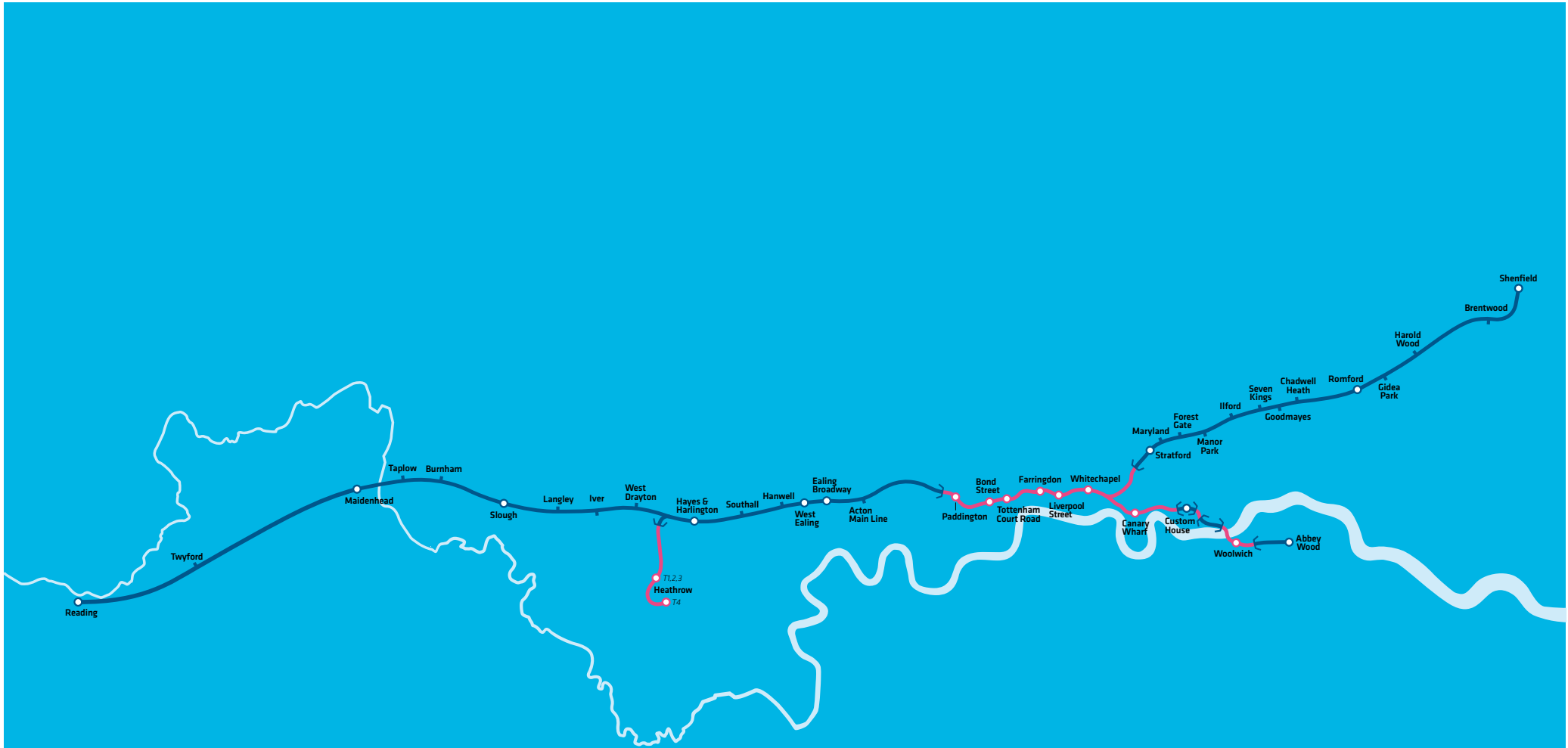




Sustainability Summary 2018





MOVING LONDON FORWARD



MAYOR OF LONDON



CONTENTS

Foreword	Page 4
Sustainability overview	Page 5
Economic progress: maximise competitiveness & productivity of the economy	Page 6
Sustainable consumption and production	Page 8
The physical environment: natural resources protection and environmental enhancement	Page 11
Climate change and energy	Page 13
Improve health, wellbeing and happiness	Page 15
Protect people's safety, security and health	Page 18
Promote greater equality of opportunity and social inclusion	Page 21



FOREWORD

By 2030 the capital's population is set to reach 10 million and its transport system must be able to meet this demand. Crossrail is delivering a new railway to add 10% to central London's rail capacity and to help maintain London's place as a global city. When complete in 2019 the Elizabeth line will offer a high frequency, high capacity service linking 41 stations over 100 kilometres from Reading and Heathrow in the west to Shenfield and Abbey Wood in the east. It will transform travel in London and the South East.

Crossrail has been a project of huge ambition. In one of the busiest cities in the world, a large diverse workforce has been delivering 42 kilometres of new tunnels, 10 new stations and upgrades at many more, while keeping the city moving. In addition to the rail line, Crossrail is delivering new public space around stations as well as new homes, offices and shops along the route to integrate the new infrastructure into the communities it serves. World class public art installations are being created to enhance the

experience during travel and reinforce London's place as a thriving centre for art and creativity.

We set out to deliver a world-class railway fit for future generations and in the process we wanted to make a positive economic, environmental and social contribution to the city, the country and global industry.

During construction the Crossrail project has supported 55,000 jobs all around the UK. It has trained a new generation of engineers in tunnelling, underground construction and railway engineering through its purpose built academy. It has recruited over 1,000 apprentices, injecting new talent into the industry.

The scale of the job has driven innovation, helping to improve safety and productivity across the construction industry. Offsite manufacture at a scale not seen before in the UK construction industry and a custom built robotic drilling rig have demonstrated benefits in productivity, accuracy and importantly, safety.



Safety has remained the highest priority in delivering the new railway. We have set the most stringent safety requirements and shared best practice to help the industry achieve the highest standards of safety.

I hope that our experience and lessons learned delivering this fantastic new railway will benefit the next generation of megaprojects. The delivery of the Elizabeth line will be an historic moment for infrastructure delivery in the UK.

There isn't long to go – the new railway is coming.

Simon Wright OBE
Chief Executive, Crossrail Ltd

SUSTAINABILITY OVERVIEW

Delivering a new railway sustainably

Crossrail is the first project of this scale to consider sustainability from the beginning and embed sustainable thinking into its decision making. This summary reflects on the sustainability achievements of the project. In depth case studies about each of the sustainability initiatives outlined are available on Crossrail's Learning Legacy website for the benefit of future projects and industry.

Crossrail published its sustainability strategy in 2009 as construction of the Elizabeth line began at the Canary Wharf site. The strategy set a path to ensure Crossrail would make a positive contribution to the UK by promoting sustainable transport choices and supporting a sustainable pattern of growth in London and the South East. It presented an overview of the benefits the new railway will bring to passengers and the city when it becomes operational and the sustainable delivery of the new railway project looking at its design, construction and future provision for sustainable operation.

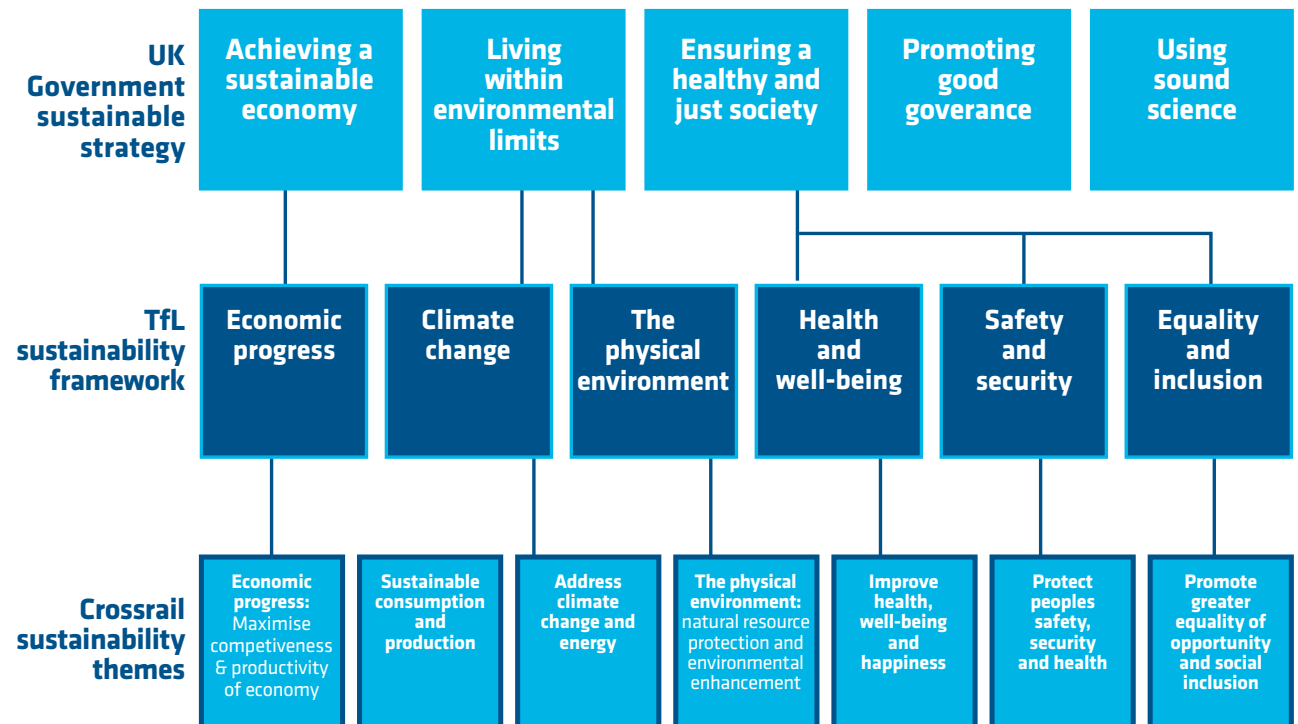
The strategy set a holistic approach aimed at delivering economic, environmental and social sustainability improvements in the UK. It established seven sustainability themes that were aligned to its two sponsors, Transport for London and the Department for Transport.

Key sustainability initiatives were identified and objectives and targets were set where possible. Where there were no available relevant benchmarks, the approach was to either use informed judgement to select a nominal target, or an objective was set with a view to observe what could be achieved and provide benchmark data for later projects to use. Each initiative would work towards delivering a sustainable railway.

At the time of publishing the Crossrail project is over 93% complete. The following summary provides a high level snapshot comprising a mixture of achievements and current measures of progress under the seven themes of Crossrail's sustainability strategy.

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

CROSSRAIL SUSTAINABILITY THEMES AND LINKAGE WITH TFL/UK GOVT.



ECONOMIC PROGRESS MAXIMISE COMPETITIVENESS & PRODUCTIVITY OF ECONOMY

Helping the city grow

The Elizabeth line is part of the UK's plan to help meet London's growing population, which is expected to reach 10 million by 2030. It will increase central London's rail capacity by 10 per cent, the largest single increase in the capital's transport capacity in over 70 years.

The net economic benefit of Crossrail is substantial. From the jobs created during construction and operation and time saved by improved transport connections to the enhanced accessibility the line brings to millions of people, the project is estimated to generate at least £42 billion for the UK economy.

10%

increase to central
London rail capacity

1.5 million

people within 45 minutes
access of London

£42bn

net benefit to
UK economy

Our goal was to deliver a sustainable transport choice that would support economic growth in the UK and improve travel quality by easing congestion, shortening journey times and increasing London's accessibility.

Enhancing local communities

Crossrail is the first project in the UK to design the stations, surrounding areas and oversite development opportunities at the same time. This approach and wider master-planning will help maximise regeneration along the route and create an excellent experience for the travelling public.

Key stakeholders such as Transport for London and the local authorities have contributed funding alongside Crossrail to develop designs and deliver public space improvements around the stations.

Crossrail is supporting delivery of

4.4 million sq m

of new offices and retail

Over

90,000

new homes by 2021

180,000

new homes by 2026

Benefits across the UK

Crossrail actively engaged with suppliers across the country to maximise the economic benefits to UK businesses by trying to attract a wide and diverse base of potential bidders for Crossrail work and ensure UK businesses, irrespective of size and location, were made aware of the opportunities available.

Alongside the public realm, three million square feet of high quality office, retail and residential space is also being delivered directly above or near the new central stations. These 12 property developments are estimated to raise £500 million towards Crossrail's funding package – reducing costs to the taxpayer.

In addition, independent forecasts show the project is unlocking or accelerating the supply of over 90,000 homes and over 4.4 million square metres of commercial office and retail space, adding £10.6 billion to property values in London.

FOCUS ON: CREATING JOBS ACROSS THE UK



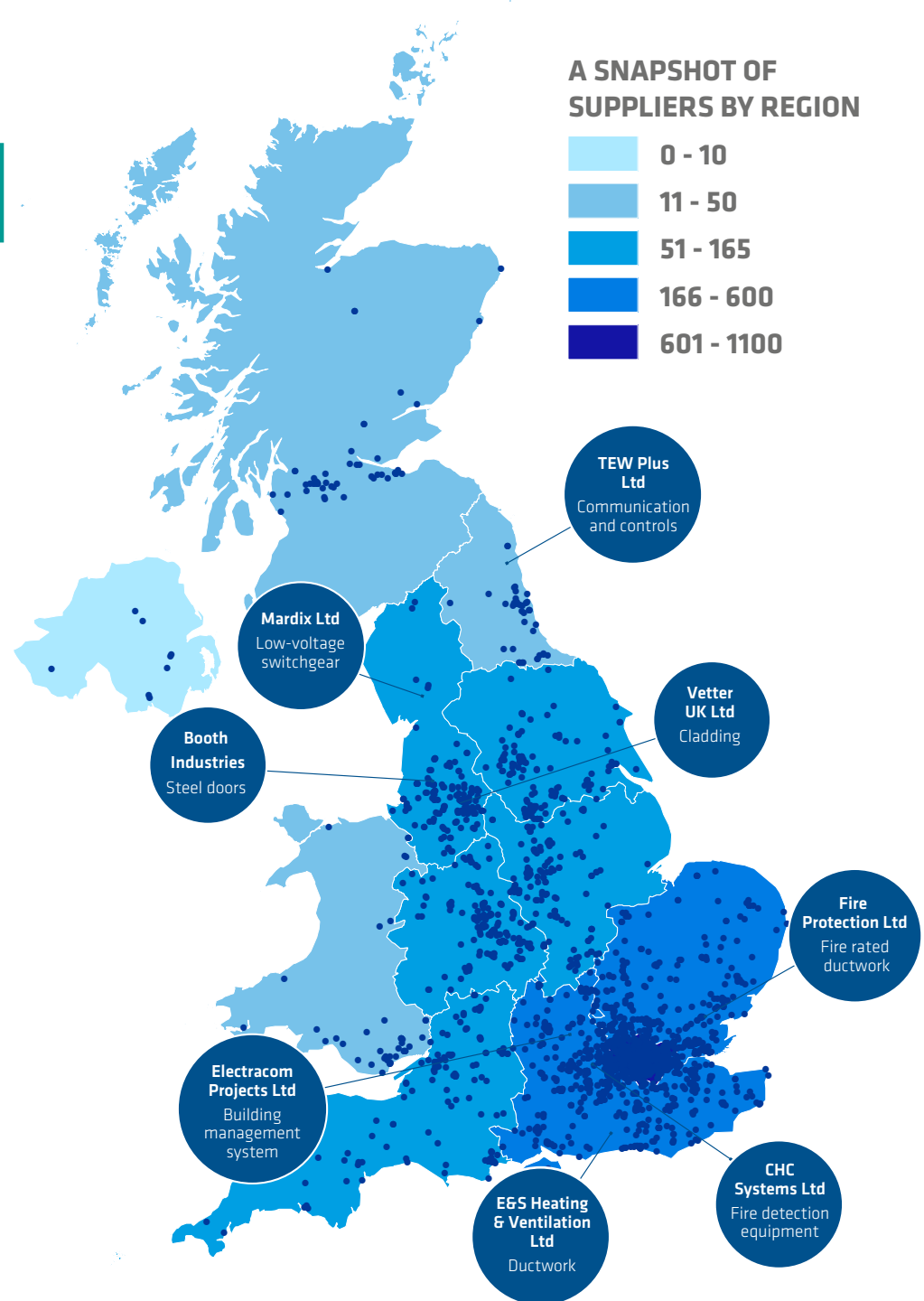
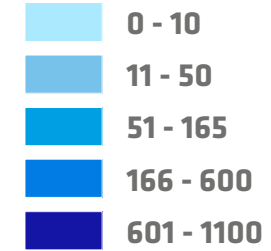
People in every region across the UK, are helping deliver the Elizabeth line. Crossrail is estimated to be supporting 55,000 jobs across the country.

96%
of contracts awarded by Crossrail were to companies within the UK

62%
of Tier 1 contractors and 76% of Tier 2 suppliers are SMEs

62%
of companies based outside of London

A SNAPSHOT OF SUPPLIERS BY REGION



SUSTAINABLE CONSUMPTION & PRODUCTION

Our goal was to minimise the environmental impact of construction and the operational railway by making sustainable choices about the design and build of the new infrastructure.

Minimising construction impact on the environment

Eight million tonnes of excavated material were generated during construction of the tunnels, shafts, station boxes and caverns. 99.7% of it was beneficially reused to develop new nature reserves, recreational facilities, agricultural and industrial land. 80% of this material was transported by rail and water, significantly reducing lorry journeys from the streets of London.

539,499 tonnes of waste material was generated by demolition and construction activities 99.6% of which was diverted from landfill for reuse and/or recycling.

99.7%

of excavated materials beneficially reused

(target 95%, stretch target 100%)

99.6%

of construction and demolition waste diverted from landfill

(target 90%, stretch target 95%)

39%

of material content reused or recycled

(target 20%)

80%

of excavated material was transported by rail and water

(target 85%)

Ethical sourcing

Crossrail established the Ethical Supply Chains in Construction (ESCIC) working group with its contractors to address responsible procurement issues. Amongst its achievements, ESCIC produced

five commodity sheets that set out key ethical sourcing issues associated with concrete, timber, personal protective equipment, reinforcement steel and stone. These sheets have been passed to the Building Research Establishment and the Supply Chain Sustainability School for further development.



Farringdon Station

Sustainable design

Crossrail adopted the Civil Engineering Environmental Quality (CEEQUAL) and Building Research Establishment Environmental Assessment Methodology (BREEAM) schemes in order to evaluate sustainability performance.

All civil structures such tunnels, portals, shafts and the surface sections were assessed using CEEQUAL and have either achieved an excellent rating or are on target to do so.

All new stations, depots and maintenance facilities are on target to achieve a final BREEAM rating of Very Good.

CEEQUAL	Target rating	Client and interim design rating	Construction rating
Western tunnels	Excellent	Excellent	Excellent achieved
Eastern tunnels	Excellent	Excellent	Excellent achieved
Thames tunnel	Excellent	Excellent	Excellent achieved
Sprayed concrete lining structures	Excellent	Excellent	Excellent achieved
Paddington Integrated Project	Excellent	Excellent	Excellent achieved
Eleanor Street / Mile End shafts and head houses	Excellent	Excellent	Excellent achieved
Victoria Dock portal	Excellent	Excellent	Excellent achieved
Pudding Mill Lane	Excellent	Excellent	Excellent achieved
Royal Oak portal	Excellent	Excellent	Excellent achieved
Connaught tunnel	Excellent	Excellent	Excellent achieved
Stockley flyover	Excellent	Excellent	Excellent achieved
Acton dive under	Excellent	Excellent	Excellent achieved
Western outer track infrastructure	Excellent	On target	Excellent achieved
Western outer track electrification	Excellent	On target	Excellent achieved
Old Oak Common Paddington approaches	Excellent	On target	On target
West stations	Excellent	On target	On target
Northeast section	Excellent	Excellent	On target
Southeast section	Excellent	Excellent	Excellent achieved

FOCUS ON: TURNING WASTE INTO GAIN

The top 10 sites that have benefitted from 8 million tonnes of excavated material

1

CALVERT LANDFILL
Landfill restoration



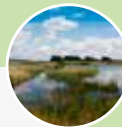
2

RAINHAM LANDFILL
Landfill restoration



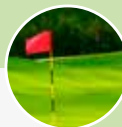
3

FAIRLOP QUARRY
Agricultural use and nature conservation



4

INGREBOURNE
Golf course



10

OCKENDON
Landfill restoration prior to creation of a wildlife reserve



9

PITSEA LANDFILL
Supporting restoration of RSPB nature reserve



8

RSPB'S WALLASEA ISLAND WILD COAST PROJECT

More than three million tonnes of excavated material was used to help raise the land above sea level and create a new 115 hectare intertidal area of saltmarsh, islands and mudflats known as Jubilee Marsh. It also helped create saline lagoons, a creek network and grazing marsh, transforming two-thirds of the Island's arable farmland into wildlife-rich habitat. A bird survey conducted on the island in 2017 revealed that out of a total count of 36 species of bird and 12,096 individuals on Wallasea Island, 29 species and 7,839 individuals were found on Jubilee Marsh.



7

KINGSNORTH
Land raised to allow for construction of a commercial park



6

GOSHEMS FARM
Grazing pasture for livestock



5

EAST TILBURY QUARRY
Supporting restoration to RSPB wetland nature reserve



©MAPS IN MINUTES™ 2013 Contains Ordnance Survey data ©Crown copyright and database right 2010

THE PHYSICAL ENVIRONMENT & NATURAL RESOURCE PROTECTION

The goal was to protect the natural environment and mitigate negative impacts on communities and businesses around construction sites through the design and build.

Minimising impact on air quality

Crossrail was the first UK infrastructure project to set a requirement that all construction machinery be fitted with diesel particulate filters or cleaner Euro Stage IIIB engines to reduce air pollution. The target was for 80% of construction machinery on site to be compliant and the project has achieved 83% compliance across all its sites.

83%

of construction machinery fitted with emissions controls, reducing air pollutants

Archaeology and uncovering London history

During construction, Crossrail undertook one of the most extensive archaeological programmes in the UK. It presented an opportunity to preserve finds for archaeological study and inform wide audiences about London's rich history. More than 10,000 items have been discovered across 20 construction sites. More than 135 learning events were delivered. In addition, school children and members of the public were invited to participate in site based events and to assist in some of the historical research associated with the Bedlam burial finds discovered at Liverpool Street. The public programme culminated in a final exhibition in 2017 that showcased 500 of the most exciting discoveries on the project. Delivered in partnership with the Museum of London Docklands, 'Tunnel: the archaeology of Crossrail' exhibition received 96,750 visitors – the highest ever at the venue – and a further 7,324 event participants.

Numerous publications have been written about the discoveries. This includes 20 professional and technical papers, a series of 10 archaeological books setting out the key discoveries and a consumer book alongside the exhibition.

Over

10,000

objects discovered, spanning 55 million years

Community Investment Programme

Crossrail wanted to ensure the project was able to positively contribute to local communities during construction. It set a contractual requirement for all main contractors that involved a donation of skills, time, funds and/or expertise to bring lasting benefits to the communities around the worksites. Particular areas of focus were education, renovation and refurbishment, social welfare, economic development and jobs.

Between 2011 and February 2017, approximately 8,385 staff hours and £377,900 were donated across the central section to community projects. For the same period on the outer surface section, 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.

Contractors donated

8,385 staff hours and
£377,900

to community projects in the central section

2,300

hours donated across the outer section to initiatives such as Budding Brunels



FOCUS ON: MAXIMISING OPPORTUNITIES FOR BIODIVERSITY GAINS

Mile End

Crossrail and Network Rail have used the DEFRA biodiversity accounting methodology to determine the value (expressed as biodiversity units) of habitats lost, enhanced and created as a result of the project. The construction of 42 kilometres of tunnels and 10 new stations in the central section results in an overall net loss of biodiversity units. Where possible, the project found ways to turn some of this loss to gain through initiatives including green roofs and landscaping. A target was set to achieve 80% of the possible biodiversity units it identified and the project is currently on target to achieve 91%.

Crossrail biodiversity initiatives include:

- Green roofs delivered at Mile End, Eleanor Street and Limmie Peninsula shafts, Paddington Integrated Project and Whitechapel station.
- New landscaping at Pudding Mill Lane, Royal Oak portal, Custom House and Victoria Dock portal.
- 85 new trees to be planted around 10 new stations.

On the surface section, Network Rail set a target to achieve no net loss of biodiversity units. It is on course to deliver 59% on site and the remaining 41% by providing biodiversity enhancement to sites currently managed by local wildlife trusts.

CLIMATE CHANGE & ENERGY

Minimising our carbon footprint

Crossrail is a major energy user, during construction (particularly through the operation of tunnel boring machines and associated material transportation) and operation over its lifetime.

Crossrail has been committed to reducing its carbon footprint, by reducing the energy consumption of the operational railway, the embodied energy in construction products and the energy used during construction.

As the project nears completion Crossrail is preparing a final carbon footprint report which will be added to the Crossrail Learning Legacy website.

Capital carbon

Crossrail has achieved a construction-related carbon emissions reduction of 18.6%, against its target of 8%. Reductions in the embodied carbon footprint have been made possible through the use of concrete with cement replacements. Crossrail's concrete specification required a minimum of 50% cement replacement but the project has been able to increase this amount to as much as 72% with associated carbon reduction at sites such as Paddington station.

Operational carbon

Crossrail set targets for weight and energy efficiency for the rolling stock of the Elizabeth line. These targets were 350 tonnes unladen weight per 10 car train and 24 kilowatt hour/ train, respectively. The last figure equated to 55g CO₂ per passenger kilometre. The weight target has been exceeded with a little under 319 tonnes unladen weight achieved. This lighter train has assisted in meeting the energy efficiency target. Tests

on the efficiency of the rolling stock of Class 345 trains are still being carried out, but the latest information indicates an efficiency in the order of 14 kWh/ train will be achieved. This equates to approximately 32g CO₂ per passenger kilometre making the new trains amongst the best in their class for energy efficiency.

LED lighting has been installed in the tunnels and stations which requires 62% of the energy of standard light fittings. The new stations have been designed with sophisticated lighting controls and include electricity sub-meters that are integrated into the building management systems, allowing optimisation of station energy performance. In addition all the station lifts and escalators are significantly more energy efficient than those currently used on the underground.

LED lighting whole life benefits

The decision to move from conventional to LED lighting in stations will result in a significant whole life cost and carbon savings.

The switch to LED lighting has a positive environmental and financial impact through enhanced energy efficiency, greater longevity of bulbs and reduced maintenance requirements. The reduced operating and maintenance costs do more than offset the initial implementation costs reinforcing it as a viable alternative to conventional lighting. LED lights also bring health and safety benefits to workers and commuters.

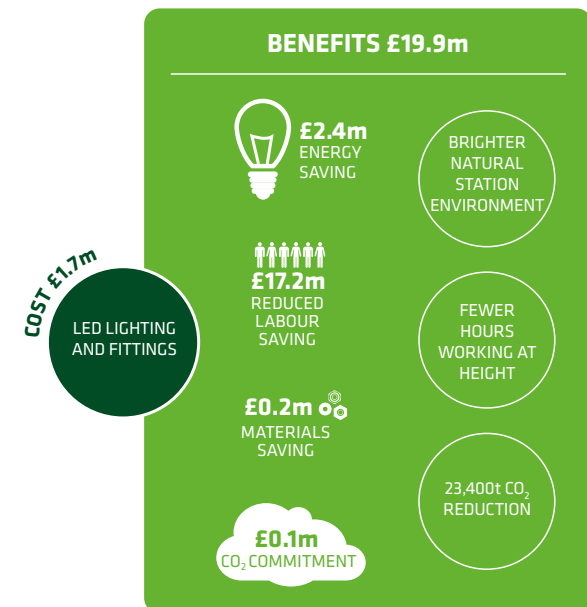
We set targets to reduce our carbon footprint during construction and the operational life of the railway. In designing the railway, we factored in flexibility to mitigate the risks of climate change on this long-term infrastructure.

Climate change resilience

The new railway has a minimum 120 year design life. The future impacts of climate change have been carefully considered in designing the railway. The potential impact of flooding has been one of the focus areas. Crossrail has worked with the Environment Agency to develop infrastructure that will be protected from potential flooding in 2100 or beyond, even in the event of a possible failure of the Thames flood defences.

18.6%

reduction in construction related CO₂ emissions



FOCUS ON: DESIGNING FOR A SUSTAINABLE FUTURE

Over 30% of the new Old Oak Common depot Elizabeth line maintenance facility will be powered by an innovative renewable energy system, bringing impressive sustainability credentials to the TfL network. The hybrid renewable energy system integrates ground source heating and cooling from a combination of energy piles and 150 metre deep bore holes, with three different types of thermal technologies creating an innovative system which will help to control the temperature of the main depot building.

Old Oak Common is the first rail depot in the UK to introduce these environmentally-friendly measures to this extent, by fully integrating separate systems which will help to reduce its running costs and save over 500 tonnes of CO₂ emissions each year.

up to

35%

reduction in CO₂ emissions
for Old Oak Common depot



Old Oak Common depot

IMPROVE HEALTH, WELLBEING AND HAPPINESS

Creating an excellent experience

Improving journey quality, reliability and safety for millions of daily commuters is a vital component of ensuring that London's workforce can travel comfortably and arrive at work in a productive state of mind.

When fully complete in 2019, the Elizabeth line will run up to 24 trains per hour between Paddington and Whitechapel during peak times, easing congestion and reducing journey times on London Underground and existing east to west commuter networks. It will also contribute to a reduction of 500 million kilometres of car journeys annually, reducing congestion on roads and minimising air pollutants.

The 10 new stations have been designed to be accessible, safe and comfortable spaces that people can move through easily and efficiently. Multiple entrances and ticket halls, large, flowing spaces below ground and straightforward interchanges to the rest of the transport network will ensure that Elizabeth line stations feel spacious, are easy to navigate and can cater for future growth in passenger numbers.

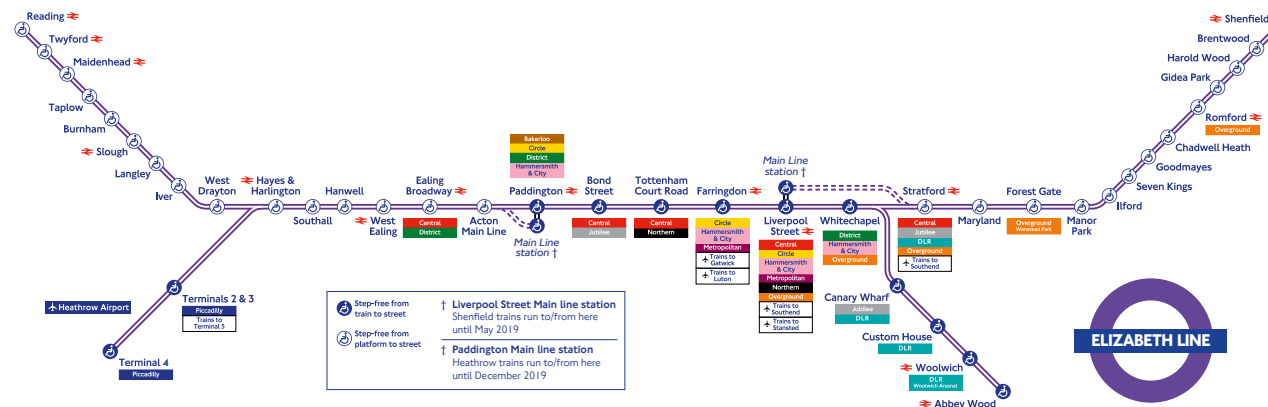
The goal was to deliver a sustainable transport option that would increase capacity and easily, quickly and comfortably get people around the city, helping to improve the quality of the travel experience.

The stations have been designed to best serve the communities around them and the travelling public. In underground spaces, from station platforms to the top of the escalators, the architectural forms and materials are recognisably consistent to give passengers a sense of familiarity right across the route. As passengers move upwards, into the ticket halls and surrounding streetscape, each new station has its own, distinct character that reflects the environment and heritage of the local area. Improvements around stations include new pedestrianised areas, provisions for cycle parking, wider footpaths and enhanced lighting and signage.

The remainder of the Elizabeth line route includes 31 existing stations. Many of these outer London stations are being upgraded with some undergoing major design transformations to make the railway accessible and accommodate the new longer trains.

10
new stations designed to best serve local communities and the travelling public

The Elizabeth line will increase central London rail capacity by 10%



FOCUS ON: NEW TRAINS

The new accessible trains will be some of the most advanced on the UK rail system, making them more reliable, easier to maintain and more efficient.

840

people building trains,
including

80

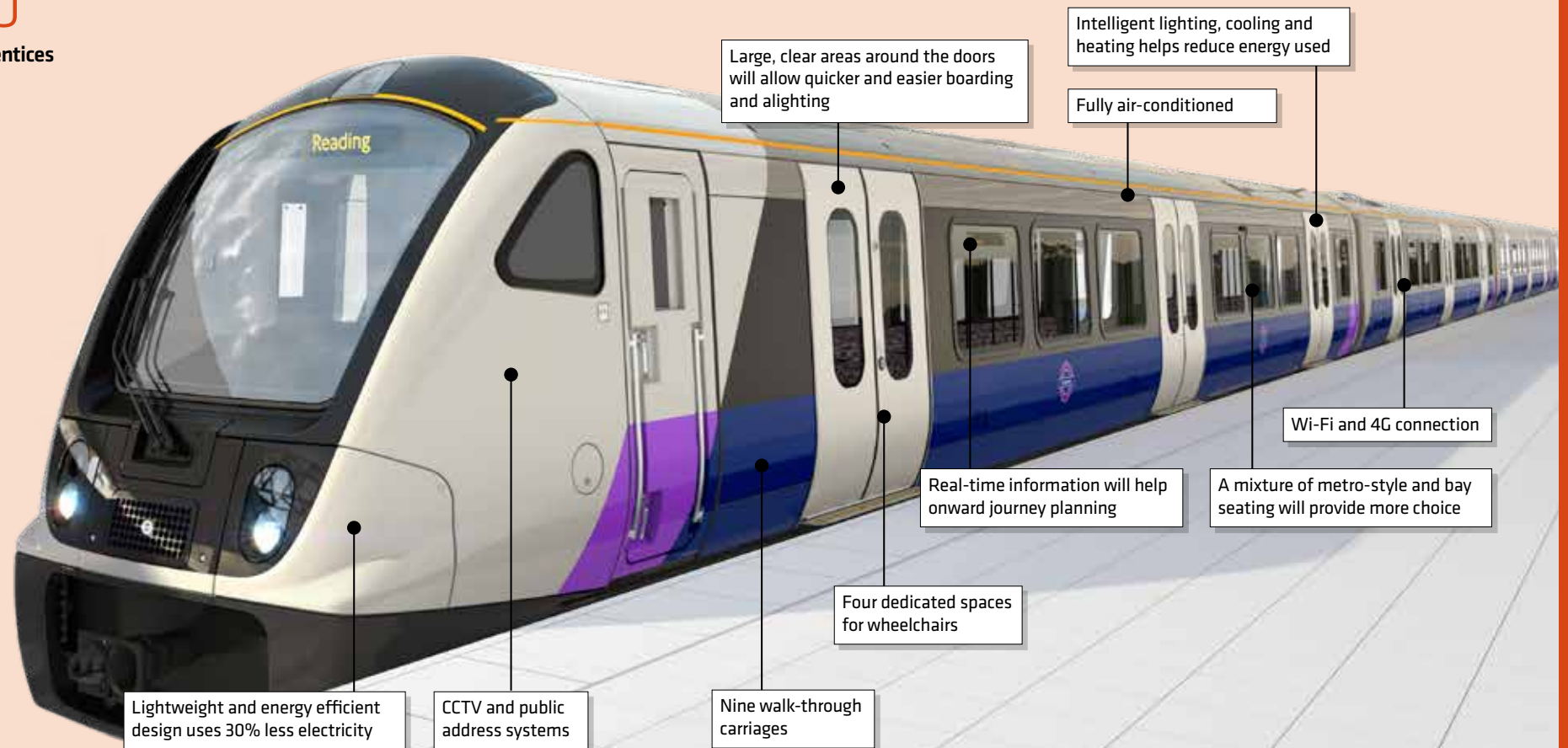
apprentices

70

new trains built by
Bombardier in Derby

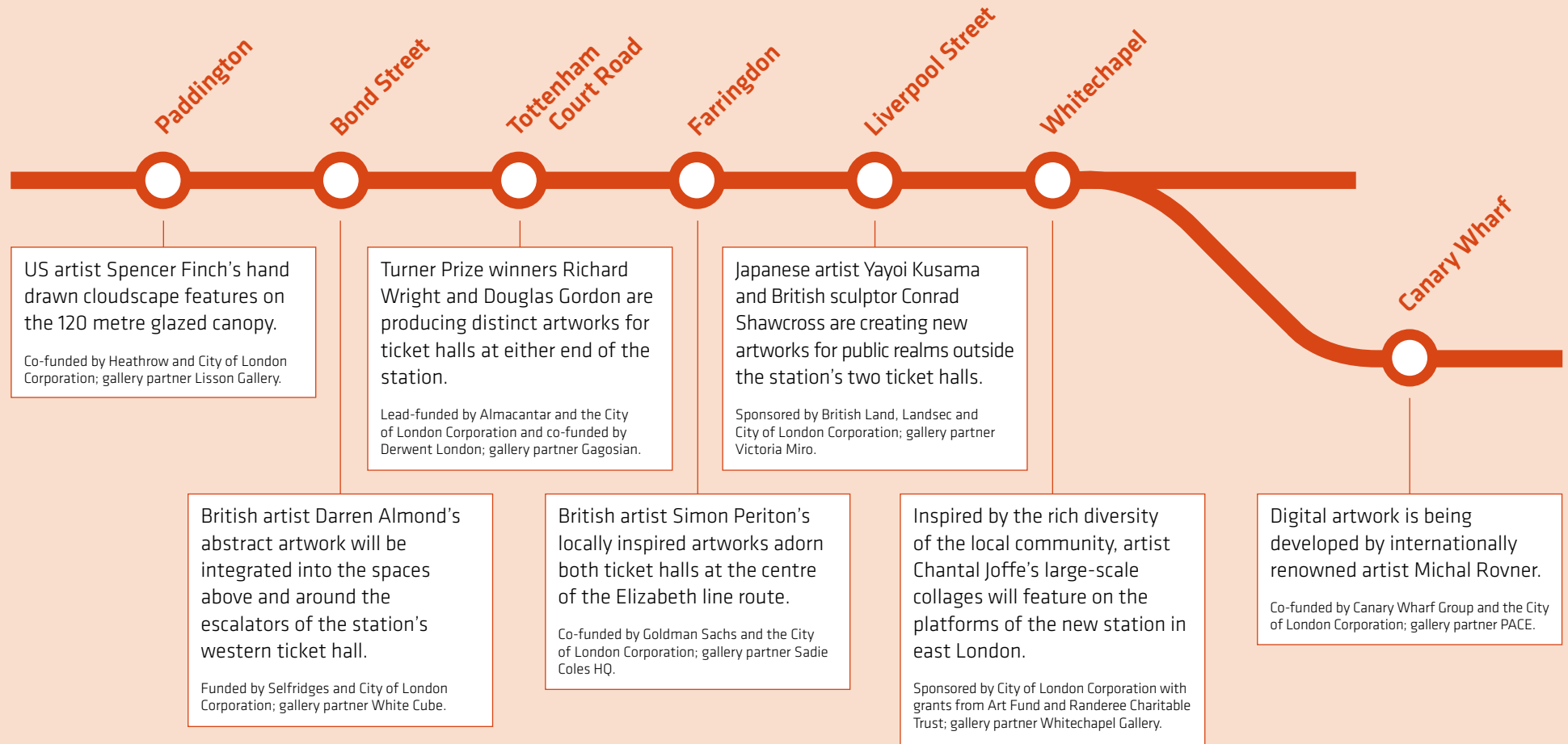
1,500

passenger capacity
per train



FOCUS ON: CROSSRAIL ART PROGRAMME

Through the Crossrail Art Foundation, nine artists are creating ten works of public art that will be integrated into seven of the new Elizabeth line stations.



PROTECT PEOPLE'S SAFETY, SECURITY AND HEALTH

Target Zero

Safety has remained the most important value on the project and Crossrail has set the most stringent safety requirements in the industry. It has been embedded in the organisational culture and is central to how everyone on the project delivers their part in building the new railway.

The Target Zero aspiration has remained central to promoting health and safety excellence on the project. The principles of Target Zero are:

- Everyone has the right to go home unharmed
- All harm is preventable
- We must all work together to achieve this



Supporting the Target Zero principles was the identification of nine key high risks which focused attention and a set of Golden Rules to drive behaviours. These were developed to ensure everyone on the project understood what was expected from them and as construction shifted through different phases, such as from tunnelling to systems and infrastructure fit out, the application of the Golden Rules were updated to align with changing risks.

The ambition has been to lead health and safety improvements across the construction industry by setting the world class standards aimed at keeping everyone on the project safe.

Safety and Health Leadership Team (SHELT)

Delivering a great performance depends on good leadership. The SHELT, which comprises directors from Crossrail and the Tier 1 contractors, ensures senior level commitment to delivering the highest standards in health and safety performance. SHELT meet every period to discuss health and safety performance, emerging trends and the strategic direction of the health and safety improvement programme. Its membership has evolved in line with the changing profile of construction works and includes the future operators; Transport for London and MTR Crossrail.

Programme Wide Induction

Programme wide induction was developed to offer a consistent message and approach for inducting everyone across the project. It was developed in consultation with Crossrail's Principal Contractors and has been shaped over the course of construction to align with the changing needs and scale of the delivery team.

Reporting

All incidents on Crossrail sites are recorded using the RIVO incident management system. The system regularly showed higher level of reporting of near misses than past practice would expect and this data was regularly used at site level to drive improvement. The reporting levels were also used to organise an accident and incident learning review system that required all the top level RIVOs to be formally investigated and the results from the investigation communicated to all other sites.

Monitoring and Assurance

Assurance work was undertaken to ensure that the Crossrail programmes developed were having the intended impact. Best practice was sought out and promoted and areas for improvement communicated. To help ensure the project was delivering the highest standards Crossrail worked with Metropolitan Police and London Fire Brigade officers to review key focus areas.

Driving innovation

To maintain the highest safety standards and productivity, technology and data have been used on Crossrail in ways not seen before in traditional construction environments. An award winning innovation programme, Innovate18, was developed together with the Tier 1 contractors to inspire and share creativity across the large workforce and ultimately help raise the capability and standards of UK construction. Innovate18 has evolved into the industry-wide i3P innovation programme managed by the Knowledge Transfer Network.

Over
400
innovations trialled

Campaigns

Stepping Up Week

For nearly five years Crossrail and contractor teams ran Stepping Up Week – a bi-annual, week-long, health and safety engagement initiative implemented across all sites. Each week was set to different themes and featured guest speakers, equipment demonstrations from manufacturers, evacuation and rescue drills and drama groups acting out serious incidents. This initiative provided an effective platform to communicate concerns and identify improvements.

Christmas campaign

Three Christmas campaigns were run across all sites to help keep people engaged and focused in the workplace to minimise risk during a period where external distractions can prevent people from noticing common hazards in the workplace.

High Impact Videos

Crossrail made a series of seven short health and safety films. These high impact films are fictitious accounts of incidents that could happen, focusing on some of the high risk activities. Hard hitting and emotive, these films have been used extensively across the project and have been made available to others in the rail and construction industry. They have been viewed in over 90 countries.

Road and cycling safety

Crossrail introduced stringent standards for all vehicles involved in building the new railway. Over 40,000 heavy goods vehicles and more than 14,000 vans have been made safer. These measures include setting a standard suite of safety equipment for all lorries working on the project, along with rigorous compliance checking procedures applied each time a vehicle visits a Crossrail worksite. In addition, an award winning lorry driver training programme delivered 561 courses to nearly 10,000 drivers.

Through the 'Exchanging Places' programme, Crossrail engaged over 5,000 cyclists and other vulnerable road users to help them understand the risks associated with sharing London's roads with heavy goods vehicles. This activity was delivered in collaboration with the Metropolitan Police.

54,000
vehicles made safer

Over
5,000
cyclists engaged

Nearly
10,000
lorry drivers trained to help make roads safer

Health

The construction sector has been making significant progress in the management of health risks presented by construction activity. While there has been some good progress in health management there is still much to do. Crossrail committed to making a difference in key focus areas: dust (silica and diesel exhaust emissions), fatigue and mental health.

A custom built innovative drilling rig was built for the project to reduce dust exposure to workers. It allowed major drilling works in the tunnels to be carried out by a machine rather than people, preventing dust exposure and eliminating Hand Arm Vibration risk for workers, while increasing accuracy and speed.

Work was also undertaken to scientifically measure the impact of shift work patterns on fatigue and sleep, which resulted in changes to shifts. Another initiative included a long-term campaign to address the stigma of mental health, provide practical tools to improve wellbeing and developing networks of support.

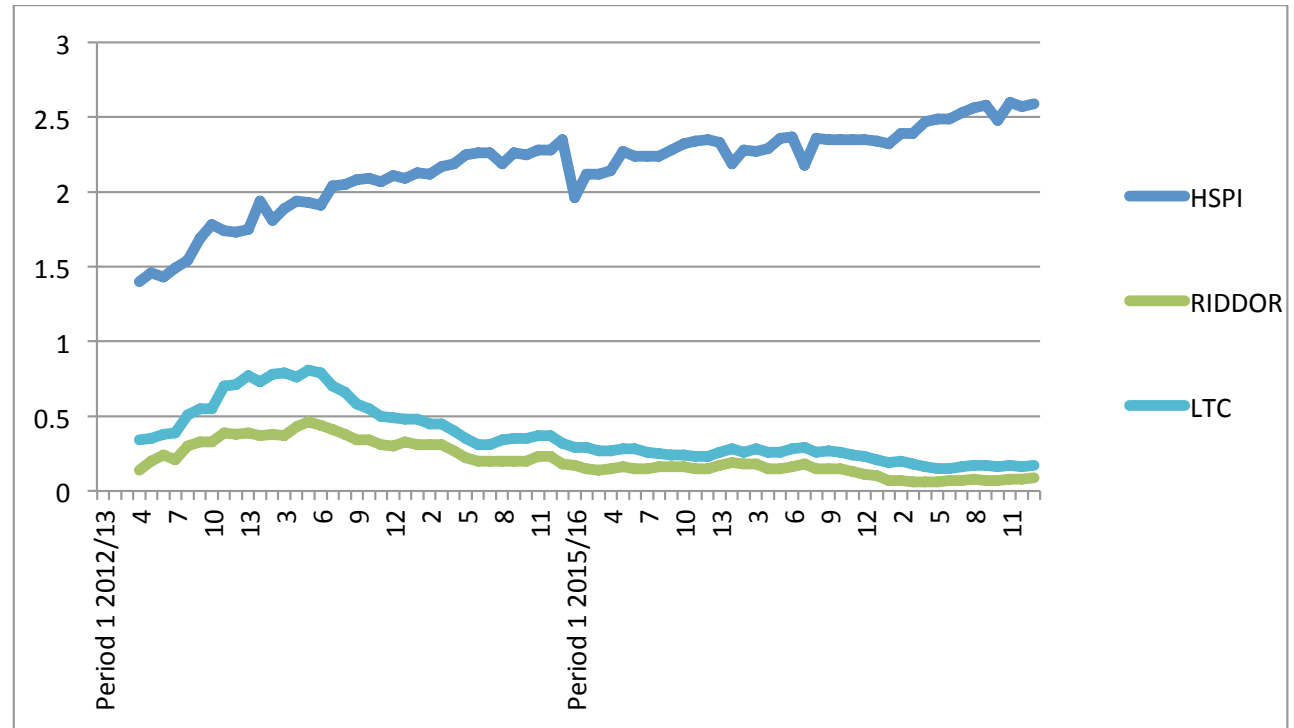
Health and safety performance

Crossrail uses a combination of leading and lagging indicators to measure safety performance across the project. Leading indicators are those which focus on the proactive activities and processes, aimed at improving health and safety performance and culture into the future. Lagging indicators are the more traditionally utilised measures which relate to incidents that have occurred.

Crossrail developed a new, ambitious way to measure health and safety focused on leading indicators. The Health and Safety Performance Index (HSPI) provided a mechanism to track contractor health and safety performance and their commitment to continuous improvement. HSPI included a process called Gateway to encourage contractors to put forward good performance ideas they wanted to develop over time. This was linked to the Innovate18 programme, which could ultimately provide match funding to develop new ideas.

To measure and ultimately drive down accident frequency, Crossrail used RIDDOR injury accident frequency and Lost Time Case rates.

The chart illustrates the overall LTC and RIDDOR performance, and compares this against the HSPI. The regular drops in the HSPI coincide with the yearly rerating of the HSPI. While only an associative relationship, the chart shows the HSPI has kept rising as the accident rates have fallen.



LTC, RIDDOR, HSPI performance

Despite all these efforts and the project's industry leading accident rate, a fatality occurred on the Fisher Street construction site and four fatalities occurred involving HVGs working on the project.

PROMOTE GREATER EQUALITY OF OPPORTUNITY AND SOCIAL INCLUSION

Skills and employment opportunities

To equip the workforce with the skills required to deliver the railway, a state-of-the-art, specialist training facility, the Tunnelling and Underground Construction Academy (TUCA) was built in east London. Over 20,000 people have been trained to work effectively and safely in tunnels since opening in September 2011. TUCA was transferred to Transport for London in 2017 and will continue providing specialist training. It is also now the home of the new Elizabeth line training centre for the staff who will operate and maintain the new line.

Jobs Brokerage

Crossrail operated a job brokerage service delivered in partnership with Jobcentre Plus. The brokerage directly secured employment for local or previously unemployed people. It also championed several initiatives to improve skills development and employment opportunities for disadvantaged and under-represented groups, including injured former service personnel, unemployed young construction workers and women. Through this initiative 4,706 jobs were created on the project for local and/or previously unemployed people.

London Living Wage

Crossrail contractors and their supply chains have been required to pay workers on the project's London sites the London Living Wage, an hourly rate of pay set by the Greater London Authority and based on the cost of living in London. Amongst the measures adopted to enforce this requirement all individuals coming to work onsite were asked whether they were receiving the London Living Wage or better, and contractors undertook regular payroll audits of their subcontractors.

Over
20,000
people trained at TUCA

Engaged
44,000
young people, teachers
and parents

4,706
jobs starts for local and/or
previously unemployed people

The UK, like other countries, has been experiencing a shortage of skilled construction workers and engineers. Our goal was to promote careers in construction and engineering, to help address the skills shortfall by inspiring a diverse workforce.

Delivering the single largest injection of new talent and skills in a generation

Young Crossrail

The Young Crossrail programme was created to work directly with primary and secondary schools within a one-mile radius of the Elizabeth line route to promote science, technology, engineering and maths education. Between 2013 and 2016, 44,000 young people, teachers and parents across 350 schools, colleges and universities participated in Young Crossrail activity.



FOCUS ON: DEVELOPING THE FUTURE WORKFORCE

More than 1,000 apprenticeships have been created across the Crossrail project. Crossrail and its contractors created 710 apprenticeships during the construction, far surpassing the original target of 400. Apprentices have been trained in civil engineering, business administration, railway systems and mechanical and electrical engineering. Network Rail, Bombardier and MTR Crossrail have also created 297 apprenticeships as part of the project.





MOVING LONDON FORWARD

www.crossrail.co.uk



MAYOR OF LONDON

