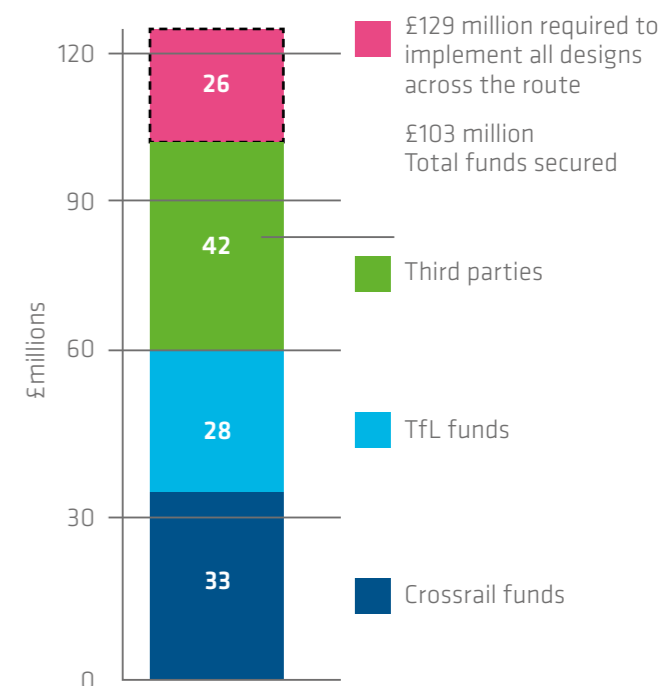
Crossrail is stimulating regeneration and economic growth

Funding urban realm improvements

Crossrail is improving public spaces around the new stations to maximise the regeneration opportunities and deliver an excellent experience for the people moving through these spaces. The improvements include new pedestrianised areas, wider footpaths and enhanced lighting and signage. Its urban realm initiative is delivered in partnership with Transport for London and local authorities who are contributing funding alongside Crossrail.

The target for contributions (set in 2010) was to raise £90 million by the time the railway opens in 2018. This target was exceeded in 2015. The total sum stands at £103 million which comprises significant increases in contributions from third parties (including local authorities and developers) which now make up £42 million of the total (compared to £27 million in 2014-15). The aim is to continue to promote the designs and achieve the £129 million required to deliver all of the urban realm improvements. This will continue beyond the opening of the new service in 2018. As a result, a significant number of stations across the route will have improved public realm beyond the station forecourts.

Urban realm funding: March 2016
 (Target for 2018: £90 million)



The progress to date shows that through genuine partnership, the project can be a catalyst for improvements funded and delivered by others.

The aim is to continue to promote the designs and to maintain and increase funds from third parties up until the end of 2018. The emphasis is now on co-ordinating the delivery of the improvement works so that they are managed alongside the completion of the stations and the construction of the over-site developments.



The Crossrail Effect

In 2012 and 2014 Crossrail commissioned property experts Bilfinger GVA to research development trends around its stations. The reports highlight the positive effect of Crossrail on property values and the numbers of planning applications submitted compared to areas not served by Elizabeth line stations.

In 2015 two property agents independently produced reports with similar conclusions: Knight Frank concluded that once averaged over each station, residential values around station sites between 2008 and 2013 out-performed other areas by around five per cent; JLL forecasted that house price growth outperformance between 2014 and 2020 would reach an average of eight per cent and a maximum of 19 per cent concluding that, 'areas experiencing significant regeneration to combine with the Crossrail Effect will benefit the most'.

Over-site development

The buildings above or around the new stations and associated urban realm schemes will deliver significant physical and visual improvements to the communities they serve. Great care and attention has been given to design to ensure integration with the existing urban fabric. All designs have been undertaken by leading architects and urban designers and have been reviewed and approved by the Design Council and the Commission for Architecture and the Built Environment. A number of the over-site developments have been evaluated as 'excellent' at the pre-assessment stage using the BREEAM environmental rating scheme.

The over-site developments in the central section of the route will deliver prime new commercial and residential space in some of the most sought-after and high-profile locations in London. In Woolwich and Limmo (Leamouth) Peninsula, the residential over-site developments will act as a major stimulus to regeneration in these locations and will contribute significantly to the housing targets in the boroughs.



SUSTAINABLE CONSUMPTION AND PRODUCTION

Indicator 4 - Environmental assessment ratings

CEEQUAL

The new tunnels, portals and shafts in the central section of the route are assessed for overall environmental quality using the Civil Engineering Environmental Quality (CEEQUAL) assessment scheme.

Areas of particularly good performance continue to relate to management of water resources, protection of water receptors, energy and carbon emissions, local community engagement and stakeholder relations.

On the outer surface sections of the route, several key elements including the Stockley flyover and Acton dive-under are also being assessed under the scheme. Eight projects are currently working towards CEEQUAL ratings. All projects bar one are on track to achieve a score of 'excellent'. Additional design evidence is required to support the remaining target rating for the approaches leading to Paddington station from Old Oak Common.

CEEQUAL	Target rating	Client and interim design rating	Post construction rating
Western Tunnels	Excellent	Excellent	Excellent achieved
Eastern Tunnels	Excellent	Excellent	On target
Thames Tunnel	Excellent	Excellent	Excellent achieved
Sprayed Concrete lining structures	Excellent	Excellent	On target
Paddington Integrated Project	Excellent	Excellent	Excellent achieved
Eleanor Street / Mile End shafts	Excellent	Excellent	On target
Victoria Dock portal	Excellent	Excellent	Excellent achieved
Pudding Mill Lane	Excellent	Excellent	On target
Royal Oak portal	Excellent	Excellent	Excellent achieved
Connaught tunnel	Excellent	Excellent	Excellent achieved
Stockley flyover	Excellent	Excellent	On target
Acton dive under	Excellent	Excellent	On target
Western outer track infrastructure	Excellent	On target	On target
Western inner track infrastructure	Excellent	On target	On target
Old Oak Common Paddington approaches	Excellent	To be confirmed	To be confirmed
West stations	Excellent	On target	On target
Northeast section	Excellent	Excellent	On target
Southeast section	Excellent	Excellent	On target

BREEAM

Crossrail has adopted the Building Research Establishment Environmental Assessment Methodology (BREEAM) for the new stations being delivered.

Since the last report, the design stage assessment for Farringdon station has been completed and certified. Opportunities to improve overall performance continue to be explored collaboratively. These are subject to engineering feasibility, cost and programme

delivery constraints. Several opportunities are being investigated that will consolidate the 'very good' rating and contribute to an overall performance score towards the higher-end of the rating band.

Structures being certified under BREEAM are unlikely to be fully certified for their post-construction rating until late 2017 or early 2018.

BREEAM	Target rating	Design stage rating	Post construction rating
Tunnelling and Underground Construction Academy	Very Good	Achieved	Excellent achieved
Paddington station	Very Good	Achieved	On target
Bond Street station	Very Good	On target	On target
Tottenham Court Road station	Very Good	Achieved	On target
Farringdon station	Very Good	On target	On target
Liverpool Street station	Very Good	Achieved	On target
Whitechapel station	Very Good	Achieved	On target
Custom House station	Very Good	Achieved	On target
Abbey Wood station	Very Good	On target	On target
Woolwich station	Very Good	On target	On target
Iford logistics and stores	Very Good	Achieved	Very good achieved
Iford operations and welfare	Very Good	On target	On target
Plumstead depot	Very Good	On target	On target
Old Oak Common depot	Very Good	On target	On target



Indicator 5 – Recycled content by value

Recycled content by value is the standard industry metric developed by the Waste Resources Action Programme (WRAP) for the measure of recycled content within construction products.

Crossrail set a target of 15 per cent across the programme with a stretch target of 20 per cent based on consultation with industry experts from the WRAP. At the end of this reporting period 34 per cent had been achieved. This surpassed the original target but is consistent with past years, attributed largely to the use of similar construction materials – mainly steel and concrete.

As the construction transitions to architectural finishes, including cladding and flooring, this figure is likely to reduce, although remain significantly above the original 20 per cent stretch target figure. Contractors continue to seek opportunities to procure products with higher recycled content where they exist and where there are no commercial constraints. Successes in this area include an increase in cement replacement in concrete where it can be accommodated. This also has the added benefit of reducing the embodied carbon in concrete.

Most of the major concrete pours came to an end this year, however, construction of station walls continued, presenting an opportunity to procure blockwork (concrete or similar material used in the construction of a wall or other structure) with higher recycled content. The recycled content in the blockwork being used by Crossrail is typically 50 per cent, compared to standard market products that average less than 10 per cent.

Indicator 6 – Recycling and reuse of waste material

During 2015-16, 389,068 tonnes of material was excavated from tunnelling and underground station construction, 98 per cent of it was diverted from landfill. This material was beneficially reused at a number of sites across the south east such as the Ingrebourne Valley in Essex where it is used to restore to recreational and agricultural uses. This brings the total excavated to approximately 7.9 million tonnes since construction began. The amount excavated during 2015-16 is significantly less compared to previous years as these works near completion.

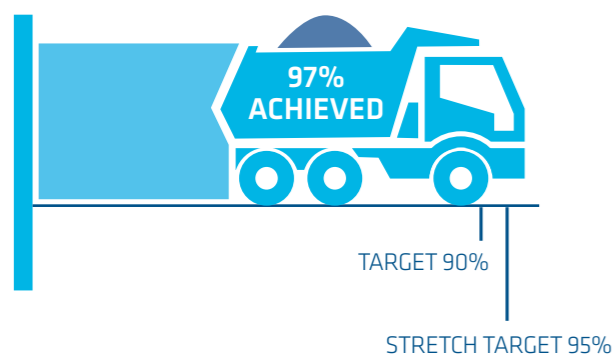
67,280 tonnes of construction and demolition material, the majority of which is construction waste, was also produced. Ninety-seven per cent of this was diverted from landfill. The high diversion from landfill rates achieved has been a major success for the project so far.

Excavated material represents a relatively homogenous waste stream composed predominately of soil and stones. This has been beneficially reused for projects such as Jubilee Marsh at Wallasea Island, which was created using more than three million tonnes of excavated material from Crossrail.

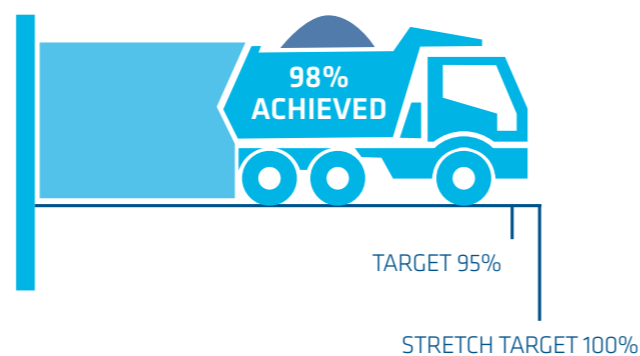
The materials produced from the railway fit-out, although smaller in volume, consist of diverse packaging materials and are more likely to be sent for recycling and recovery rather than re-use. One example being implemented is a plastic frame system used to transport lighting. The system is fitted with shelves allowing them to be returned to the supplier who re-stocks and returns them to site with the next shipment, thus saving on a huge amount of packaging waste. Crossrail will work closely with its principal contractors to set targets for this waste stream.



Construction material
2015-16



Excavated material
2015-16



ENVIRONMENTAL SUSTAINABILITY

Building a large, long-term infrastructure requires the use of significant natural resources during construction and the railway's operational life. Crossrail aims to minimise the environmental impacts of both. This includes the beneficial reuse of excavated material to create new habitats, minimising energy consumption as well as the impact of construction on communities and designing in future flexibility to accommodate likely impacts of climate change.

- **More than 3 million tonnes of excavated spoil contributed to the creation of Jubilee Marsh as part of the Wallasea Island Wild Coast project**
- **Up to 72% cement replacement is helping reduce carbon emissions**
- **Approximately 2.5 million tonnes of CO₂ reduction expected over the 120 year life of the railway**
- **Over 10,000 objects unearthed in one of the most extensive archaeological programmes ever undertaken in the UK**

ENVIRONMENTAL SUSTAINABILITY ▶

PHYSICAL ENVIRONMENT AND NATURAL RESOURCE PROTECTION

Air quality

Crossrail is committed to reducing particulate emissions from construction machinery as part of the environmental minimum requirements standards it is required to meet. The use of diesel particulate filters or cleaner Euro Stage IIIB engines on construction plant and equipment is helping minimise the negative impact on air quality from diesel emissions.

The supply chain engagement indicates that in stipulating high requirements, mega projects such as Crossrail are able to stimulate the market, making it worthwhile for the supply chain to invest in this equipment. The benefit of this carries through to projects beyond Crossrail,

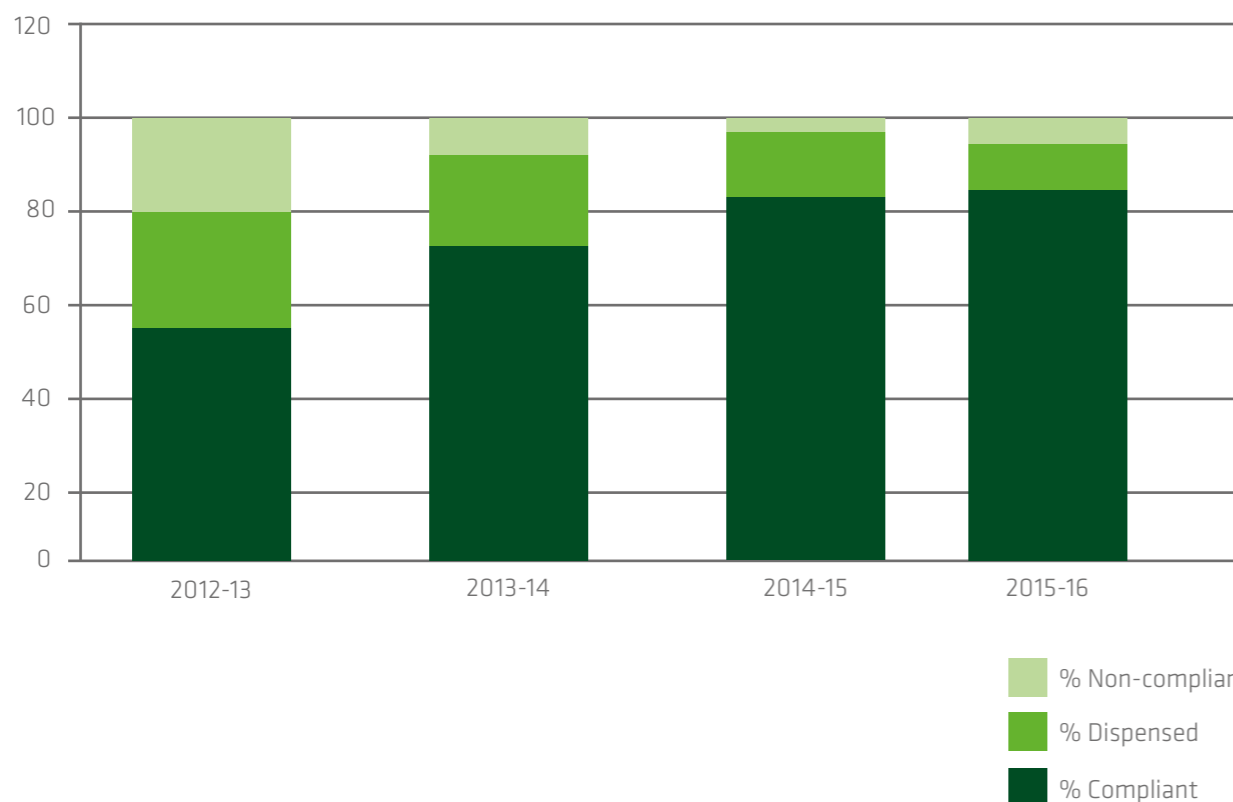
particularly to smaller projects that could not otherwise influence this level of change.

Eighty-four per cent of equipment used in the central section is fitted with emissions controls. A further 10 per cent of equipment was awarded a dispensation where it was not deemed practicable to fit these controls; a reduction from the previous year. There has been a focus on promoting the use of emissions controls on equipment such as generators which are recognised across the industry as difficult to retrofit. This type of equipment had been dispensed in previous years but this year it was reported as non-compliant. This will remain an area of focus.

A 2014 Network Rail review of compliance against the requirements of Non-Road Mobile Machinery (NRMM) on emissions confirmed that 72 per cent were fitted with emissions controls or Euro IIIB engines, making them compliant. It is the intention to undertake further analysis on NRMM in the next year.

Crossrail continued to provide advice to the Greater London Authority on the implementation of London's Ultra Low Emission Zone for construction machinery, which came into force in September 2015.

Construction machinery emissions control performance



Water use

Over 200,000 cubic metres of water was used for construction during 2015-16. This is a reduction of 75,000 cubic metres compared to the year prior which is commensurate with the cessation of tunnelling and other heavy civil engineering. The most water intensive works involved tunnel boring machines and sprayed concrete lining.

Rainwater will be harvested at Old Oak Common and used to wash the new trains

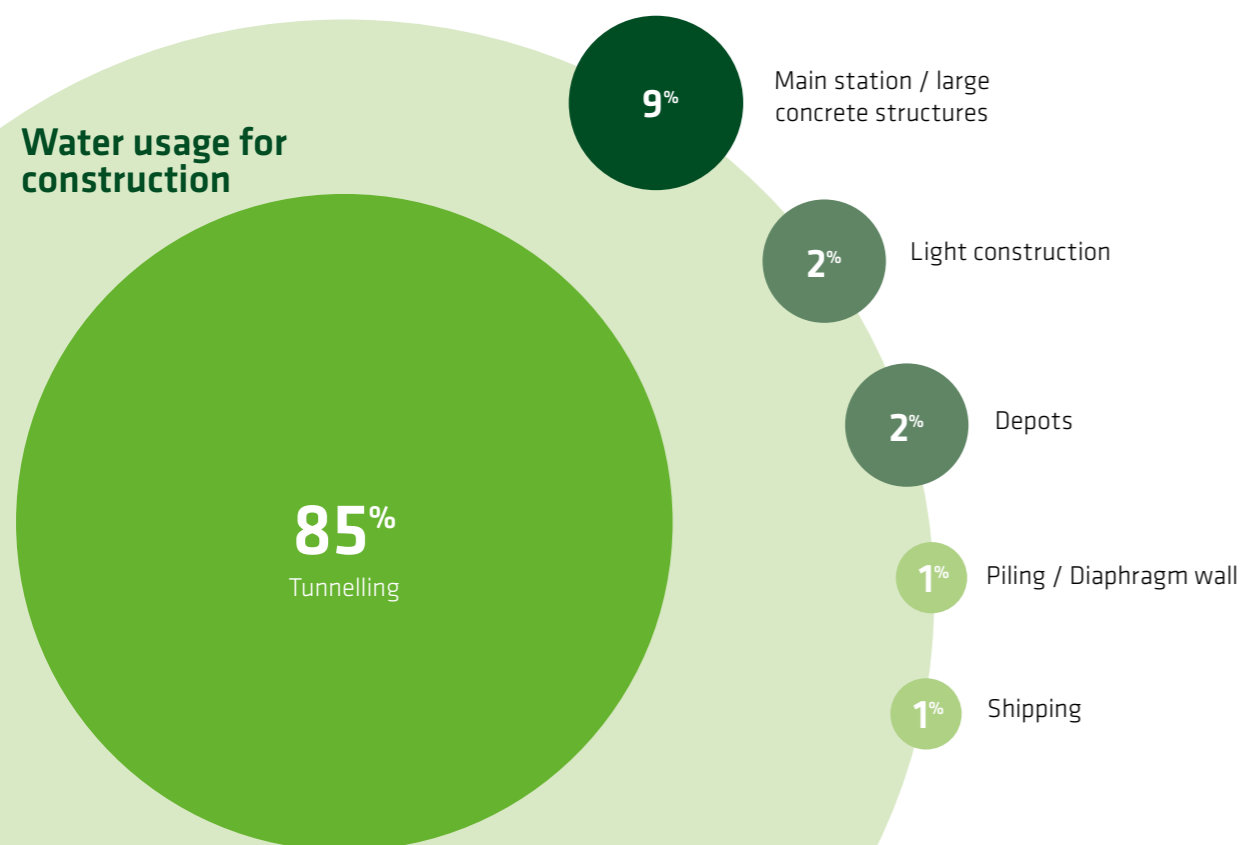
Crossrail's railway systems contractor, Alstom, TSO and Costain (ATC), responsible for the fitting out the railway, requires a variety of plant, materials and fuels to deliver this complex component of works. Amongst these, a 465 metre-long train, operating as a mobile concrete batching plant, pours the wet concrete required to build the new tracks. The train needs to be cleaned daily and a bespoke concrete washout pit is required to facilitate the safe and environmentally acceptable removal of wash water and residual sediment (containing cement, sand, aggregates and petroleum products) whilst reducing waste transfer

costs. This wash water is treated to a standard that allows it to be used in fresh concrete batching, saving a significant volume of potable water.

Crossrail is undertaking groundwater remediation at Pudding Mill Lane, Stratford, using ozone sparging and vapour extraction. Due to the various historic industrial uses at the site a source of contamination is in the groundwater. Crossrail together with its contractors and the Environment Agency are remediating over the next year to ensure the area is left suitable for future intended use.

Water saving features have also been factored into the future operational railway. These include low volume flush and leak detection systems for stations and portal washroom facilities as well as rainwater harvesting at the Old Oak Common depot which will be used to wash the new trains.

Water usage for construction



THE GREEN LINE

Crossrail recognises that improving environmental performance means helping everyone involved to understand what needs to be done and providing the motivation to do it. The Green Line Recognition Scheme aims to recognise and reward contractors that engage with and support their teams to promote better environmental behaviour. It also aims to promote continual improvement by maintaining good performance and sharing successes.

Since the beginning of the project, 18 contracts have received Green Line recognition and two further contracts are working towards it under this scheme.

Crossrail has been working on updating the scheme to reflect the changing nature of works on the programme and will be launching the Green Systems Scheme in the next financial year which is tailored towards railway systems contractors and the interfaces with other contractors.



Find out more at: learninglegacy.crossrail.co.uk

BIODIVERSITY ON THE OUTER SECTIONS OF THE ROUTE

In accordance with the DEFRA biodiversity accounting methodology, an objective has been set to protect and enhance biodiversity in the outer section of the route to achieve a target of 'no net loss' during construction.

An important aspect of biodiversity compensation, or offsetting, is stakeholder consultation. The first stakeholder workshop took place on 28 October, 2015 and was well attended with representatives from local authorities, conservation groups and Crossrail's supply chain.

The aims of the workshop were to:

- Raise awareness of our commitment and approach to 'no net loss'
- Explore views and opportunities on delivering 'no net loss' for the Crossrail programme
- Develop a delivery framework for 'no net loss'

The long-term maintenance of compensation sites that are created was an area that participants believed needed careful consideration. Overall, stakeholders felt the programme was a good opportunity to engage with local communities and benefit biodiversity.

All risks and opportunities that were identified from the workshop are being reviewed and incorporated into a delivery framework currently under development.

Consultation will now take place with local stakeholders to establish suitable areas for providing compensatory biodiversity planting. Network Rail and their consultants WSP: Parsons Brinckerhoff received a Bronze Award at the Green World Awards in October 2015 in the category of 'Conservation, Habitat and Diversity' for this work.

Biodiversity

Over three million tonnes of excavated earth contributed to the creation of a landmark 1,500 acre wildlife habitat at Wallasea Island - a collaborative project between Crossrail and the Royal Society for the Protection of Birds (RSPB). In September 2015, the sea walls were breached to allow the tidal water to flood into the new wetland habitat. Since the breach, the RSPB has undertaken detailed monitoring of the area to ensure it will establish a suitable habitat for many thousands of visiting birds. Named Jubilee Marsh, the area created by Crossrail sees around two million cubic metres of water enter and leave the breached area every day.

Raised embankments that were barren with spoil from the tunnels are now lush with greenery. Feeding birds are expected to move in as the marsh builds up with silt and vegetation and becomes colonised by invertebrates. In early November 2015 at least 39 different species of birds were counted at the site including the peregrine falcon, kingfisher, avocet and corn bunting. The RSPB expects more than 10,000 birds to visit Jubilee Marsh in 2016.

More than 10,000 birds expected at Jubilee Marsh within a year of creating the new wetland habitat at Wallasea Island

Crossrail and Network Rail have undertaken work using the DEFRA biodiversity accounting methodology to determine the value of habitats lost and created. Habitats that can be included in site restoration have been identified in the central section and these are being continually reviewed as work progresses and it becomes clearer what land will be retained as part of the operational railway. A multidisciplinary working group has been set up internally to maximise the opportunities for biodiversity enhancement. An example of restoration that resulted in improved biodiversity value is the Ham and Wick worksite in east London. This site was used to support tunnelling operations and was originally intended to be returned as a car park for local residents. In consultation with the local community, a planting scheme of trees and shrubs has been implemented around the car park boundary, enhancing the site for future use.

Archaeology

The Crossrail project has resulted in one of the most extensive archaeological programmes ever undertaken in the UK.

Since 2009, more than 200 archaeologists have unearthed over 10,000 objects at 20 locations.

Research has been carried out to understand the impact of construction on the archaeology along the route. This research has culminated in successful archaeological investigations carefully coordinated with the construction programme and is contributing important knowledge about London's history.

Archaeological fieldwork programme

In October 2015, the large-scale excavation of the Broadgate ticket hall at Liverpool Street station was completed. More than sixty archaeologists worked around the clock for three months to excavate complex deposits up to five metres deep.

3,500 skeletons of the 16th and 17th Century Bethlem burial ground were excavated. Amongst these were approximately 42 individuals interred in a burial pit, possibly associated with one of the plague outbreaks in the 17th Century.

Several hundred skeletons are undergoing in-depth osteological analysis and advanced scientific testing to learn more about London's population during this period. This is by far the largest archaeological sample of the early modern London population ever studied and a selection of these will be considered for retention by the Museum of London for future study. The remainder have been respectfully reburied in a new burial ground.

The archaeologists also found important Roman remains at the site. Parts of a northwest-southeast aligned road were found running almost parallel to the old Roman City wall. Approximately 20 skulls were encountered in the road's southern ditch and eight roman burials in its immediate vicinity, of which three were decapitated individuals. Some of the Roman remains have been selected for isotope analysis which may reveal their geographical origins. Radio carbon dating of the remains will also help uncover whether these skulls ended up in this area in just one or multiple events.



Post-excavation dissemination and publication

A significant milestone for the archaeology programme in February 2016 was the publication of the first two volumes in the Crossrail archaeology series. A further eight books in the series will be published over the next 12 months.

Crossrail's archaeology programme has produced an extensive body of 'grey literature' which consists of a digital library of fieldwork reports, desk-based assessments, project designs and archaeological drawings that are not formally published.



Volume 1: Stepney Green: Moated Manor House to City Farm
Volume 2: The Thames Ironworks 1837-1912: A Major Shipbuilder on the Thames

Community information and resources

The excavation at Liverpool Street attracted significant media attention throughout the year. The dig was featured on multiple programmes such as BBC Breakfast, Blue Peter, The One Show and Radio 4 Today programme. Channel 4 TV commissioned and broadcast two programmes as part of their 'Secret History' series focussing on the Roman Walbrook skulls (Spring 2016) and the Bethlem burial ground (Spring 2015). Crossrail's archaeology programme was also highlighted in the Financial Times and the Current Archaeology magazine (April 2016) and featured internationally in the cover story 'Under London' in National Geographic magazine (February 2016).

Find out more at: learninglegacy.crossrail.co.uk

Urban realm

At some of the sites it is possible to integrate elements of the historic environment within the urban realm. In this way modern design maintains a link with local heritage and acknowledges the history of the area. At Liverpool Street a memorial to the Bethlem Burial Ground is planned as part of the new station structure.

At Pudding Mill Lane, two 19th century parish boundary markers were recovered during excavations; one marked the old West Ham parish boundary and the other possibly the boundary of a private area. Both markers will be reinstated in the final urban realm design of the area.

Although no heritage assets have been removed and re-sited in their original location to date, opportunities to incorporate these within the completed urban realm designs may be presented through collaboration with local authorities. Others have been donated to different museums and institutions.



126 Public enquiries on archaeology addressed

106 Events (talks, site visits and exhibitions) delivered

22 Heritage assets reused or relocated off site

20 Professional and technical publications

12 Educational events carried out

9 Permanent heritage led installations installed in permanent locations



ADDRESS CLIMATE CHANGE AND ENERGY

Indicator 7 – Carbon footprint

In 2014 Crossrail signed up to the Green Infrastructure Board's (GIB) Infrastructure Carbon Review, making the following commitments:

- Commit to minimise the carbon footprint of the programme through the construction phase
- Commit to achieving energy saving efficiencies through design of station facilities and best practice in operation
- Commit to working with the supply chain to procure materials and products for Crossrail that take due account of their sustainability and impact on the project's carbon footprint

The commitment was signed by Crossrail's CEO and is supported by the senior leadership team.

Construction carbon emissions

At the start of construction, Crossrail set a target of reducing its construction-related carbon emissions by eight per cent and is currently on target to achieve it. With over 70 per cent of construction completed, and many of the energy intensive activities reducing, the current reduction is just under 11 per cent against the baseline figure. This has reduced slightly on the figure reported last year but is equivalent to the stretch target.

Estimated £2 million cost-saving through efficient fuel and electricity usage

In last year's report it was noted that the tunnel boring machines had consumed significantly less energy than anticipated in 2009. It was also indicated that this would be verified in the 2016 report to ensure that the assumptions in 2009 were reasonable. Based on the information available at the time the assumptions suggest the major factor contributing to the decrease in energy usage has been the use of power factor correction demonstrating the value of this technology for large electricity loads with high induction.

Working together with the supply chain, initiatives focussed on utilising more efficient plant and equipment have continued to progress. These include:

- LED lighting inside stations and tunnels
- Hybrid and hydrogen technologies
- Solar photovoltaic panels
- Renewable energy tariffs where supply chain contractors have been able to secure cost-effective deals

To provide a more robust approach to the calculation of carbon associated with green tariff electricity Crossrail has used the Greenhouse Gas Protocol Scope 2 Guidance (an amendment to the GHG Protocol Corporate Standard published in 2015) and only credits carbon reductions for those tariffs that are calculated in accordance with this guidance.

A spreadsheet-based carbon calculation tool, first developed in 2014-15, was further refined this year to provide a more consistent and robust evaluation of construction carbon emissions. It also provides contractors with a tool that allows for carbon reduction options to be assessed on-screen prior to implementation on site. An evaluation of carbon emission impact at the end of contract can be made, before an initiative is implemented.

Find out more at: learninglegacy.crossrail.co.uk

The business case for these initiatives demonstrates an estimated energy cost saving of £2 million through less fuel and electricity usage.

Embodied carbon

As reported previously, reductions in the embodied carbon footprint have been made possible through the use of concrete with cement replacements. Cement production is carbon intensive as the conversion of calcium carbonate to calcium oxide, one of the key components of Ordinary Portland Cement, releases carbon dioxide. Furthermore the heat required for cement kilns is derived from hydrocarbon based fuels. Any reduction in cement therefore has a benefit in reducing the inherent carbon within the concrete

Work with the supply chain to identify cement replacement opportunities has continued to reduce the carbon emissions from this component of the programme.

Crossrail's concrete specification requires a minimum of 50 per cent cement replacement but the project has been able to increase this amount to as much as 72 per cent with associated carbon reductions at sites such as Paddington station. However, there are two main reasons why accommodating these changes

is not always possible: the particular performance requirements of the concrete may not be suitable; and the longer curing time of concretes with high cement replacement may have a negative impact on the construction programme.

Given the changing nature of construction during the year which has moved away from large concrete pours, new opportunities for cement replacement have diminished. However, the opportunities that have been identified continued to be implemented, contributing to an incremental embodied carbon reduction.

Rolling stock and depot

The design review of the new Class 345 rolling stock was completed and gives confidence that the planned energy efficiency features will be realised. With train construction now fully underway the total train mass remains on target – a major determinant of how much

Up to 72% of cement replacement where possible is helping reduce carbon emissions

energy the train will use on each journey.

The design ensures good aerodynamic performance. The first train will move to the Melton Mowbray test centre in the summer of 2016; this will be the opportunity to fully assess the actual electrical efficiency of both the electric traction system that propels the train and the heating and ventilating equipment.

At Melton Mowbray, basic operation of the Automatic Train Operation (ATO) capability will be demonstrated and allow the ATO algorithms that determine optimal acceleration and braking rates to be checked. The various tests will allow the operating arrangements for the train to be developed into the means for managing a sustainable railway.

At Old Oak Common the structure of the main depot building is substantially complete, enabling work to focus on fit-out including installation of various sustainable features such as the photovoltaic roof panels, energy piles and rainwater harvesting. This progress will allow the BREEAM credentials of the final building to be fully achieved

Overall, the combined technologies are predicted to reduce operational carbon emissions from the depot by 35 per cent. If this is achieved, it will considerably improve the overall target to reduce CO₂ by 20 per cent.



Other carbon reduction measures

Given the nature of underground stations and the tight physical constraints at sites it has not been possible to harness renewable energy on any scale. However, it was recognised that Crossrail's construction programme provided a unique opportunity to future-proof the over-site developments, by incorporating technology to extract ground heat from the station structure for the benefit of the building above the station.

The new stations have a design life of 120 years (although are expected to last considerably longer) whereas a typical commercial development in central London is likely to be replaced at least twice during this time. If the station does not have the provision for the capture of this ground heat now, then the opportunity is lost for at least the next century.

Crossrail has worked closely with the prospective developers of these sites to ensure that the capability to capture both heating and cooling from this provision is utilised when the first commercial developments are

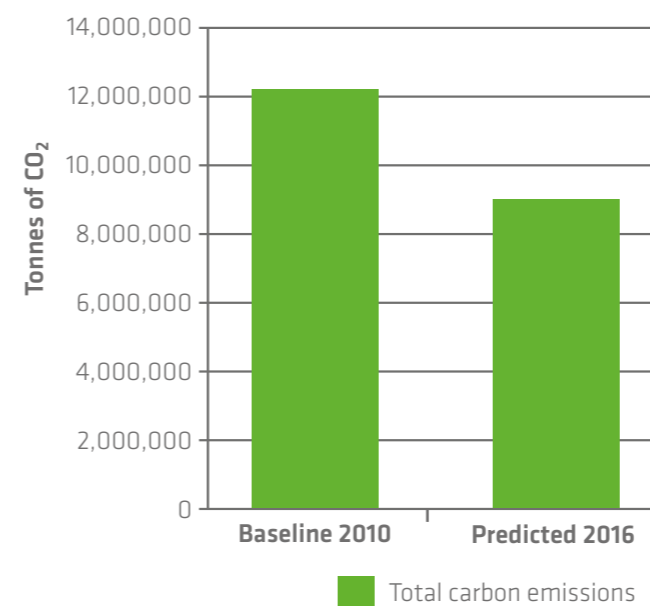
built. The buildings above both the eastern and western ticket halls at Tottenham Court Road station and the eastern ticket hall at Liverpool Street station are expected to make use of this heat.

Whitechapel station is topped with a sedum roof and incorporates solar photovoltaic panels on its Duward Street shaft which will provide a viable proportion of the station's energy requirements.

In taking account of carbon savings during construction and in operation, it is expected that an overall reduction of approximately 2.5 million tonnes of CO₂ will be achieved over the 120 year design life of the railway. This equates to around 20 per cent improvement over the original baseline figure.

**Approximately
2.5 million
tonnes of CO₂ reduction
expected over the 120 year life
of the railway**

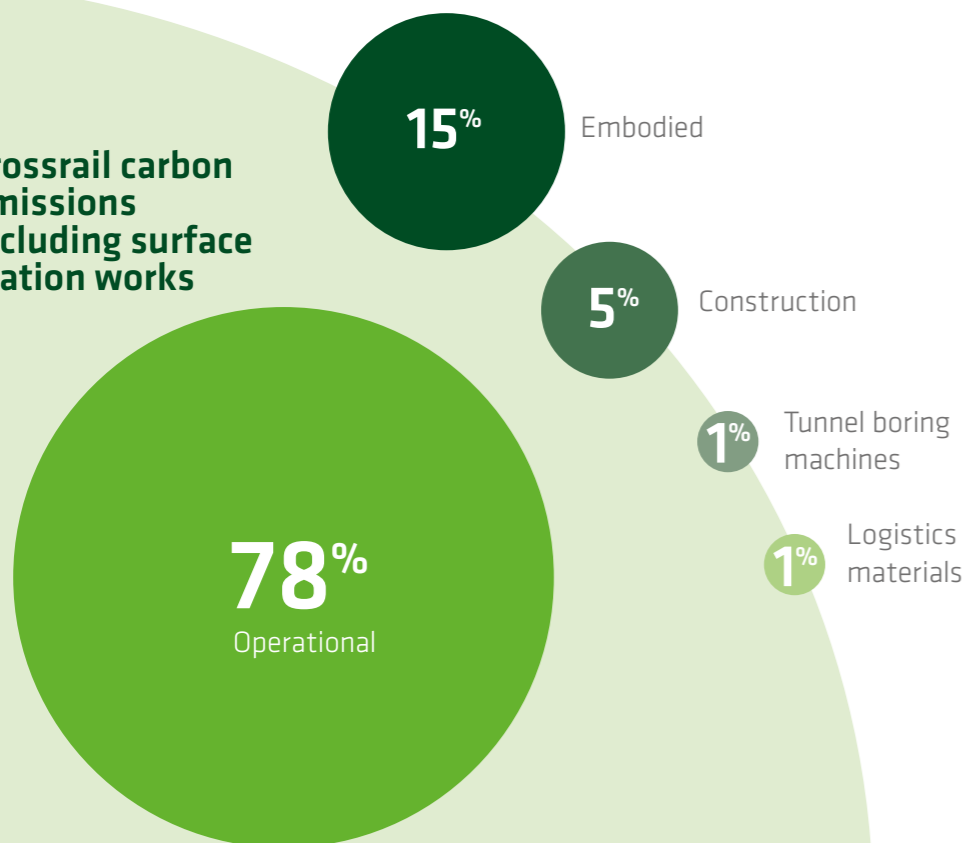
Total carbon emissions



Managing the operational energy over the lifetime of the railway is of great significance as it equates to 78 per cent of the overall carbon footprint. The focus on keeping train weight to a minimum and ensuring an uninterrupted service with minimal signal failures will also help minimise emissions.

Furthermore, the design of the mechanical and electrical components within the stations has progressed and a reiterative process is being undertaken to ensure these are optimised.

Crossrail carbon emissions including surface station works



Indicator 8 – Environmental complaints

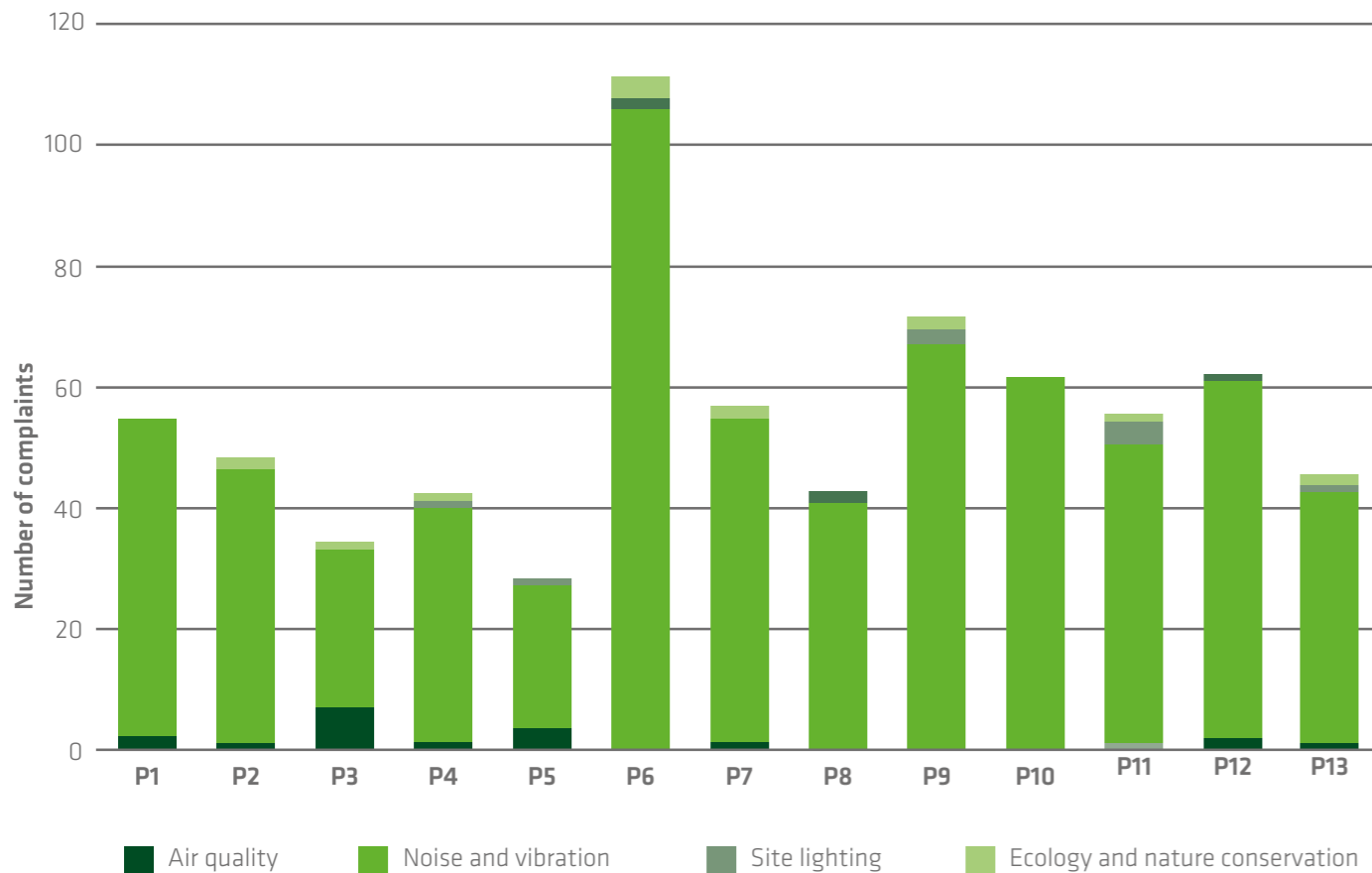
Limiting the impact of construction works on people that live and work in close proximity to Crossrail sites has been a challenge for the project. Mitigating this risk has involved a combination of industry best practice techniques and local authority engagement to devise and approve appropriate working methods for sensitive areas. There is a 24-hour helpline that allows people to seek advice or register a complaint.

In 2015-16 the Crossrail Helpdesk received a total of 725 environmental complaints, of which 94 per cent were related to noise and vibration. Fifty per cent of complaints were from the sites between Paddington in the west and Plumstead Portal in the east. The complaints in this section were predominantly related to night time works affecting residents living in close proximity to the works at Whitechapel, Bond Street and Farringdon. This is a reduction compared to 2014-15 due to the nature of the works changing from heavy civil construction towards railway fit-out.

On the outer surface sections of the route, 363 complaints were received, compared to the 167 complaints the year before. The vast majority of these were noise and vibration related. This can be attributed to the intensification of works in the outer east and west, in particular electrification and station works in the west and station and track works at Abbey Wood. These works have been delivered predominantly during night time possessions and have involved noisy activities such as hammer piling.

Ongoing engagement with the local communities on the route continues so that they are given advance notice of works. At Whitechapel and to a lesser extent, at Bond Street, the most seriously affected residents were provided with temporary re-housing during the noisiest works. A comprehensive programme of secondary glazing installation has also been undertaken in many properties in these areas to help mitigate noise.

Total number of environmental complaints for 2015-16



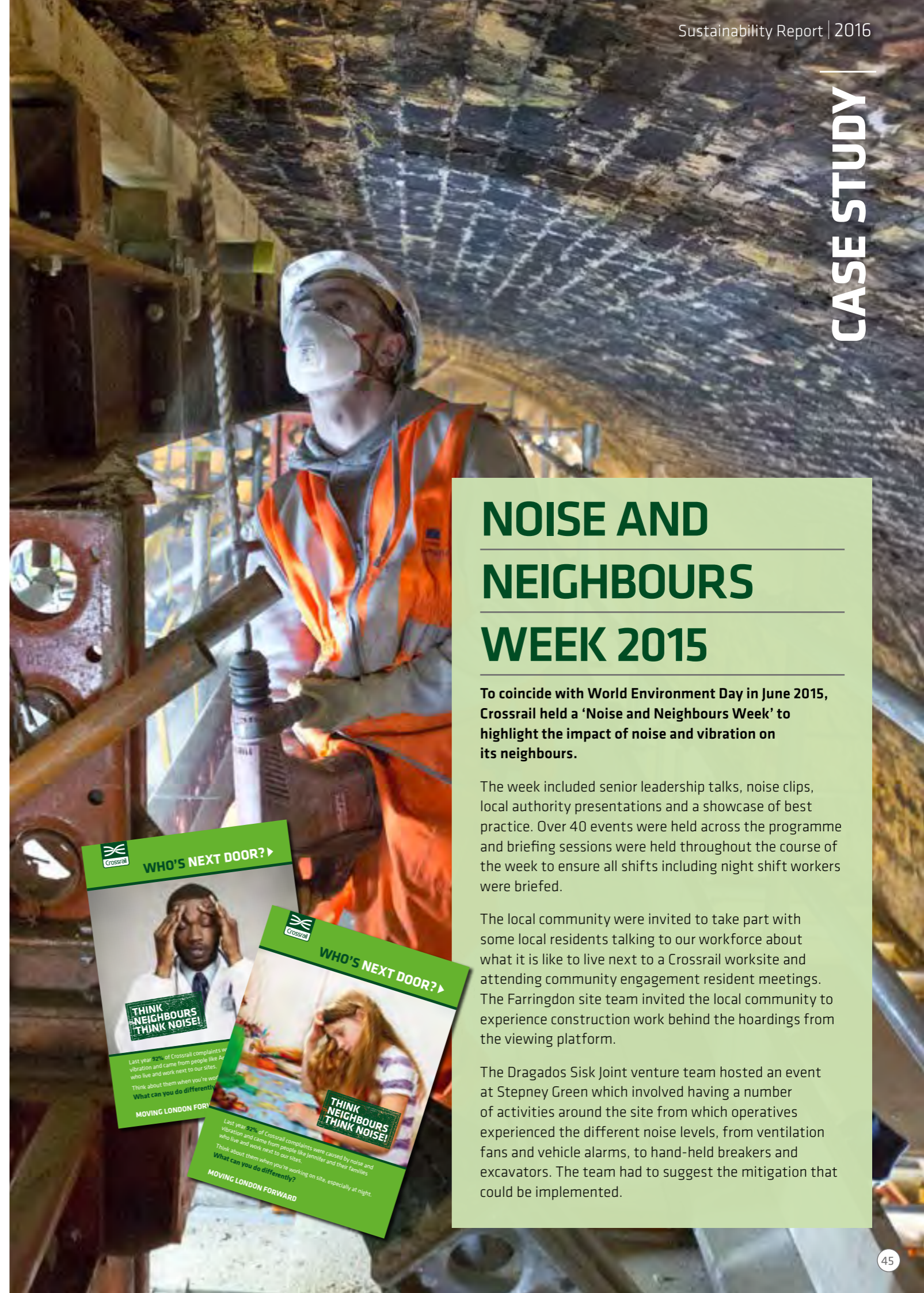
NOISE AND NEIGHBOURS WEEK 2015

To coincide with World Environment Day in June 2015, Crossrail held a 'Noise and Neighbours Week' to highlight the impact of noise and vibration on its neighbours.

The week included senior leadership talks, noise clips, local authority presentations and a showcase of best practice. Over 40 events were held across the programme and briefing sessions were held throughout the course of the week to ensure all shifts including night shift workers were briefed.

The local community were invited to take part with some local residents talking to our workforce about what it is like to live next to a Crossrail worksite and attending community engagement resident meetings. The Farringdon site team invited the local community to experience construction work behind the hoardings from the viewing platform.

The Dragados Sisk joint venture team hosted an event at Stepney Green which involved having a number of activities around the site from which operatives experienced the different noise levels, from ventilation fans and vehicle alarms, to hand-held breakers and excavators. The team had to suggest the mitigation that could be implemented.



SOCIAL SUSTAINABILITY

Crossrail is a major employer and offers a significant opportunity to develop a highly skilled workforce. A significant investment in training and education maintains the high standards required to deliver the railway and will benefit future projects. A key priority is to maintain the highest health and safety standards across the project and help raise the bar for the industry.

- **Target Zero** aspiration remains core to promoting health and safety excellence across the project
- Nearly **10,000** drivers trained in road safety
- **573** apprentices helping deliver Crossrail
- **4,544** jobs created for local and/or previously unemployed people
- **15,800** students, teachers and parents engaged to promote careers in engineering and construction
- Over **1,000** innovation ideas submitted across the project
- A **digital version** of the railway being developed to be handed over to the future operator
- **7** exciting public art installations to be delivered

SOCIAL SUSTAINABILITY

IMPROVE HEALTH WELLBEING AND HAPPINESS

Occupational health and wellbeing

There has been significant progress in the management of health risks, improvements in the treatment of common health conditions and a rise in the awareness of good mental health and wellbeing in the UK, however there is still scope for further development.

Crossrail's Occupational Health and Wellbeing Strategy has been refreshed to incorporate the four cornerstones for health, and now provides an occupational health and wellbeing maturity matrix, where sites can demonstrate how they have developed from the 'awareness' category to an 'advanced' status.

In 2015, implementation of programmes and initiatives under each of the four cornerstones for health continued.

Health risk company – commitment to the health of our workforce

The internal drive for sustainable development of occupational health and wellbeing continues. In 2015, a number of commitments were introduced to support embedding the desired leadership and culture:

- To improve understanding of occupational health and wellbeing and develop a culture of wellbeing
- To develop and implement an occupational health and wellbeing standard on each site
- To measure and monitor key performance indicators
- To implement a management training programme on health and wellbeing
- To identify and manage key health risks
- To implement an appropriate health surveillance programme
- To improve communication regarding health and wellbeing throughout the organisation to increase awareness of all staff
- To coordinate health campaigns and initiatives
- To complete the occupational health and wellbeing maturity matrix and gain year-on-year improvement

Health risk management – protecting our workforce from inherent risks and ensuring zero harm

During 2015, findings were shared from research on air quality in tunnelling and recommendations made on maintaining good practice, as well as developing a best practice guide. Further research on the impact of shift work on fatigue has provided valuable information on how best to improve the management practices and the need to implement regular awareness training, intervention and monitoring. At a local level the key health risks continue to be controlled and monitored, including; noise, vibration, dust, chemicals and manual handling.

Externally, Crossrail has played a key role in the Health in Construction Leadership Group which has been formed to raise the awareness of occupational ill health and disease within the construction industry and to energise the industry to do more to prevent such harm. The group comprises contractors, clients, the Health and Safety Executive (HSE), professional bodies, trade associations and trade unions and is co-chaired by Crossrail's Health and Safety Director.

Fitness for work – managing the effects of health on work

Early intervention on ill health reduces the negative impact on both the individual and the organisation. In 2015, the audit programme focused on assessing the processes in place to refer staff for specialist health advice and support. Ongoing communication about the robust drug and alcohol testing programme continued to help ensure a reduction in the potential risks and establish a culture where misuse is not tolerated.

Wellbeing – providing information and tools to maintain optimal health

The wellbeing programme focusses on three areas:

- Management of common health conditions such as diabetes, high blood pressure and cancer
- Influencing healthy lifestyle choices such as healthy eating, being active and stop smoking
- Raising awareness of mental health and wellbeing

The local calendar of events and toolbox talks focused on the first two areas while Crossrail focused on a long-term campaign to provide the knowledge and skills to address the stigma of mental health, providing practical tools to improve wellbeing and developing networks of support.



PROTECT PEOPLE'S SAFETY SECURITY AND HEALTH

Indicator 9 – Construction health and safety

Safety remains the most important value across the Crossrail programme.

The number of hours worked in 2015-16 increased to 19.3 million compared to 18.8 million in 2014-15. Along with this increase, Crossrail's transition from heavy civil engineering based-work, to railway fit-out has gathered pace and led to many new workers to the project. Crossrail has adapted its approach to promoting health and safety to account for these changes and to ensure the good health and safety culture is adopted by these new workers from their first day on site.

The Target Zero aspiration remains at the core of Crossrail's approach to promoting excellence in health and safety. It has been integrated into a new programme-wide induction and utilised in all health and safety communications and initiatives undertaken.

The three founding principles of Target Zero remain unchanged:

- We all have the right to go home unharmed every day
- We believe that all harm is preventable
- We must all work together to achieve this

Supporting the Golden Rules a number of 'High Risk Activities' were also identified and agreed. These High Risk Activities are those that will be present during the remaining phases of the project.

The five new behavioural based Golden Rules introduced in 2015 to support the Target Zero aspirations.



RESPECT THE BASICS



ASSESS THE RISKS



CHECK THE SITE



FOLLOW SITE REQUIREMENTS



SUPPORT EACH OTHER



This updated approach has been designed to evolve with the programme and will continue to be used to ensure the Target Zero philosophy is fully engrained across the organisation.

Three Corporate health and safety objectives have been set:

Objective 1: Strive for excellence in industry health and safety performance

Crossrail continues to utilise the Health and Safety Performance Index (HSPI) as the mechanism to provide a leading indicator of its contractors' health and safety performance, as well as their commitment to continuous improvement. As in previous years, HSPI was reviewed at the start of the year to ensure measures remained relevant and challenging with new, more challenging, metrics being implemented from April.

The Gateway health and safety assessment scheme forms part of the HSPI scoring process. Gateway assessments include on-site review of processes, initiatives and evidence. It promotes good practice and innovation amongst contractors and provides a chance to share ideas and learning across the entire programme. The output from gateway assessments contributes to 50 per cent of HSPI. Assessments are now undertaken once a year except for new contracts. This year a second contract, Bond Street station, achieved an overall status of 'Inspiration', joining Paddington station, at this, the highest level available within the scheme.

Indicator 10 – Health and Safety Performance Index

A HSPI score of 1.0 signifies contractual compliance. Above 1.0, and up to a maximum of 3.0, signifies increasing levels of good practice. Crossrail's overall HSPI score was 2.33 at year end, improving from 1.96 at the beginning of the year following the introduction of the new, more challenging measures. Ninety-four per cent of all Crossrail contracts (15 out of 16) scored 2.0 or above by the end of the year, exceeding the Corporate objective of '85 per cent of contractors above or equal to 2.0'. HSPI metrics will again be reviewed and updated in 2016-17, to maintain the challenge and ensure contractors address relevant issues.

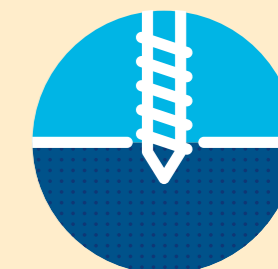
Objective 2: Continue to drive the Frontline Leadership Programme

The Frontline Leadership Programme (FLP) provides training for contractors' supervisors to improve their leadership skills, including competencies to help them exhibit the right behaviours in terms of health and safety. FLP has been running since 2012 and, following continued success and good feedback, an objective was again set to progress a further 100 supervisors through the programme this year. This objective was exceeded, with a total of 130 additional supervisors enrolled over the course of the year. Almost 400 supervisors have now been engaged in the FLP programme to date.

FLP has received external recognition from the Construction Industry Training Board (CITB) and further recognition is being sought from the Institute of Leadership and Management (ILM)



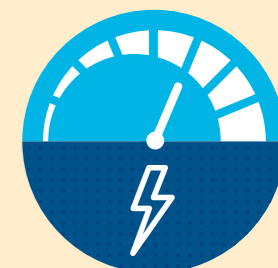
CONFINED SPACES



BREAKING GROUND



FIRE/HOT WORK



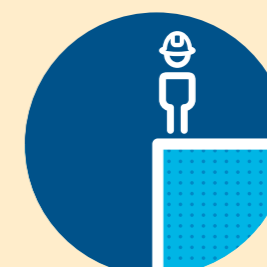
ENERGISED SYSTEMS



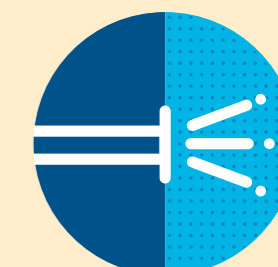
PEOPLE & PLANT



LIFTING OPERATIONS



WORKING AT HEIGHT



SPRAYED CONCRETE LINING



RAILWAY OPERATIONS

Crossrail High Risk activities

Objective 3: Drive down accident rates

Crossrail set the objective to reduce the Accident Frequency Rates (AFR), measured over a rolling year and normalised per 100,000 hours worked, by 20 per cent this year.

The RIDDOR AFR (including injuries resulting in more than three days lost time) did not meet this target, however it did reduce from 0.18 to 0.17, an improvement of five per cent over the previous year. It should be noted that although the target for RIDDOR AFR was not achieved at year end, for much of the year, the rate was in decline, approaching target levels and even exceeding the target during one period.

The Lost Time Case (LTC - accident resulting in one or more day's absence) AFR met the target, reducing to 0.26 from 0.32, a reduction of 20 per cent.

This continued reduction in AFR, during a period of significant change in risk profile and personnel, demonstrates Crossrail's approach to health and safety remains effective. This year the focus has been on developing the approach to account for the changing risks and personnel by updating many of the now standard annual initiatives accordingly and by adding new approaches where required.

- Programme-wide induction (PWI) - As work on the project has transitioned from multiple, independent

worksites to a single connected structure, access and induction arrangements required review. The programme-wide induction was developed to offer a consistent message and approach for induction across the project. The content was developed in consultation with principal contractors. It was designed to be interactive and to provide key information on Crossrail values, health and safety, environment and quality requirements. It was launched at the start of 2015-16 and is mandatory for anyone that is working on a Crossrail site.

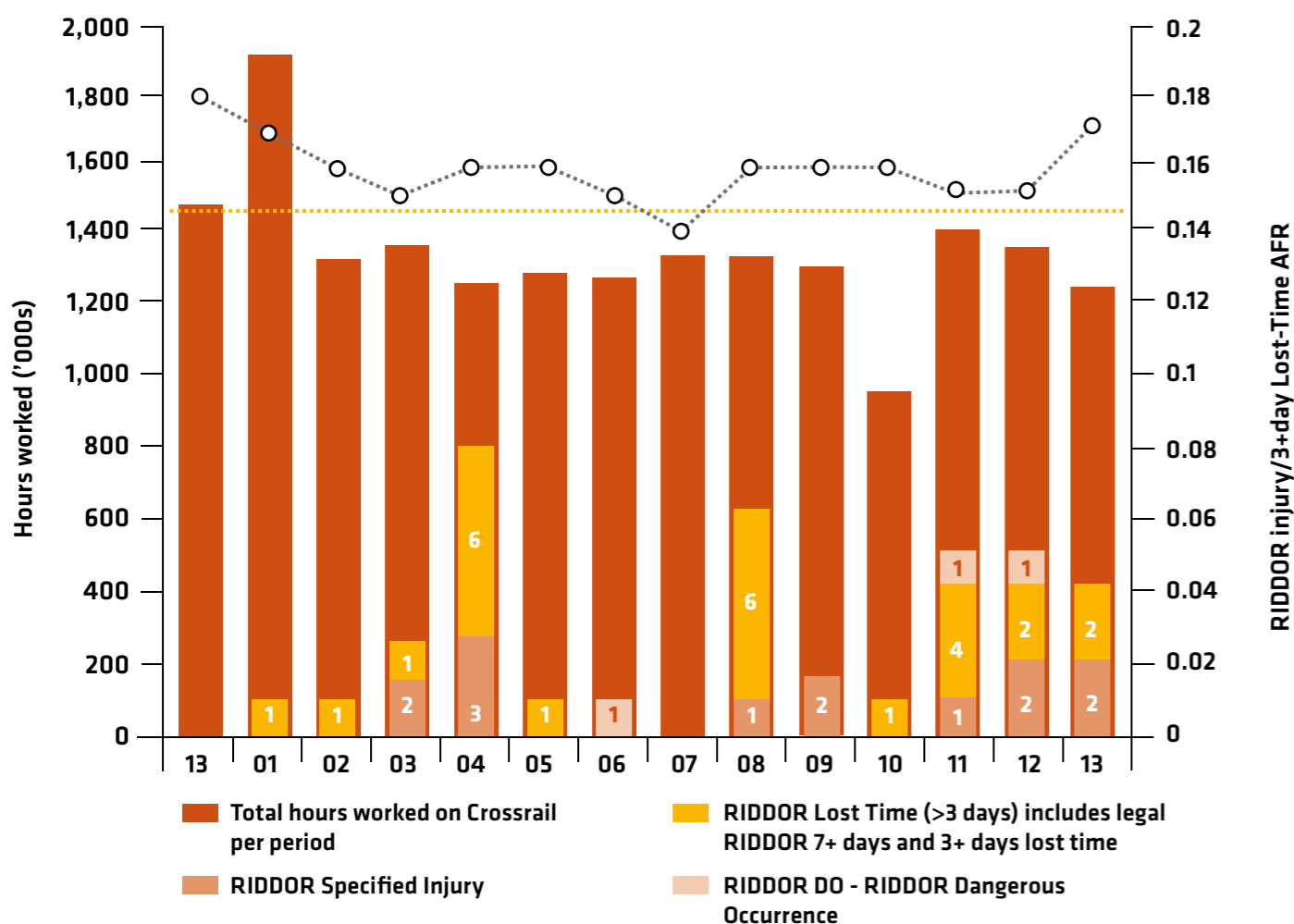
- Golden Rules - As already outlined, the Golden Rules and associated messaging were updated to be behaviour-based and applicable to all types of work. The updated Golden Rules and High Risk Activities have been comprehensively incorporated into the PWI.
- Diversity and inclusion (D&I) - This work is aimed at improving health and safety performance by integrating a focus on D&I our existing strategy. This concept stems from the belief that diverse and inclusive teams perform well in all things, including health and safety. By ensuring everyone on the programme feels valued, respected, included and relevant, it ensures everyone is supporting each other and considering each other's health and safety. D&I has been integrated into the existing processes,

including Gateway, Have Your Say and management systems. Work will continue this coming year to further embed D&I in all H&S activities.

- Have Your Say survey - First launched in 2013 this initiative helps gauge health and safety culture across the programme. The survey has been completed each year, resulting in feedback that gives a sample reflection of the organisational culture. For the 2015 survey, Crossrail included a focus on health and wellbeing as well as diversity and inclusion. Over 4,100 surveys were completed with predominantly favourable responses. Action plans have been compiled to address any deficiencies that were identified.
- Stepping Up Week - Two more Stepping Up Weeks were held this year, with activities at all sites designed to improve and enhance engagement in health and safety. Specific themes were incorporated for each week to focus teams on topical issues. The first was focused on the launch of the new Golden Rules, with the second focusing on mental health and wellbeing.
- Best practice guides - 'Construction Site Fire Safety', 'Pressure Systems', 'Air Quality in Tunnel Environments' and 'Lifting Operations' best practice guides were created collaboratively with contractors during the year.

- Health and safety alerts and good practice bulletins - 36 health and safety alerts and 14 good practice bulletins were created and distributed across the project, ensuring consistent and shared knowledge among all contractors.
- Behaviour Influences Behaviour (BIB) - BIB was designed to raise health and safety standards and to help achieve the Target Zero goals by driving the right behaviours. The course was delivered throughout 2015-16 to Crossrail employees. The updated course examines how employees' behaviour, remote from site though it may seem, can influence that of operatives that are actively engaged in construction activities. The course has received consistently positive feedback and will continue in 2016-17.
- Assurance - A risk-based schedule was again developed and delivered, with a total of 86 health and safety assurance audits and 20 occupational health audits carried out during the year. Fire safety assurance and compliance assessments were also undertaken by the London Fire Brigade (LFB) Liaison Officer for Crossrail. These assessments ensured that the core LFB requirements are being met, as well as identifying both areas for improvement and good practice which was shared across the programme.

Find out more at: learninglegacy.crossrail.co.uk



Construction logistics and road safety

Crossrail has re-drawn the traditional boundaries of health and safety to include all drivers, vehicles, companies* and deliveries engaged in building the new railway. The high standards and best practices implemented and demonstrated through this leadership continue to influence projects in London and beyond.

The Construction Logistics for Cycle Safety (CLOCS) initiative that was founded on the best practice implemented by Crossrail, continues to gather pace and is now widely supported. As a CLOCS Champion, Crossrail regularly plays a key role in helping shape this initiative by sharing lessons learned with working groups managed by Transport for London CLOCS team. Crossrail also continues to pass on best practice to other infrastructure projects, local authorities and recently to the Sydney Metro logistics team.

Safer construction vehicles

Since introducing stringent standards for all contractors' vehicles involved in building the new railway (over 40,000 heavy goods vehicles and more than 14,000 vans) have been made safer through working on Crossrail. The fitting of safety equipment to all lorries working on the project, along with rigorous compliance assurance procedures each time a vehicle visits a worksite, has raised the bar for vehicle safety in the construction industry. Crossrail continues to deliver Compliance Assurance Training to Principal Contractor staff to ensure they are qualified to undertake systematic safety checks every time a vehicle visits site. Each check is recorded on a handheld computer and reported monthly to monitor and track the compliance levels of each principal contractor. At the end of March 2016 the principal contractor level of vehicle safety compliance across the project was running at 98.5 per cent. This is a testament to the ongoing commitment and co-operation of Crossrail's supply chain to meet its contractual requirements and to make London safer for vulnerable road users.

Upskilling lorry drivers

During the period of this report, 101 lorry driver training (LDT) courses were delivered, bringing the overall total to 662 courses. This has seen nearly 10,000 drivers complete the one day course. This training remains focussed on 'sharing London's roads with vulnerable road users' but is overlaid by key project information covering Crossrail health and safety policies, approved lorry routes and contract requirements covering vehicle safety requirements. Crossrail continues to host observers from stakeholder organisations, safety managers and company directors from the supply chain.

The two main LDT KPIs during 2015-16 remain consistently high as follows:

- 90.25% of drivers said: "This course has significantly raised my awareness of sharing London's roads"
- 92.14% of drivers said: "This course will definitely make me a safer driver"

In conjunction with TfL, Crossrail has contributed to the development of the new 'Van Smart' driver training which was rolled out in the last quarter of 2015-16. Crossrail's supply chain has free access to this training which is setting a new standard for drivers of commercial vehicles up to three and a half tonnes.

Road safety in the community

Exchanging Places and London Bike Show

Since 2012, Crossrail in conjunction with the Metropolitan Police and the City of London Police, has been running Exchanging Places safety events around its central London worksites. Crossrail also organised the annual Exchanging Places exhibit at the London Bike Show in February 2016. Crossrail led this initiative for the third year running bringing together the Metropolitan Police and 24 CLOCS Champions for the three day event.

The 2016 Bike Show event reached over 1,000 vulnerable road users who participated in safety briefings and had the opportunity to take part in a new virtual reality Exchanging Places experience using special 3D headgear.

To date, Crossrail has reached over 4,700 cyclists and vulnerable road users by engaging directly with them to raise their awareness of sharing London's roads safely with HGVs.

Young Crossrail – cycle safety

Young Crossrail once again worked with the Metropolitan Police as part of the three-week Junior Citizens Scheme for primary school students in Newham. The event was held in January 2016 and saw Young Crossrail ambassadors present a cycle safety scenario alongside safety critical situations from other organisations including the Metropolitan Police and London Fire Brigade. It included a 'Be Safe, Be Seen' interactive session which encourages students to wear helmets and reflective clothing and use bike lights.

This initiative also aims to help students understand the dangers of blind spots in an engaging way through the use of a mock-up HGV lorry, webcam and a related video clip.

Continuous commitment

The Crossrail programme continues to stand out as a leading example focused on the safety of vulnerable road users. During the year covered by this report no fatal collisions occurred involving lorries operated by a Crossrail contractor. Crossrail continues its efforts to improve safety for vulnerable road users and encourage the construction industry to follow the best practices standards it has helped set.

The Exchanging Places initiative has reached over **4,700** cyclists and vulnerable road users



* All haulage and transport companies working on Crossrail must be at least bronze members of the Fleet Operator Recognition Scheme (FORS).

PROMOTE GREATER QUALITY OF OPPORTUNITY AND SOCIAL INCLUSION

Ethical Sourcing

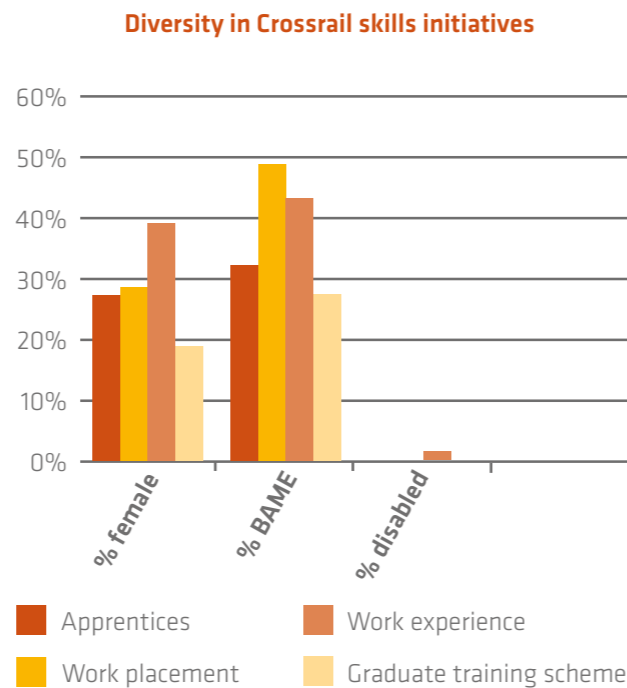
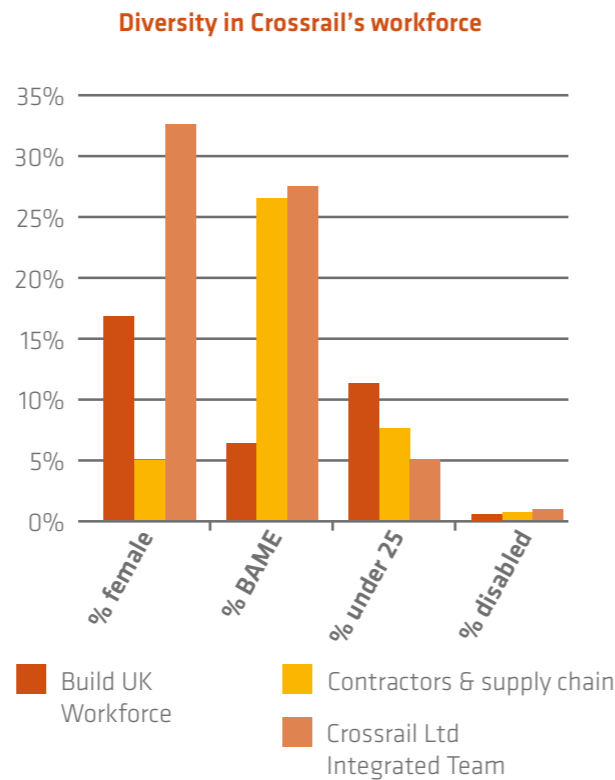
Crossrail has continued to keep its vigilance on ethical sourcing through collaborative working with its Tier 1 contractors and their supply chains, as well as with various industry bodies. A key success during the year has been linked to the Crossrail Learning Legacy programme with resources shared with the Construction Industry Research and Information Association, Action Programme on Responsible Sourcing, Building Research Establishment, Supply Chain Sustainability School and Institute of Environmental Management and Assessment. The tools developed on the project have been shared and are available to the wider community. Crossrail has been represented on the steering group for forthcoming publications from the BRE and CIRIA on responsible procurement and has also contributed to the Manifesto for Ethical Sourcing. The manifesto challenges the industry and seeks to embed ethical sourcing across the construction industry and was developed by 35 co-authors representing clients, contractors, designers, manufacturers and suppliers. It has been recently promoted via the Institution of Civil Engineering's procurement and supply chain campaign.

Indicator 11 – Diversity in Crossrail's workforce

Crossrail and its contractors are committed to promoting diversity, valuing talent and respecting each other and the communities they impact. The table (right) shows the diversity of Crossrail's Integrated Team and its contractors' workforces, measured against Build UK main contractors' industry data.

An encouraging picture of diversity is seen in specific work-related programmes, such as higher levels of Black, Asian and Minority Ethnic (BAME) and female representation in work experience, work placements and apprenticeships.

The percentages of both women (32 per cent) and people from BAME groups (27 per cent) in Crossrail's Integrated Team have increased modestly in comparison



with last year: by two per cent and three per cent respectively. The proportion of people who self identify as having a disability has remained broadly the same at around one per cent.

To help address workforce gender diversity, Crossrail has continued its partnership with the Women into Construction organisation.

To date, 24 women have benefited directly from this partnership which has included 20 work placements of six weeks each covering engineering, health and safety and various trade occupations. Fourteen of these candidates have gained full-time employment on the project, including 10 who have moved directly from work placements into jobs.



“ It’s a fantastic role as I get hands-on experience on a real working site. I’m constantly gaining new experiences and facing new challenges. ”

Zoe Conroy, Technician Engineer and 500th apprentice on Crossrail

Indicator 12 – London Living Wage

Crossrail contractors and their supply chain are required to pay workers on the project's London sites the London Living Wage. This is the hourly rate of pay set by the Greater London Authority and is based on the cost of living in London.

Crossrail continued its work with its contractors to establish robust processes for monitoring and enforcing London Living Wage compliance. These include asking all individuals coming to work on site whether they are receiving the London Living Wage or better. Contractors are also expected to undertake regular payroll audits of their subcontractors, prioritising those considered to be 'high risk'.

Over the past year, Crossrail has participated in several forums with contractors and the Living Wage Foundation, exploring how enforcement of living wages might be extended more widely within the construction and transport infrastructure sectors.

Strategic Labour Needs and Training

Crossrail requires each of its contractors to deliver specific skills and employment outcomes proportionate to the value of their contract. These are known as SLNT targets. Through these commitments, Crossrail's

contractors develop their workforces' skills and offer opportunities for local people to work on the project and improve their employability.

Indicator 13 – SLNT compliance

Crossrail reviews the SLNT progress of its contractors every quarter and provides support to optimise the opportunities provided. Over the past year, Crossrail has been especially active in encouraging contractors to involve their supply chains in the delivery of apprenticeships and other SLNT opportunities on the project. When last assessed, only one out of sixteen live contracts was not on track to meet or exceed its SLNT targets.

Indicator 14 – Apprentices

By the end of 2015-16, a total of 573 apprentices had been recruited to help deliver the project, surpassing the original target of 400 apprenticeships over the lifetime of the project.

Crossrail continued to build on its work in the area of provision and retention of high quality apprenticeships. Contractors with robust recruitment processes and strong mentoring and support systems at site level were generally found to enjoy the best retention rates for apprentices.

Since the start of the project, Crossrail's Tier 1 contractors have been required to deliver at least one skills or employment-based outcome for every three million pounds of tendered contract value as part of individual contractual agreements. These include job starts by previously unemployed people, apprenticeships, graduate traineeships and work placements.

The use of procurement as a means to increase the number of apprenticeships right through the supply chains was one of the principal recommendations in the 'Transport Infrastructure Skills Strategy' drawn up

27 per cent of new apprentices in the past 12 months are female

by Crossrail Chairman, Sir Terry Morgan. Released in January 2016 by the Secretary of State for Transport, Patrick McLoughlin MP, the strategy intends to support the sector achieve a collective target of 30,000 new apprenticeships by 2020, contributing to the UK Government's overarching objective of three million apprenticeships over the same period.

Crossrail is also contributing directly to the work of the Strategic Transport Apprenticeship Taskforce (STAT),

established by the Secretary of State to bring together employers to address the skills gap in the transport sector and oversee the implementation of the 30,000 apprenticeship target. Its board membership includes Crossrail's Talent and Resources Director. Crossrail employees are also involved in the STAT working groups and sharing their experience implementing supply chain skills and employment targets.

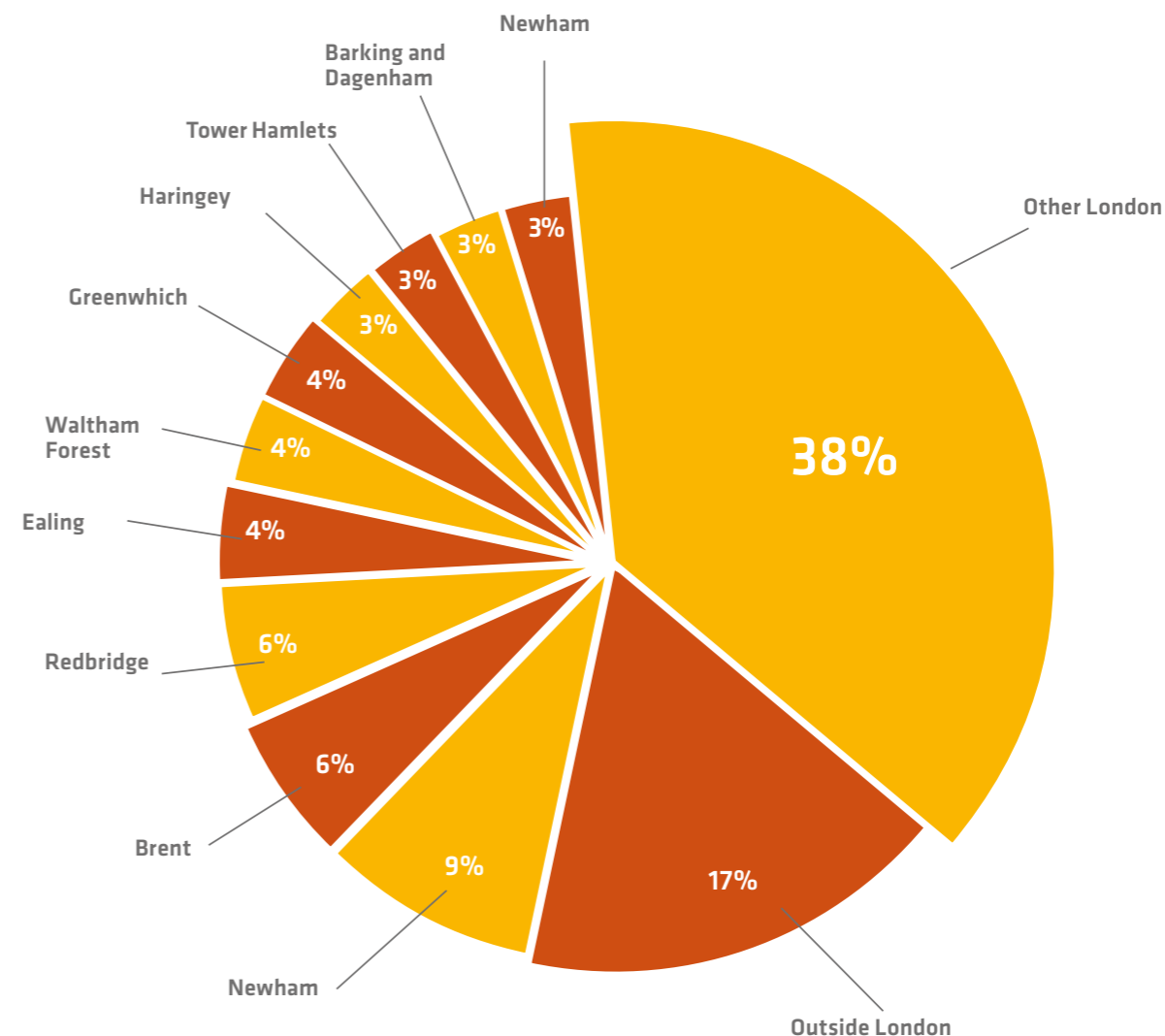
The London Major Programmes Apprenticeship was expanded at the beginning of 2016 to include other geographical areas of Network Rail infrastructure projects. There are now 25 apprentices on the programme of which four are within Network Rail's supply chain. A target was also set to create nine additional apprenticeships sponsored by Network Rail and its supply chain, seeking to address the social mobility agenda, targeting young people along the route.

Indicator 15 - Jobs brokerage service and local employment

During 2015-16 Crossrail continued to operate a dedicated Jobs Brokerage service, delivered in partnership with Jobcentre Plus. This ceased operating at the end of March 2016, following a reduction in available contractor vacancies as the Crossrail project moved from civil engineering to railway fit-out and more specialised job requirements.

Since its inception in 2011, the Crossrail Jobs Brokerage directly secured employment for more than 700 local or previously unemployed people. It also championed several initiatives to improve skills development and

New job starters by Borough



employment opportunities for particular disadvantaged or under-represented groups, including injured former service personnel, unemployed young construction workers and women.

Crossrail and several of its contractors are now actively supporting the Build London Brokerage: part of an important new integrated skills and employment initiative called Skills Planner. The Build London Brokerage is also a partnership with JobCentre Plus and offers access to construction jobs across a wider range of projects and employers.

By the end of 2015-16, a cumulative total of 4,544 jobs had been created on the project for local and/or previously unemployed people: an increase of 429 from the figure reported in last year's report. The chart above shows the breakdown of job starts by the top 10 boroughs.

Other work opportunities

Crossrail's aim to equip its workforce with key competencies and skills remains an important priority. The Tunnelling and Underground Construction Academy (TUCA) set up by the project offers specialised courses for the sector and other crucial training.

Since the start of the project, 1,109 young people have taken part in work experience on Crossrail, both on site and at head office. Longer work placements of between 11 and 100 days enable people to learn, develop or improve their knowledge and skills. There have been 489 such placements on the project to date.

In 2015-16, contractors took on 72 additional graduates on a training scheme, bringing the total graduate intake on the project, including Crossrail's own graduate scheme, to 494. The positions offered cover many disciplines and each graduate spends a minimum of six months working either directly with Crossrail, one of its Tier 1 contractors or a member of the supply chain.



Sir Terry Morgan with Crossrail's Apprentice of the Year Charley Whitelock

“ I was so encouraged by the intelligent, courteous, inquisitive questions! If these young people are anything to go by, this is a generation that will do great things and so I want them in our industry! ”

Linda Miller, Project Manager, Crossrail

WOMEN INTO CONSTRUCTION

Women into Construction (WiC) candidates who found jobs on the project, assisted by the Crossrail Jobs Brokerage:

Stamatia Kantziari

Stamatia wanted help finding employment after completing her civil engineering degree at Brighton University. WiC helped Stamatia take the compulsory Construction Skills Certification Scheme test, followed by

a site visit to Pudding Mill Lane. After meeting Stamatia, Morgan Sindall offered her a six-week work placement on a Crossrail contract, at Whitechapel, and then full-time employment in the surveying and monitoring team at Whitechapel.

Narges Afshari

Before meeting WiC, Narges (a refugee from Iran) was working as a shop assistant. WiC arranged a work placement for Narges with the Dragados Sisk joint venture on its eastern running tunnels contract. Dragados were so impressed that they then offered Narges employment as a ground settlement engineer on the contract, allowing her to capitalise on her previous six years' experience analysing rock formations in Iran and BSc and MSc degrees in geology.

Indicator 16 – Volunteering

During 2015-16, the number of Young Crossrail ambassadors grew from 250 to 280. This number includes 62 STEM ambassadors who are allied to the STEMNET programme. The ambassador number has fluctuated over the year due to staff joining and leaving the project. There has been an increase in the number of individuals from the supply chain signing up to the programme and volunteering at Young Crossrail events on a regular basis.

Ambassadors played a key part in a number of successful initiatives rolled out through the programme. Some highlights include; mentors working with student teams in preparation for the First Lego League robotics competition, assisting at Skills London and Skills Show careers exhibitions, supporting schools careers fairs and apprenticeship events, delivering cycle-safety workshops to primary school students, hosting careers talks and site visits, assisting with employability workshops and supporting a number of corporate work experience students from partner schools. In total, volunteers logged over 1,000 volunteer hours over the year.

A range of other volunteer activities have also taken place engaging both Network Rail and its contractors' employees. This has covered areas such as skills and employment, environment and safety. Against a target of donating 1,000 hours of volunteer resource between Network Rail and its contractors, a total of 2,357 hours were donated through over 50 activities including presentations at schools, science clubs, site visits and environmental talks.

“Work experience at Crossrail has allowed me to be more excited by the projects coming up in the future. I am now much more excited about engineering.”

Indicator 17 – Work experience

In 2015-16 Crossrail provided 75 work experience placements at its site and head offices, including 15 placements as part of the corporate work experience programme.

The corporate work experience programme is a scheme for Young Crossrail partner school students. To ensure that the placement is mutually beneficial to the student and the host, assessment sessions are held to recruit genuinely interested, motivated and engaged students.

Feedback from the programme was positive with students rating the experience as 4.8 out of 5, on average. Hosts were also very happy with the support from Young Crossrail. One host said, “Being able to interview the students really helped us chose someone who was a great fit and could really benefit from time with us”.

The corporate work experience programme will take on a final cohort of students before the Young Crossrail programme ends in September 2016.

In addition to Crossrail's programme, Network Rail also offer paid work placements to support local skills and provide employment opportunities. Two six-week paid work placements were completed between June and August 2015 via Careers UK. The students from Paddington Academy were placed with various teams to get an overview of the programme and different roles. This followed a year of support for the students and school through mentoring, workshops and sites visits.

Indicator 18 – Young Crossrail audience reach

The Young Crossrail programme works with schools and young people, particularly those closest to the route. During 2015-16, Young Crossrail worked with 150 schools and engaged 15,800 students, teachers and parents (increase of 2,500 from previous year) across a range of activities.

A key focus of the programme is to work in depth with students from its nine partner schools: Royal Greenwich UTC, Greenwich; Rokeby School, Newham; Swanlea School, Tower Hamlets; Elizabeth Garrett Anderson School, Islington; Maria Fidelis School, Camden; Westminster Academy, Westminster; St. Pauls Way Trust School, Tower Hamlets; Oasis Academy, Newham; and St. Marylebone School, Westminster.

Through its engagement activities, Young Crossrail aims to change perceptions of engineering and engineers and encourage more young people, particularly girls, to consider engineering and construction-related careers.

It is a key part of the wider social sustainability agenda, allied to other work carried out to help young people into work and apprenticeships, to develop a pipeline of engineering and construction workers beyond the lifetime of the project.

“ I gained a new found respect for the rail and transport industry and admiration for my colleagues. I now have an aspiration to build a career as a project planner. ”

Abu, work placement student

WORK PLACEMENT PROGRAMMES

In 2015, The Mayor's Fund for London and Network Rail embarked on a brand-new partnership designed to support social mobility for young people (aged 18-24) in London. Under the scheme, Network Rail designed three-month work placements across the business to:

- Build and strengthen overall employment skills to better prepare young people for the work place

- Help young people gain valuable work experience
- Create an increased awareness about career opportunities in Network Rail

Following a rigorous process of promoting the roles, sifting applications, interview preparation and job interviews, a total of four young people were selected for a variety of roles. Through a caseload worker, the Mayor's Fund provided ongoing pastoral care for the duration of the placement.

Without exception, the successful candidates became highly valuable members of the respective Network Rail teams and all had their contracts extended. Young people gained significant employment skills and expressed how the experience shaped their career aspirations.

Work placement highlights

July 2015 – Teacher Industrial Partners Scheme

Two teachers from London schools completed a two-week industry placement at Crossrail. The programme works by placing teachers with science, technology, engineering and maths STEM backgrounds into engineering organisations. Teachers spent time with individuals and teams across the project to gain an understanding of the complexity, scale and variety of career opportunities in engineering and construction.

November 2015 – Skills Show and Skills London

Young Crossrail exhibited at Skills London and the Skills Show skills and careers events with a 'Routes to Your Future' themed stand to showcase the project and inspire young people. Across the two shows, Young Crossrail ambassadors engaged with over 5,000 young people, teachers and parents.

January 2016 - Junior Citizens Scheme

Young Crossrail worked with the Metropolitan Police as part of the Junior Citizens Scheme for primary school students in Newham. Young Crossrail ambassadors presented a 10-minute safety scenario encouraging children to understand the dangers of lorry blind spots.

March 2016 – Engineering Your Future event

In collaboration with the Institution of Mechanical Engineers, Institution of Engineering and Technology and Institution of Civil Engineers, Young Crossrail ambassadors supported this event which hosted 120 young people aged 15-18. The event aimed to illustrate the diverse careers available within the engineering industry and raised awareness of the importance of engineers in wider society.

“The placement was a fantastic opportunity and where better to do it than at one of the most exciting engineering projects around. I learned a lot more than I had initially thought and I am looking forward to sharing this, inspiring young minds and guiding those interested in getting into engineering.”

Mark McGowran, Physics Teacher at Cardinal Pole Catholic School

Tunnelling and Underground Construction Academy, Ilford

Tunnelling and Underground Construction Academy (TUCA)

Crossrail's state-of-the-art training facility and Europe's only specialist soft-ground tunnelling training facility, TUCA, provides training for the key skills required to work in tunnel excavation, underground construction and infrastructure. TUCA has become a sector-led centre of excellence, delivering skills and sustainable career opportunities for Crossrail and future infrastructure projects.

Since opening in September 2011, over 15,000 people have been trained with skills and safety training required to operate effectively and safely in tunnels.

In 2015, the team at TUCA trained more than 4,500 candidates – a 45 per cent increase on the previous year. The training delivered falls across three key strands: pre-employment, workforce development and apprenticeships; providing training and support to those looking for their first step in a new career through to those looking to build upon their existing skilled roles.

TUCA engages with employers across the entire tunnelling industry, ranging from large multi-nationals, through to SMEs within the supply chain.

2015 highlights include:

- 758 candidates gained their Tunnel Safety Card (TSC) or its successor, the new Tunnel Safety Training Scheme (TSTS) certificate
- 430 candidates undertook the pre-employment courses
- 2,892 candidates benefitted from employer-led workforce development courses, against a total of 1,457 the previous year

In 2014/15, TUCA was successful in obtaining funding under the Employer Ownership of Skills (EOS) pilot, with plans to develop training programmes that are employer

and sector driven. The ambition of EOS is to put more ownership of the skills agenda in the hands of employers.

Two of the key outcomes were the commencement of a cohort of learners on a new Materials Testing Apprenticeship, based at TUCA's laboratory and the sign-off for the development of a new 'Trailblazer' Apprenticeship standard in tunnelling operations. This has been in addition to more than 2,000 learning outputs that were not fundable by traditional sources and new programme development and enhancements to existing courses, such as TSC and TSTS.

Community Investment Programme

Crossrail remains committed to investing in local communities along the route through opportunities that arise from the construction programme. Community investment takes the form of a donation of skills, time, money and expertise to help bring lasting benefits to the local communities where Crossrail contractors work.

Each contractor working on Crossrail is required to provide a community investment plan customised to each specific community and their local stakeholders. Particular focus areas are education, renovation and refurbishment, social welfare, economic development and jobs.

Community investment is not just limited to the London boroughs. Crossrail delivery partner, Network Rail, has a range of volunteer activities across the east and west sections of the route. More than 2,300 hours were donated through initiatives such as the Budding Brunels programme and the corporate community involvement service run by the Paddington Partnership. Each project area now has a community investment plan with a focus on employee and contractor volunteering.

BUDDING BRUNELS

Network Rail is in the second year of their partnership with the Construction Youth Trust delivering the Budding Brunels training programme. The programme works with young people along the route to encourage them to consider careers in construction and engineering.

During 2015-16, six courses were run in Shenfield, Ilford, Acton, Abbey Wood, Maidenhead and Romford engaging 102 students from 18 schools. Each student was interviewed at the end of the three day course and then given the opportunity to complete a week's work placement on site. A total of 15 placements took place with another 27 planned for summer 2016.

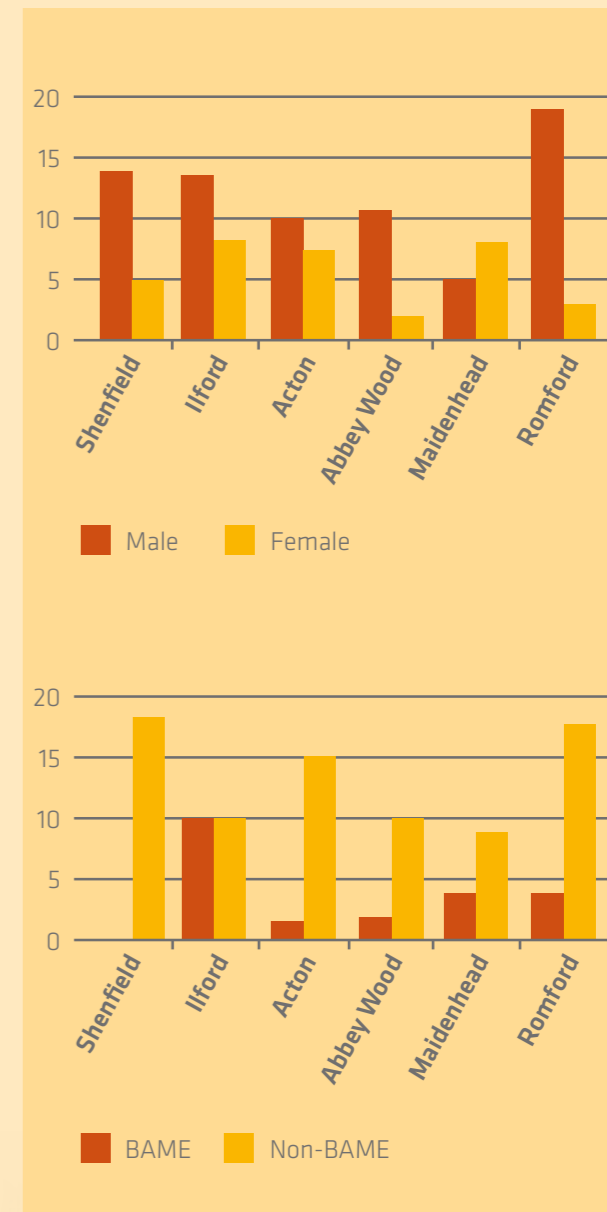
The students were surveyed before and after each course on various topics including their knowledge of the industry and the skills they have enhanced through attending the course.

- 87 per cent said they increased their knowledge of the industry
- 43 per cent were more confident in delivering presentations

The students were also given the opportunity to complete an Open College Network Level 2 unit Introduction to Construction Professions course. Over half the students completed the coursework necessary to gain this qualification.

All courses will have their social return on investment analysed – the forecast results indicate that for each £1 invested the social return is £4.33.

The students are also kept engaged and informed of opportunities within the industry through an alumni organisation which distributes regular newsletters.



CASE STUDY



THE PRINCE'S TRUST: GET INTO CONSTRUCTION

Crossrail contractor Alstom TSO Costain (ATC) partnered with The Prince's Trust to deliver a 'Get into Construction' programme for young people between the ages of 18 to 25 who were not in employment, education or training.

The aim of this community investment initiative was to help the young people gain the skills, qualifications and experience needed to work on a construction site.

The process began with an introductory day for prospective attendees selected by the Prince's Trust, local engagement charities and Jobcentre Plus. The focus of the day was on practical project management and construction-related activities.

After short interviews, ATC offered 13 young people a two-week work placement at Crossrail's Plumstead railhead site. The programme was led by ATC supervisors and a Prince's Trust employee and included a full site induction, drug and alcohol testing, Construction Skills Certification Scheme (CSCS) tests and practical on-site activities including carpentry, concreting and steel fixing.

As a result of the programme, 11 participants now have their CSCS cards and six have secured jobs within the Crossrail supply chain.

THE ARBOUR

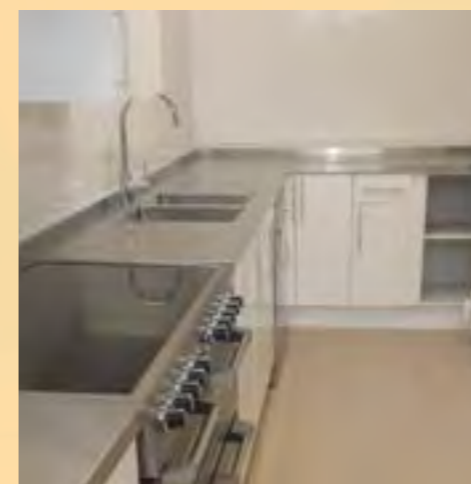
The Arbour has been delivering youth projects for over 50 years within the London borough of Tower Hamlets, partly through engaging young people to act as peer-mentors and role models in their community.

It offers many services to young people, including holiday, after-school and sports clubs and has strong links with local organisations including schools, youth offending teams, youth and drug outreach services, social services and pupil referral units.

The kitchen facilities at The Arbour had become rundown over the years and were in need of significant investment. Crossrail contractor for the eastern tunnels, Dragados Sisk joint venture (DSJV), stepped in to provide the club with two new kitchens through a community investment initiative.

DSJV designed the kitchens, supplied the materials and paid for a team of local professional kitchen fitters to completely refurbish the kitchens. This included laying new floors, fitting new cupboards and installing new kitchen electrical goods including an extractor fan, cooker, fridge freezer, catering cabinet, dishwasher and microwave, all donated by DSJV.

The kitchens are now well-used to prepare food and catering for events at the youth club. They will also soon host healthy eating workshops for the local community.



ATC C610
Training
Building

ART PROGRAMME

The Crossrail Art Foundation, a registered charity, has been founded with support from the City of London Corporation, with a mission to promote art for the benefit of the public by establishing and maintaining a public art programme that will enhance the journeys of the millions of people who will use the Elizabeth line each day.

The Crossrail Art Foundation will help deliver The Culture Line: an integrated series of public artworks being developed by internationally renowned artists for seven of the new central London stations between Paddington and Canary Wharf. The result will be a series of unique artworks, specific to the local context and architecture at each destination.

Over £5 million in sponsorship has been raised to support the development and delivery of eight public artworks across the seven stations. The Foundation is selecting

the artworks with the support of London's leading contemporary art galleries and advisory round table panels of art-world representatives.

The Culture Line falls outside Crossrail's £14.8 billion core funding. The Crossrail Art Foundation is raising funds for the individual artworks from corporate sponsors.

The City of London Corporation has also agreed to support the Crossrail Art Foundation, including by match-funding the contributions received from the corporate sponsors. To date, artworks have been selected for Paddington, Tottenham Court Road, Liverpool Street and Canary Wharf. Artist proposals are currently being developed for Bond Street's western ticket hall, in partnership with White Cube Gallery and funding partners Selfridges and the City of London Corporation, and Farringdon station in partnership with Sadie Coles HQ.



The City of London Corporation is match funding the contributions received from the corporate funders.

- Gallery partner confirmed.
- Artist and sponsor selection underway.



A CLOUD INDEX FOR PADDINGTON STATION



Significant progress was made this year for the Paddington station artwork, which is now in the delivery phase thanks to generous funding contributions from Heathrow and the City of London Corporation.

'A Cloud Index', designed by internationally acclaimed artist Spencer Finch, was the first artwork to be selected for The Culture Line back in October 2012. The proposal will see different types of hand drawn clouds using pastels, digitally printed onto a 120 metre-long, 18 metre-wide glazed canopy above the new station ticket hall. The artwork will appear to change according to the light, the direction of the sun and the time of day.

After almost a year spent deliberating the viability of the artwork through considering various application techniques, a multidisciplinary team including the artist, visited a printing factory in Bavaria to help refine the appearance of the art application using a ceramic frit. Spencer and the team witnessed the printing process



of iterations of the artwork onto sample glass panels, to assess the density, gradation and disposition of the pattern across the glass sheets. The visit was hugely beneficial in helping agree the most effective printing method and technical specification for the eventual production of the artwork.

INNOVATE18

Crossrail's award-winning innovation programme, Innovate18, provides an opportunity to capture and explore unique and pioneering ideas from all those involved in the project. It supports ideas that have the potential to raise the capability and standards of UK construction.

Innovate18 is jointly funded by Crossrail and Tier 1 contractors which has helped to drive engagement and collaboration that transcends client-contractor boundaries.

By supporting the development and delivery of sustainable innovation projects, Innovate18 has provided a mechanism to go beyond compliance.

The programme is in its fourth and final year and has so far received over 1,000 ideas from innovators across the project, published over 400 shared innovations and invested in implementing over 40 innovations.

Innovate18 is helping raise the bar for the construction industry and future infrastructure projects such as Thames Tideway Tunnel and High Speed 2 by providing the foundations for similar programmes.



TRACK SLAB THERMOFORMED SLEEPER COVERS

As part of the railway systems works, Crossrail contractor ATC identified an opportunity to improve efficiency in the post-cleaning activities required after concreting inside the tunnels, by drastically reducing the volume of concrete that comes into contact with the trackslab twin-block sleepers.

In partnership with a thermoforming company, ATC designed a thermoformed plastic sleeper cover which can be easily installed, will provide adequate protection to the sleeper boots from exposure to concrete and can be easily removed in order to be installed on the boot of the following sleeper.

Progress

Following the initial procurement of a small trial set of sleeper covers (funded by Innovate18), ATC is working with the supplier on a second prototype design for the mould. Further to iterative development of the mould, ATC will be in a position to order the full set of sleeper covers for use on site.



MOYA WIND ENERGY HARVESTING

The Moya system is designed to harness low-grade wind energy which is most abundantly found against existing infrastructure. Each Moya sheet is comprised of thousands of free standing filaments. Each filament is embedded with a flexible piezoelectric film that converts strain energy-caused by the movement of the wind, directly into electrical energy. The goal of this Innovate18 project is to temporarily install a Moya panel in the new tunnels to support further development of this technology.

Progress

The installation dates have been set for the autumn of 2016. Laboratory work and testing will be conducted in the summer of 2016 to ensure that the material meets fire safety requirements for tunnel installation.



CASE STUDY

AWARDS

EXTERNAL AWARDS

Club Peloton Awards 2015

Awarded the UK's most cycle friendly developer / contractor for the road safety initiatives implemented on the project.

Green World Awards 2015

Bronze award recipient in the 'Conservation, habitat and diversity' category.

British Construction Industry Awards 2015

Winner in the 'Product Design Innovation Award – Civil Engineering' category for Liverpool Street and Whitechapel station tunnels works.

NCE Tunnelling and Underground Space Awards 2015

Winner in the 'Technical Innovation of the Year' and 'Product / Equipment Innovation of the Year' categories for the uphill excavator.

N&V News Awards 2016

Commercial Building Services product of the year for Old Oak Common depot ground source heat scheme.

UK Rail Industry Awards 2016

Winner under the 'Cost base reduction' and 'Environmental and sustainability' categories for the Old Oak Common integrated hybrid renewable energy system.

Considerate Constructors Scheme Awards 2016

Most considerate site runner up award

Bam Ferrovial Kier Joint Venture, Farringdon station

BAM Ferrovial Kier JV, Fisher Street shaft and crossover tunnels

Gold

Canary Wharf Contractors, Canary Wharf station

Costain, Skanska Joint Venture, Eleanor Street and Mile End park shafts

Costain, Paddington New Yard

Costain Skanska Joint Venture, Hanover Square

Dragados Sisk Joint Venture, eastern running tunnels project

Laing O'Rourke, Tottenham Court Road

Silver

Costain-Skanska JV: Paddington station

Hochtief Murphy Joint Venture, Plumstead Portal

Morgan Sindall, Pudding Mill Lane

Taylor Woodrow, Victoria Dock Portal

VolkerFitzpatrick Ltd, Ilford Stabling Depot

Bronze

BAM Nuttall, Wallasea Island

Hochtief Murphy Joint Venture, North Woolwich portal

CROSSRAIL AWARDS

Sustainability Awards 2015

Environmental engagement

Costain Skansa Joint Venture, Bond Street Station – awarded for their work in safety, health and environment calendar and project risk profile.

Innovation and exemplary environmental performance category

Dragados Sisk Joint Venture, eastern tunnels – awarded for noise control of the temporary construction railway.

Supply chain engagement

Morgan Sindall, Pudding Mill Lane – awarded for their overall approach to supply chain engagement for Pudding Mill Lane works.

Young Crossrail and community investment

Morgan Sindall, Pudding Mill Lane – awarded for their work with St Agnes primary school and Stratford theatre.

CompeteFor usage

Laing O'Rourke – awarded for their proactive approach to add new suppliers as part of Tottenham Court Road station delivery.

Fair payment / prompt payment

Siemens Invensys – awarded for fair and prompt payment in delivering the railway signalling contract

Sustainability champion

Dean Collins and Lewis Smith, Foremen Eleanor Street & Mile end shafts – awarded for going "beyond the call of duty" and engagement with the local community.

Apprenticeship Awards 2016

Apprentice of the Year and Higher Business Apprentice

Winner: Charley Whitelock, ATC
Described as an 'unstoppable and inspirational' apprentice who helped disadvantaged candidates find work.

Apprenticeship Advocate of the Year

Winner: Ashley Swaby, Laing O'Rourke
Provides end-to-end support to apprentices including helping unsuccessful candidates find work elsewhere.

Intermediate Infrastructure Apprentice

Winner: Katie Kelleher, Select Plant Hire for Laing O'Rourke
Commended for her first-class attitude to safety and excellent communication skills.

Advanced Infrastructure Apprentice

Winner: Rajeev Chavda, ATC
Described as exceptional and extremely committed and respected among team due to his positivity and keenness to learn.

Advanced Business Apprentice

Winner: Bodrul Azad, Crossrail
Does his utmost to live all the Crossrail Values, and goes above and beyond the requirements.

Outstanding Tier 1 Contractor

Winner: ATC
ATC was awarded for its commitment to apprenticeships and approach to involving its supply chain in providing quality apprenticeships at all levels.

Outstanding Supply Chain Employer

Winner: Kilnbridge
Kilnbridge was recognised for creating 14 apprentices, almost five times more than originally pledged.

PUBLIC INFORMATION

Construction activities

Crossrail is committed to providing information about construction works taking place throughout the route to ensure local communities are aware of construction works that may affect them and the measures being taken to lessen impacts. Crossrail also works to keep stakeholders informed about the benefits that the Elizabeth line service will deliver, current progress and milestones achieved.

Crossrail Ltd is an organisation established solely to build the new railway linking Reading and Heathrow, to the west of London, with Shenfield and Abbey Wood, to the east, including a new central underground section that will link east to west through London.

Crossrail Ltd acts as a client and project management organisation, with the construction work delivered through a number of contractors and their supply chains. Crossrail Ltd imposes a number of requirements on its contractors in order to ensure that the works are undertaken in accordance with the Crossrail Act 2008 and its associated performance requirements.

Through the Crossrail website (www.crossrail.co.uk), we have developed the 'Near You' mapping tool to explain local works in each area.

To receive email notifications about planned works, sign up to our mailing lists online or contact our helpdesk team. Additionally, specific works are notified to residents and the wider stakeholder community through information leaflets that are distributed in the local area. Communications material can also be translated into other languages upon request.

Crossrail Helpdesk

The Crossrail Helpdesk is available to answer any questions about the project and help with any problems which may arise from construction of the railway. The helpdesk operates 24 hours a day, seven days a week. The team is contactable by email helpdesk@crossrail.co.uk or telephone 0345 602 3813. Details are advertised on the Crossrail website, on all our communications material and at construction site locations throughout London.

Crossrail aims to close all complaints within 10 working days, with an initial response made within 24 hours. Passing complaints to contractors is immediate and the response rate is generally much faster than this.

The Secretary of State for Transport has appointed an independent Crossrail Complaints Commissioner.

Any member of the public who does not know how to complain to Crossrail or has been unable to resolve an issue in communication with Crossrail, may ask the Complaints Commissioner to adjudicate. The application must be submitted in writing and the Complaints Commissioner must respond within 28 days, unless a further time limit is agreed.

The Crossrail Complaints Commissioner will:

- Act as a mediator in unresolved disputes between the project and members of the public
- Make recommendations to the Nominated Undertaker (Crossrail or London Underground) where action might be taken to satisfactorily address complaints, resolve disputes, or mitigate against the future occurrence of complaints or disputes
- Act as Registrar of the Small Claims Scheme – if a claim for loss or damages has been turned down by the Administrator of the Small Claims Scheme, the applicant can request the Complaints Commissioner to adjudicate. The Complaints Commissioner will be able to make financial recommendations if the applicant has suffered a loss or damages of up to £5,000
- Advise members of the public who are unhappy with any aspect of Crossrail's construction on how to lodge a complaint

The Complaints Commissioner will not act before Crossrail, London Underground or its contractor have attempted to address a case, and will not get involved in issues such as property, matters already considered by Parliament in approving the Crossrail Act, or issues which are not part of the Crossrail project.

Our contractors work in accordance with their contractual requirements which have been developed from Parliamentary commitments. They all have dedicated community relations representatives whose role it is to work with communities and address issues of concern. If breaches of agreed work parameters occur, the methods of working are re-evaluated and communication of agreements re-assessed to prevent recurrence.

Stakeholders

The Crossrail project conforms to a series of undertakings and assurances agreed with various parties under the Crossrail Act 2008.

Continued community liaison forms a central part of Crossrail's duties, especially in ensuring construction work causes the least disturbance possible. Crossrail works within the constraints imposed to minimise noise and vibration, dust and road traffic. Crossrail works with contractors to make sure all community concerns are addressed.

Crossrail's stakeholders also include its contractors and we work with them as both client and project manager. They are crucial to Crossrail's success. Contractors provide and develop many of the innovative solutions required to safely complete a project as complex as Crossrail, with the least disruption.

Contractors communicate with Crossrail senior management through many routes, notably the safety, health and environment leadership team and a regular forum for project directors. This allows for open discussion on performance, identifying what Crossrail needs to do to improve its leadership and identifying areas where our contractors can achieve more.

Engagement with the workforce has improved significantly through the commitment to Investors in People. Its recognised framework provides the means for employees to express their concerns in a structured way and helps us address issues and make workplace improvements.

Above all Crossrail Ltd is responsible to the public and to private sector partners for project funding. There is a strict financial governance process to which Crossrail must adhere, with full accountability to the two project sponsors, Transport for London and the Department for Transport.

Reporting requirements

This report covers our sustainability performance for the financial year 2015-16. As part of governance and accountability, Crossrail is already subject to a rigorous reporting regime as defined by its sponsors TfL and DfT. Reports are required to cover health and safety, security, environment and cost performance. Additional reports cover management and assurance, consents, compliance and change control.

This annual sustainability report is a voluntary publication. By producing it Crossrail aims to provide a single source of sustainability performance information, which may otherwise prove difficult to gain and would involve extracting details from several different sources.

Organisation profile

Crossrail Ltd is registered in England and Wales No. 4212657. Registered Office: 25 Canada Square, Canary Wharf, London, E14 5LQ.

The purpose of the Crossrail project is to build a new railway under central London, linking Reading and Heathrow in the west with Shenfield and Abbey Wood in the east.

Crossrail Ltd was established in 2001 to promote and develop the project. In 2008, the project gained Parliamentary approval when the Crossrail Act received Royal Assent.

Crossrail is jointly sponsored by TfL and the DfT. Crossrail Ltd is a wholly owned subsidiary of TfL and is a company controlled by a local authority within the meaning of Part V of the Local Government and Housing Act 1989. The controlling authority is TfL. Crossrail Ltd comprises employees from several companies and at March 2016 had 1,183 full-time equivalent staff. Of these, 893 are direct Crossrail employees; the rest are drawn from various partner organisations with consultancy and project management expertise.

Operational structure and governance of Crossrail 2015-16

The Crossrail Board comprises:

Sir Terry Morgan CBE, Chairman
 Andrew Wolstenholme OBE, CEO
 Terry Hill CBE
 Michael Cassidy CBE
 Pam Alexander OBE
 Robert Jennings CBE
 Phil Gaffney
 Mathew Duncan, Finance Director
 Simon Wright OBE, Programme Director
 David Allen, Finance Director*
 Daniel Moylan*

Below the Board is the Executive Committee, comprising the following:

Andrew Wolstenholme, CEO
 Simon Wright, Programme Director
 Chris Sexton, Technical Director
 Mathew Duncan, Finance Director
 Mark Fell, Company Secretary and Legal Services Director
 Martin Buck, Transition and Strategy Director
 Martin Brown, Health and Safety Director
 Howard Smith, Operations Director
 Valerie Todd, Talent and Resources Director
 Will Parkes, External Affairs Director
 Paul Grammer, Commercial Director
 David Allen, Finance Director*
 Steve Hails, Health and Safety Director*

Crossrail has a sustainability sub-committee. This sub-committee is responsible for setting strategy and providing organisational oversight. Members are:

Andrew Wolstenholme, Crossrail CEO and Chairman of the sub-committee
 Simon Wright, Programme Director
 Bill Tucker, Central Section Delivery Director
 Chris Sexton, Technical Director
 Valerie Todd, Talent and Resources Director
 Will Parkes, External Affairs Director
 Mathew Duncan, Finance Director
 David Allen, Finance Director*

*Current for the reporting period but no longer with Crossrail.

