More than just a railway

Thameslink Programme

New Civil Engineer
Major Project Report
04 Passenger Benefits

Increased train frequency and new services across Central London have drawn largely positive response from passengers.

The completion of the infrastructure elements of the £7bn government-sponsored Thameslink Programme is not only a boon for rail passengers in the South East; it is also a chance for the infrastructure industry to learn lessons on how to carry out complex projects.

And Thameslink Programme was extremely complex. Each individual element was a challenging project in its own right: the complete reconstruction of three central London stations, including the award-winning London Bridge redevelopment; intricate track layouts had to be untangled with the help of some major new infrastructure such as the Borough Viaduct and Bermondsey Dive-Under; and a world first that is the key to unlocking extra capacity – the introduction of Automatic Train Operation (ATO) overlaid on European Train Control System (ETCS) signalling.

Passengers, train operators, Network Rail and the communities on the route have all started seeing the benefits, and now the programme partners want to share their learning with others attempting to deliver similarly complex programmes. Complex projects never go completely according to plan; it is learning the lessons and passing on those lessons that matters.

As part of its commitment to knowledge sharing the Programme has launched the Thameslink Learning Legacy website, www.thameslinkprogramme.co.uk, a free to access resource which includes case studies, technical papers and video interviews.

In this supplement, we look at the achievements of the 10-year Thameslink programme from the viewpoint of the people who have benefited from it, and we find out what lessons the wider infrastructure industry can learn for future projects.

Mark Hansford
Editor
New Civil Engineer

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THAMESLINK PROGRAMME
Winning over the passengers

BY TY BYRD

ovia Thameslink Railway (GTR) operates trains through London on its Thameslink, Southern and Great Northern brands, and gets a lot of phone calls, letters and emails from its customers. Here is a recent one: “Having complained about endlessly delayed trains, overcrowded conditions and an unreliable service, I want to comment on what an amazing transformation you have achieved. Your new trains, the accuracy of your service and the new timetable are all major developments…. thank you for all your hard work.”

The cause of this “amazing transformation” is the Thameslink Programme, a major schedule of projects begun in 2008 to radically improve north-south travel through the capital.

Thameslink passengers were promised new, longer and more frequent trains; new and improved stations; better connectivity to other services and lots of new destinations, north and south of London. And it all seems to be becoming true.

“We’re getting so many positive comments on people’s cross-London experiences that it is truly heart-warming,” says GTR senior customer relations manager Julie Allan. “People really appreciate the new service, particularly the improvements in reliability and punctuality.”

The copious correspondence indicates that the government-sponsored Thameslink Programme is proving its worth, Allan says. Which, with a price tag of £7bn, is just as well.

Much of the money has been spent by Network Rail sorting out London Bridge station and the tangle of track that serves it. The area was infamous as a bottleneck, so bad that few Thameslink services could be routed through it during peak hours.

But for passengers, the most obvious change is perhaps the new Thameslink trains – 115 of which
have joined GTR’s fleet. Siemens Mobility built the new Class 700 trains, which are 50% longer than many they replace. They have wider doors and aisles, adaptive climate control, screens with real-time service information (about London Underground, for example) and electronic signs showing where there are empty seats.

“We’ve had feedback that the seats are on the firm side,” says GTR chief operating officer Steve White. “But the reality is, we’ve got more trains moving more people to more destinations in more comfort than ever before. The Class 700s are real people movers.”

The Thameslink Programme is not only about accommodating more passengers, but also moving trains at higher speeds with closer headways. “We’re looking to be a “turn up and go” railway – more like a metro service,” says White. “For that, we’re having to change our PPM (Public Performance Measure) mentality.”

PPM is an official gauge of punctuality. Short distance trains are considered punctual if they arrive at their destination up to five minutes after the scheduled time. “Five minutes as a measure of arriving on time is not good enough,” says White. “With the programme’s civils work now complete, and when the full Thameslink timetable is in place, we are planning for 24 trains an hour crossing central London in both directions during peak hours. For timetabling purposes, that means 2.5 minute headways.”

This will be achieved with the help of Automatic Train Operation (ATO) signalling, the European Train Control System (ETCS) and traffic management technology that makes it possible to see where trains are running, predict any conflicts along the route and flag these up to the railway controllers (see p12).

Implementing the whole multi-billion-pound Thameslink Programme has been the responsibility of Network Rail, owner and infrastructure manager of most of Britain’s railways. Delivery has been in partnership with the Department for Transport, Siemens Mobility and the train operating companies on the route, GTR and Southeastern, which had significant input into the improvements and how they were carried out.

Southeastern runs trains from south east London, Kent and East Sussex into London Bridge (then on to Waterloo East, Charing Cross and Cannon Street) along the same Victorian brick-built viaducts used by Thameslink.

Contractor for the £1bn project was Costain working with structural engineers Arcadis and WSP, and architect Grimshaw. Balfour Beatty and Siemens Mobility delivered the railway systems.
were looking at reconstruction of London Bridge station plus 17 major changes to railway systems,” she explains. “These included track realignments, signal changes and the run-throughs to Charing Cross and Cannon Street.”

The objective was to reduce traffic jams and improve performance. “Lack of through platforms at the station was the fundamental reason you could only run a limited Thameslink service during peak hours,” Clark explains.

At the time, London Bridge had six through platforms at a high level, while there were nine terminating platforms at the low level (used by Southern Railway – now part of GTR).

It was decided the nine could be reduced to six. The three spare were effectively elevated onto the high level to provide two tracks and platforms for Thameslink services.

So, that was the congestion at London Bridge more or less sorted. This was not the end of the story, of course. The need to reconfigure platforms presented an opportunity – if the authorities were courageous enough – to replace the entire rundown station.

London Bridge is the capital’s oldest terminus station, opened in 1836 but then immediately added to and rebuilt over a number of years. The last iteration had little or nothing to recommend it, aesthetically or practically. It could be a nightmare for passengers, especially at peak times, there was limited retail space, staff accommodation was poor and, with ever-growing numbers of passengers, there were safety issues with narrow platforms.

With that in mind, the bullet was bitten, and a decision made to rebuild, to a Grimshaw design (see box).

Construction began in 2013 and went on for the best part of five years, during which the station never fully closed – although disruption to passengers at times was considerable.

“Initially there was a suggestion that the station could be closed for at least two years, but this was completely impractical with the large numbers of passengers using the station and the limited alternatives on offer,” Clark says. “There were blockades, with parts of the station closed over weekends, and other periods when parts of the station were closed for three, four or more days, which meant re-routing train services and having to alter regular services for months at a time. But mostly, London Bridge remained open.”

Around 100,000 passengers arrive each day between 7am and 9am, with around 90,000 making return journeys between 4pm and 7pm. Data from 2014 indicates that passenger journeys onwards to Cannon Street, Charing Cross and Waterloo East totalled more than 50M a year.

Drastic measures had to be taken on occasion, for example during an eight-day blockade in August and September 2017, when work was undertaken to complete the infrastructure for Charing Cross services through London Bridge. Lines were routed through the newly constructed Bermondsey Dive Under, and into platforms 6 to 9 at London Bridge, after which Platform 6 was brought into passenger use. This was one of the most
challenging sections of the programme and included four working days when Southeastern services could not travel into London Bridge, Charing Cross or Waterloo East, and were diverted to other terminals.

Southeastern asked Network Rail to refurbish a disused line and open up the former international platforms at Waterloo station to provide an alternative.

The section, known as the Linford Street Junction and the Waterloo Curve, was part of the old Eurostar route into Waterloo and had been closed in 2012, so Network Rail had to restore power and signalling. Clark says the diversion worked well: “It was a real success offering passengers a good alternative, close to Charing Cross, enabling them to get where they wanted to be with minimal impact.”

Communication and collaboration was good throughout the Thameslink Programme, according to Clark. “There was a lot of joint working between ourselves, the Department for Transport, Network Rail and GTR,” she says. “Together we endeavoured to fully understand passenger needs and make sure we made the best possible job of meeting them. Everything was done as a team.”

Implementing the Thameslink Programme means GTR’s catchment area is now much bigger than that created in 1988 with the original Bedford-Brighton line. The new network enables travel from Bedford, Luton, Peterborough and Cambridge through London to Brighton, Horsham, Orpington, Sevenoaks, Sutton, East Grinstead and the Medway Towns, serving 77 stations on the way. And there are plans to go to other destinations, including Maidstone.

The full programme included totally rebuilding Blackfriars station, as well as London Bridge, plus major work at Farringdon station, and platforms were lengthened at many outlying stations.

There are still things to be done, and the network is not perfect. But the Thameslink Programme is resulting in a service to customers that is hugely better than before.

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**LEARNING LEGACY**

“TDM has been a great success”

**TDM:** The Thameslink Programme had a huge impact on GTR, Southeastern and other train operating companies. TDM (travel demand management) was a highly effective mechanism for keeping all railway companies informed and “on the same page”.

TDM originated at the 2012 London Olympics where lessons were learned. These were taken on board for the programme where the process was enhanced and refined. “For us all, TDM has been a great success,” says Network Rail change programme manager Jayne Hemingway.

**Touch points:** Looking hard at customer journeys to make sure the service being provided is the best possible. Gathering information and analysing ‘Touch points’. Touch points are significant stages in a journey: where passengers get their initial information from; how they’re received at the station; TOC performance while on the platform (eg were there any delays?); performance of the train; how the passenger feels at the end of the journey.

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**COMPLIMENTS, NOT COMPLAINTS**

GTR has received many compliments since the effects of the Thameslink Programme investment began kicking in. Here are a few:

- “I have contacted you in the past to complain so I thought I should congratulate you on my experience so far of the new timetable... I was expecting there to be a lot of disruption because of the huge changes but there wasn’t.”
- “Excited about the new service from Finsbury Park to Gatwick. Looking forward to not having to change trains.”
- “I’d like to compliment... in particular the new routes that make possible direct travel between Finsbury Park and Blackfriars and other central London stations. This (makes) the commute inside London much smoother.”
- “I wanted to praise Thameslink on a fantastic journey... to Luton Parkway. My train was either on time or 15 seconds early on departure at each station. I was really impressed as it meant I had extra time at Luton Airport before my flight.”
- “Thanks for extending the service to St Pancras from Horsham. It is absolutely brilliant that we don’t have to change. Love the new timetable, service and trains.”
- “I just wanted to say how fabulous the Thameslink train service is from London Bridge to London Blackfriars in the morning... I can leave home half an hour later and the journey both ways is so much less stressful.”
- “The new long trains have much more space and are very practical with their electronic displays on toilets occupied, these new trains seem able to make up time being fast accelerators. Well done!”
The Thameslink Programme is a 10-year schedule of works to construct new railway infrastructure, rebuild stations, lengthen platforms and allow the network to reach new destinations. Its implementation and completion this year is the responsibility of railway infrastructure owner Network Rail.

“We let Network Rail know how we wanted to operate a metro-like service, with two and a half minute headways between trains, allowing us to offer a rapid and reliable service,” White says. “Our aim was to get 24 trains per hour in each direction at peak times [between London Bridge, Blackfriars and St Pancras]. For this, we knew new trains and leading-edge train control systems and signalling were required. But first, infrastructure bottlenecks had to be cleared and numerous track conflicts resolved.”

Network Rail former project director Mark Somers picks up the story: “Undoubtedly our biggest infrastructure bottlenecks had to be cleared and numerous track conflicts resolved.

Steve White, Govia Thameslink Railway
challenge was London Bridge station, where congestion was so intense that only a minimal Thameslink service could get through at peak times. There just wasn’t sufficient room.”

Yet 16 trains would need to be routed through London Bridge every hour if GTR’s target of 24 trains per hour through the core was to be met – 16 being rather more than zero, as Somers wryly observes.

“Track layout hadn’t changed since decades before the original Thameslink service was thought of, nor had platform location,” he says. “It became clear we had to extensively remodel track east and west of London Bridge station and possibly rebuild the station itself. We began in 2009, taking time to work out how to do it.”

The principal problem for Thameslink at London Bridge station and its approaches was that it had to vie for space with another train operating company, Southeastern. Hundreds of Southeastern trains from Kent and East Sussex transport thousands of commuters into the capital each day; to or through London Bridge, to Waterloo East, Charing Cross and Cannon Street stations. Hence there being no room for Thameslink at peak times.

“The two services had to be separated to remove conflicts. GTR needed a dedicated pathway so it could maintain a decent service,” Somers says. All of which was easier said than done.

The worst conflict was at Bermondsey, south of London Bridge station, where a section of track dating back more than 150 years featured some of the most complex track layouts anywhere in the world.

Here, Thameslink services from Brighton and the south met Southeastern’s trains from Hastings and the south east at level junctions, creating a major bottleneck.

The solution was a grade separated junction, featuring an innovative “dive under” incorporating elements of a flyover. Work began on the £75M scheme early in 2012 and was completed in 2016.

“We created a skewed concrete box structure under which Southeastern trains can dive down, before rising up again; and over which Thameslink services can climb onto the original viaduct,” explains Network Rail Bermondsey Dive Under project manager Greg Thornett.

The dive under was designed by Ramboll and built by Network Rail and Skanska (New Civil Engineer 21 May 2018). Thornett continues: “Some demolition work had to occur, but we retained as much of the Victorian structure as possible. For the Dive Under to feed the station the original brick arches were removed, their piers modified in height to suit the planned descent and ascent of track, then new arches created in precast concrete.”

This provided a reasonably aesthetic solution that worked well and was economic from a technical standpoint. “Reusing the old pier foundations meant this was cost effective as well as preserving as much of the original heritage as possible,” Thornett says. Piling work and muck-away were both minimised, although existing industrial contamination of the site (plus Japanese knotweed) required extensive clearance.

“What complicated stitching new work to the existing is that the viaduct is not a single structure, but three, built up against each other by different railway companies over time,” Thornett explains. “Curiously, we uncovered the remains of a station, Southwark Park, which closed more than 100 years ago.”

The Bermondsey Dive Under has been widely declared as crucial to the Thameslink Programme’s success overall. It is playing a key part in fulfilling GTR’s requirements for better punctuality and improved reliability of service.

During its construction it caused less disruption than might be imagined. “We worked out the train paths, the spare capacity available and were able to take out five of
the 11 lines in the area for two years,” says Thornett. If everything worked well, all was fine. “But we had absolutely no redundancy in the system: if something went wrong, we risked causing major disruption.”

Keeping Thameslink and Southeastern services apart also meant untangling and replacing track beyond the Bermondsey site. “We actually replaced 40km of track in all and renewed every set of points – 147 in all – from New Cross to London Bridge and Borough Market, into Cannon Street,” states Somers.

There was other work, too, including strengthening 20 bridges along the same stretch of railway. “Where we realigned track, the rails were sometimes moved away from the centre line of a structure’s rail bearings. This could have overstressed the deck plates – hence the need to strengthen,” explains Somers.

Immediately west of London Bridge a second major bottleneck was removed with construction of a new 500m long two track viaduct to provide GTR with its own path from the station towards Blackfriars.

The viaduct’s most striking element is a tubular bow truss which bridges Borough High Street and the hugely popular and historic Borough Market. “Borough viaduct was very much about threading through quite a historic and architecturally significant part of London,” Network Rail’s former major programme director Simon Blanchflower has been quoted as saying. “We had to take the top floor off a public house to get through; we needed to weave through a number of buildings; and to take down some of the historic Borough Market’s roof, modify [it], restore it and replace it towards the end of the programme.”

The 72m long bridge section weighed 1,200t. The bow truss was assembled on top of the new viaduct and slid into place over a long weekend in 2011. Track work, power supply and signalling were completed later, in time for the viaduct to be commissioned in 2016.

Another crucial item of civil engineering for Thameslink was twin tunnels driven under Regents Canal, their portals close to St Pancras station at one end and the East Coast Main Line (ECML) at the other (see box). Construction of the Canal Tunnels (as they were named) was a remarkable example of foresight. They were constructed between 2004 and 2006, well in advance of the Thameslink Programme, then stood empty for a decade before taking up their Thameslink role as a link between St Pancras and the ECML.

For GTR this means it can now run trains up to Peterborough and Cambridge using the ECML, which opened up its network to the east of the service’s original Bedford-Brighton line.

The Thameslink, Southern and Great Northern Franchise, currently
THAMESLINK PROGRAMME

Left: Borough Viaduct was slid into place in 2011 at Ludgate Cellars, and the entire signalling system has been replaced.”

Close collaborative working with Network Rail is maximising throughput between London Bridge and St Pancras, and GTR has also trained its station staff to ensure trains depart bang on time.

Technology is also playing its part, says White: “The industry is blazing a trail with trains using Automatic Train Operation which can run at higher frequency than manual operations. We are collectively embracing digital technology to boost capacity. We’ll always need a driver in the cab, but the systems allow us to run more trains, more frequently than we could by driving the trains manually.” He adds: “This is a world first in terms of the technology being used, plus a UK first for self-drive trains – and a vital part of our plans in close collaboration with Network Rail to modernise the busiest part of the UK rail network.”

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The basis of this franchise, which started in 2014, is a seven-year management contract, in which Govia passes ticket revenue directly to the government. In return, the company is paid a fee, the structure of which includes performance regimes which incentivise or penalise it.

As part of the franchise, GTR has invested heavily in new trains (see p4). Part of the old Thameslink’s difficulties was ageing stock combined with unreliable trackside and other equipment. Now resilience is the watchword, particularly with regard to the heavily used core.

“Channelling so many services through the centre of London, it has been essential to put in place infrastructure and processes to deliver not just capacity and punctuality but reliability,” says GTR’s White.

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Delivering a tighter timetable

BY MARGO COLE

The £7bn Thameslink Programme is not just about the infrastructure. Of course, the programme’s big ticket engineering projects – the improvements at London Bridge, Blackfriars and Farringdon, the Bermondsey dive under and the Borough Viaduct – are all deserving of the accolades that have been heaped on them. But throughout the planning and execution of the programme, decisions were taken to ensure it would result in benefits for route operation and maintenance.

And the scale of the Thameslink Programme also made it the right place to introduce new technologies and methodologies that will ultimately benefit the entire rail industry. As Paul Harwood, director of investment for Network Rail South East, says: “It’s about need and opportunity; major projects often provide the need to do something differently and provide the opportunity.”

He adds: “The programme was originally conceived as being approximately 60% enhancements and 40% renewals. Anything that is done as a fundamental change or upgrade should sweep up a lot of asset condition issues as well.”

He gives the example of Blackfriars station, which is now celebrated for the visionary decision to open up an entrance on the south side of the Thames and use the rail bridge for the station platforms: “The bridge had to be upgraded because a lot of components were strength limited. It was fundamentally a strengthening job on the bridge.”

Likewise, says Harwood, London Bridge station was not only providing a poor quality experience for passengers, it was also life-expired, and required a lot of money to be spent on major elements, including the roof.

Wrapping these “end of life” issues into the programme puts resilience into the network and helps ensure the route can perform

The Thameslink Programme has enabled a fundamental rebuild of the timetable

PAUL HARWOOD, NETWORK RAIL

60% Proportion Thameslink Programme which was enhancements

40% Proportion of Thameslink Programme which was renewals
to the levels Network Rail is aiming for. But many of the other route benefits are being achieved by introducing new technology that will improve signalling and operating systems.

“The Thameslink Programme has enabled a fundamental rebuild of the timetable,” explains Harwood, who says the south section of the network in particular had some “very odd service offers”, including timings that followed strange patterns. “But the main issue was poor reliability,” he says. “If anything happened, it was harder to recover.”

The improvements to the route have enabled the timetable to be completely recast to make it more logical and resilient, as well as giving passengers more route options. Passengers from Cambridge and Peterborough now have direct access to Gatwick for the first time; and passengers from Sussex, Surrey and Kent can access the Great Northern and East Coast routes, and international rail services, from St Pancras International.

The changes were introduced in May 2018, and it is fair to say the introduction did not go to plan. After days of delays and cancellations it became obvious that it was too difficult to implement. The changes have since been phased in over a number of timetable alterations, the most recent of which was this May.

“The implementation [in May 2018] went awry,” admits Harwood, “but what we see now is that the Southern timetable has been fundamentally rebuilt and improved, and there has been a significant uplift in Southern reliability. And if there are any problems, it is much more recoverable.”

Smooth operation of the entire Thameslink network will centre on being able to run up to 24 trains per hour trains through the core – the central section between Blackfriars and St Pancras stations.

This will be achieved by the UK’s first implementation of Automatic Train Operation (ATO) over the European Train Control System (ETCS), which provides in-cab signal

LESSONS LEARNED

“We got the planning right”

The length and complexity of the Thameslink Programme has given the wider rail industry the opportunity to look at the way it plans, designs and executes major projects. So what should the industry have learned?

Network Rail’s former project director Mark Somers says: “We took on the challenge [and] knew the complexity, so thought: let’s put in place a real, achievable programme, properly integrated and aligned with the building strategy; well thought out and giving ourselves enough time to get the planning right.”

But, he adds, the rail industry has to understand the impact a programme of this scale will have on resources. “We’re talking [about] a very big undertaking here, whose implementation would impact on the rest of the railway industry. For instance, our planning team had to think about the engineering trains we needed, the thousands of tonnes of ballast and availability of the cranes to lift in track.”

One of the reasons the project was successful, according to Somers, was that effective collaboration mechanisms were put in place. “We decided to incentivise the contractors to collaborate so that all through the programme everyone knew what each of us had to deliver, and by when,” he explains. “We had a good bonus incentive scheme in place to reward contractors for achieving certain milestones – each main party getting half a million [pounds] bonus when each milestone was successfully achieved.” But if any one party did not achieve their milestone, all failed to get a bonus.

The money wasn’t lost, Somers explains. “If it wasn’t paid out, it was rolled over to be paid out at the end, when the final programme date was achieved. “We were on time, so all the bonus money got paid out.”

INNOVATION

- The UK’s first Automatic Train Operation over ETCS
- Mid-platform signals
- Substantial sections of raised platforms, which align with accessible areas on all trains
- Platforms are zoned, with stickers on the platforms adjacent to where doors are when the train is stopped, to allow passengers to stand in the correct place on the platform
- Half term blockades allowing work to be done more effectively
- Shared bonus incentive
“It’s a subtle but really important step,” explains Harwood. “It doesn’t mean you take drivers out of the cab, but through the core – where there is intensive usage – it enables us to even out and speed up the trains. That’s critical to getting the service reliability we need.”

The system is not up and running yet, but it has been trialled. On 17 March 2018, train operator GTR successfully ran the world’s first train operating ATO over ETCS on a mainline railway in passenger service. When ATO is fully deployed, train movements will be controlled automatically from Network Rail’s new Three Bridges Rail Operating Centre. Systems will not only control the trains so they run at optimum speed and intervals, they will also make sure trains stop accurately, that doors are open as soon as the train stops, and that trains “dwell” in stations for just 45 seconds.

The full value will be seen as the frequency of services increases from 18 trains per hour (tph) through to today’s 20tph before ultimately hitting 24tph, when Thameslink will offer a Tube-like service of trains every 150 seconds through the core.

“IT’S AN IMPORTANT TOOL IN OUR ARMOURY TO Tackle THOSE POINTS OF CONGESTION IN THE NETWORK,” says Harwood. “WE’VE GOT TO HAVE A ROBUST AND FUNCTIONAL OPERATION THROUGH THE PINCH POINTS.”

It is also, he explains, part of the wider “digital railway”, which includes an air traffic control-style Traffic Management System (TMS). The TMS allows train movements to be planned and re-planned in real time, so drivers and control staff can keep trains running on time, and speed up recovery after a disruption.

Thameslink is the first operational application of full ATO functions over ETCS in the UK, but Harwood says the plan is to roll it out elsewhere on the network.

“Thameslink has provided the vehicle for something that has a wider aim and ambition,” he says.

The Thameslink Programme is designed to be able to run 24 trains an hour through the central London core.

But, as Network Rail senior commercial scheme sponsor Andrew Wood puts it: “It’s no good designing infrastructure and a train service featuring 24 trains per hour if you cannot get the majority of those trains to the Thameslink core on time.”

Wood admits that, prior to the Thameslink Programme, “we weren’t achieving the level of performance needed to support 24 trains per hour”, with incidents and delays affecting reliability north and south of the capital. As a result, the government and Network Rail pledged £300M for the Thameslink Resilience Programme, designed to improve efficiency.

The programme aims to deliver a 15% reduction in the number of incidents that cause delays, and a 15% reduction in the number of delay minutes caused by these incidents.

Analysis of the network identified “hotspots” where the most significant asset-related delays originated. This led to Network Rail putting together a programme of asset renewals and refurbishments, with around two thirds of the budget set to be spent south of London and one third to the north.

The work includes replacing tracks and signalling; renewing junctions; improving security to reduce trespassing; improving drainage in Victorian tunnels to prevent water damage to electrical equipment; and shoring up cuttings and embankments to reduce the risk of landslides.

On the Southern route, the fault analysis showed a concentration of hotspots on the Brighton Mainline, particularly the section south of Three Bridges, to Brighton and Lewes. This section only has one line in each direction, with few places where trains can overtake or get around any problems that do arise.

Network Rail identified £67M of work needed to fix problems on the Brighton Mainline, and calculated that 79 weekend possessions would be needed to deliver this volume of work. In reality, given that the line cannot be taken out of operation over summer weekends – Gatwick Airport’s busiest period – those 79 weekends of work would actually take over two years to deliver; two years of disruption and inconvenience for people using the route, and two years of potential detriment to the local economy of towns on the south coast.

Research by passenger watchdog Transport Focus has shown that rail customers like major work to be done at Christmas, but if that isn’t possible, they would prefer either the October or February half terms. Traditionally, Network Rail has only done major line closures – known as blockades – at Christmas and Easter, never at half
term. But the organisation decided to try it on the Brighton Mainline, closing the entire 32km section between Three Bridges and Brighton for a nine-day period.

Initially, it planned two blockades, one in October 2018 and one in February 2019. However, after the problems caused by the introduction of the May 2018 timetable, there was little appetite to disrupt commuters again so soon afterwards, so the October blockade was cancelled, and the work reprogrammed – some to be done over 15 supporting weekend possessions and some added into the nine-day February 2019 blockade.

Wood says that, to organise and deliver the blockade successfully, Network Rail identified four key pillars of activity: engineering planning and delivery, passenger management, operational readiness and communications. This meant that, in parallel with the work being planned, teams were also setting up alternative travel options for people who use the line and letting everyone know about the planned closure up to a year in advance.

Fewer people travel at half term than during term time, but the reduction is usually only 10%. Network Rail put in a range of alternatives, including rail replacement buses, ticket acceptance on other routes and free parking at Gatwick Airport, but the plans would only work if 25% of people chose not to travel.

The communications strategy worked so well that 40% fewer people chose not to travel while the blockade was in place. Throughout the nine days, Network Rail had 50 staff at Three Bridges working alongside operator GTR’s staff; a temporary airport terminal-style “hub” operated from the station car park, with eight bus stops alongside and free tea and coffee available. There was also a fleet of over 240 buses and 569 drivers to take passengers between stations on the route.

Christmas or Easter blockades are typically used for a single large piece of work – like demolishing or replacing a bridge. But during the Brighton mainline closure, the aim was to carry out a huge programme of individual pieces of work spread across the entire route. It was managed by splitting the line into four work sites, with a different lead contractor on each site.

“We had the core programme of work to remove these causes of failure, and we also looked ahead five years to see what else could we pull in,” explains Wood, who says around £15M of additional work was added to ensure there would be no need to close the line again in the near future.

Every station on the route also got some level of improvement, from a deep clean to new footbridges or platforms.

“These blockades are more efficient [than weekend possessions],” Wood adds. “You get a lot more work done, it is a lot more cost effective, and the quality of work is better because people are working over a longer period of in daylight hours.”

Feedback from passengers has been positive, so it is no surprise that Network Rail is looking at where else it could make use of nine-day half term blockades. But Wood says it will not work everywhere. “You need to be sure you can start planning two years out, and you have to consider the conditions,” he says. “Can you buy extra car parking? How do you get all your plant to site? Do the elements of work fit together? You have to think very carefully about where you can deliver such a blockade.”
A new service with lasting legacy

BY MARGO COLE

The main priority of the Thameslink Programme may have been to improve connectivity and reliability for passengers and train operators, but Network Rail was determined these benefits should not come at the expense of people living alongside the route – or of the wider environment. The stated vision of the project was to “deliver transport benefits to budget that represent value for money and create an overall positive impact on the community and the environment”.

During the 10 years of the programme Network Rail, its designers and contractors managed to maintain this sustainability commitment, as evidenced by the range of successful initiatives, from photovoltaic cells on the roof of Blackfriars station to the 250 jobseekers who gained new jobs or skills through the Thameslink Programme.

The project was delivered in phases. The first phase – known as Key Output 0 – ran from 2008 to 2009 and focused on the redevelopment of Farringdon Station. Key Output 1, (2008-11) included Borough Viaduct and Blackfriars station. Key Output 2 (2013-19) included the rebuild of London Bridge station, the introduction of new trains, the Bermondsey Dive Under and track improvements and upgrades.

Sustainability was high on the agenda from the start but, according to Network Rail former head of consents and sustainability Kirsty Young, the team learned a lot from Key Output 1 that helped it to do things better in the next phase. “One of the big lessons from Key Output 1 to 2 was to make the reporting much better,” she explains. “When we got to the end of Key Output 1 there were some areas – like carbon – that were quantifiable, but there were other areas like the community side and biodiversity where we could say what we did, but not what the benefit was. Moving onto Key Output 2, we specified it more

For Farringdon, sustainability is more about conserving the heritage
KIRSTY YOUNG, EX-NETWORK RAIL

250 Job seekers employed by the programme
56% Biodiversity net gain
clearly with our contractors and gave more KPIs and targets.

“On the environmental side, we learned from what we had achieved in Key Output 1 that we could set higher targets,” Young adds. “And when it came to social sustainability, we felt that there was more we could do with diversity and inclusion.”

An initial sustainability appraisal was carried out as part of the process of applying for permission for the project through the Transport and Works Act. That appraisal eventually developed into the early design and construction strategy for Key Output 1. It mainly focused on environmental objectives – things like waste, carbon and materials – rather than the social value side, although it did include a commitment to community engagement.

“We set some overarching objectives, and then each project or contract looked at those areas that were key to them,” explains Young. “We got a number of very good wins in Key Output 1 – for example the photovoltaics at Blackfriars. It came up while the station was going through design because we were looking at reducing energy use.

“Each project had its own priority, and carbon was a key area for Blackfriars. But it was not so easy for Farringdon, because we were dealing with a listed building. In that situation, sustainability is more about conserving the heritage and bringing things back into use, as well as reducing the impact on listed structures.”

At Borough Market, Young adds, the main priorities were to respect the area’s heritage and to engage with the local community: “The nature of the works – building a viaduct – meant there were fewer options in terms of environmental issues, but community and heritage were big areas.”

As the programme moved into the final phase, each contractor was charged with identifying how it could make the biggest sustainability contribution, including the contractors upgrading the rail systems. “That type of work is Network Rail’s bread and butter, so anything that can be replicated can have a big impact,” explains Young. “For them, the big wins came from things like methodology. For example, in Key Output 2 they had to install a number of relocatable equipment buildings and were able to look at how to reduce concrete use. That was something that can easily be replicated across the network.”

Network Rail developed the sustainability strategy for Key Output 2 during the procurement process, so contractors were aware of what was coming their way. “One of the key things we looked at was that we wanted to be a lot more specific about the key deliverables,” explains Young. “For example, we wanted them to provide carbon management and materials management plans, and the policies and procedures alongside them.

“They had a clearer picture of what we wanted, and we could monitor their delivery of it. It was embedded in the procurement and management processes.”

She continues: “One of the things we learned from Key Output 1 was to be a lot clearer in our roles. As client our role was to give clear instructions and guidance on our requirements, monitor delivery across each project and the programme as a whole, and support collaboration to drive delivery.”

One of the major differences between the phases was the inclusion of more social sustainability targets in the contractors’ contracts. These included things like working with local schools to raise awareness of science, technology, engineering and maths (STEM) subjects, employing apprentices, taking on people from
boroughs where work was taking place, and offering work placements. “We had a Network Rail social sustainability manager who looked at local employment skills, placements, STEM etcetera,” says Young. “We didn’t have that in the first phase. It came out of the Section 106 agreement with the London Borough of Southwark, which gave us a number of targets at London Bridge around skills. We decided to do that across the Thameslink programme as a whole – not just in Southwark. That role helped to drive a lot of the social sustainability activities.”

Achievements on Key Output 2 included 15 NVQs gained by unemployed Southwark residents, 87 certified construction skills courses completed by people wanting to enter the industry and 75 previously unemployed Southwark residents entering and remaining in work.

On the environment side, targets were related to issues like carbon, energy and waste reduction, but in Key Output 2, Network Rail also wanted to look at biodiversity. “At the end of Key Output 1 we knew how many trees had been replanted, but we couldn’t say how that compared with what we took out – whether there was a net loss or gain in biodiversity,” recalls Young. “On Key Output 2 we looked at whether we could do more with biodiversity metrics.”

While contracts for Key Output 2 were being procured, the Department for Environment, Food and Rural Affairs (Defra) was piloting its Biodiversity Metric, designed as a means of assessing changes in biodiversity value (loss or gain) as a result of development or changes in land management. Network Rail offered to trial it on the Thameslink Programme, and set a target of no net loss of biodiversity across the programme.

Surveys of all the worksites showed there would be some unavoidable loss of habitat – a total of 42 biodiversity units. “We didn’t have a lot of biodiversity impact, but we wanted no net loss,” says Young.

The main area where habitat was being lost was an old railway siding that was being brought back into use. “After we had done the assessment, we looked at what our options were to reduce biodiversity removal, or whether we could replant on site, but there was not enough scope for either,” says Young. “So, we looked at offsetting instead.

“We had developed a policy based on reducing loss where possible and partnering with the London Wildlife Trust to offset where we couldn’t avoid habitat loss.”

Three sites were chosen along the Thameslink route to offset the loss by enhancing existing woodland and planting new trees. This has secured a 56% biodiversity net gain. There was also some replanting at other sites including the Bermondsey Dive Under, but this was not factored into the calculations because Network Rail cannot guarantee that the vegetation will not be removed at a later date for operational reasons.

“It’s a small area of innovation, but a real win for Network Rail,” says Young.
Before its recent transformation, London Bridge station was not only a miserable place for rail passengers, it was a major block to regeneration in the surrounding area.

“London Bridge [station] was a physical nightmare,” says Nadia Broccardo, chief executive of Team London Bridge, the area’s Business Improvement District (BID).

“It had always been a block between the north and south – a big physical barrier. Now there is a real desire to be part of Bermondsey/London Bridge, who describes the project as a “catalyst for social regeneration”.

Team London Bridge represents the local business community, which has been impacted by construction work associated with Thameslink for 10 years. Borough Viaduct – one of the showpiece civil engineering elements of the project – had the potential to cause massive disruption to local traders when it was built in the first phase of the Programme. But it succeeded in winning them over.

Skanska built the new twin-track viaduct over the historic Borough Market, which operates almost 24 hours a day, with deliveries in the early hours of the morning, market shoppers throughout the day, and visitors to the restaurants and bars in the evening. To build the new 322m structure, Skanska had to remove and replace the market’s historic roof, temporarily relocate market stall owners, undertake demolition and construction within the working market, and then construct the 1,200t steel truss bridge over Borough High Street.

Network Rail spent time at the start of the project setting up a clear community management plan and getting (and keeping) neighbours on board through regular communication.

“The attention to detail at Borough Market and the level to which Network Rail worked with the architecture and history was very positive,” recalls Broccardo, who says the experience at Borough Market gave the local business community more confidence going into the London Bridge station rebuild.

And one thing that improved its confidence further was that London Bridge station contractor Costain appointed someone whose sole job was to liaise with the local community.

“He did his job so well,” says Broccardo. “It was not a PR exercise – he was a problem fixer. That’s what the business community enjoys – speaking to somebody who can actually make changes. You need someone with authority in that role.”

Working for five years on the project rooted Costain within the business community, building trust through initiatives like organising behind the scenes tours so local people could see how complicated the job was. The contractor also met its promise to deliver a minimum of one annual community project in the area, working with local charities and community groups.

These included helping to improve the Greenwood Theatre in partnership with Team London Bridge, the Mayor’s office, Kings College London and Network Rail. And Costain staff also volunteered time – and Network Rail put in money – to provide allotments at a local primary school.

Team London Bridge responsible business and events manager Sofia Alexandrache helps businesses develop partnerships with local community groups, and helped Costain and Network Rail link up with local stakeholders. She hopes this will continue with the station management team as the rebuilt London Bridge is a cultural destination in its own right.

“Once a year, we hold a street food event to showcase local traders,” she explains. “Two years ago, when the station was opened up on the St Thomas Street side, we wanted to celebrate that, so we collaborated with Costain and Network Rail. They managed to continue their project around enabling our event.

“Last year, when the station opened, we held the same event, but thanks to our partnership with the Thameslink Programme we were able to double it in length to two days.”

The station now has close to 70 new shops, has held both music and poetry events and is at the centre of the Low Line – a walkway through south London opening up space beneath railway viaducts. As Broccardo says: “London Bridge is now seen as a place to go to – not through.”

Costain staff at work on school allotment.
Find out more about the Thameslink Programme at the Untangling the Tracks exhibition at London Transport Museum.

www.thameslinkprogramme.co.uk