



Investment programme report

26 June 2022 – 17 September 2022

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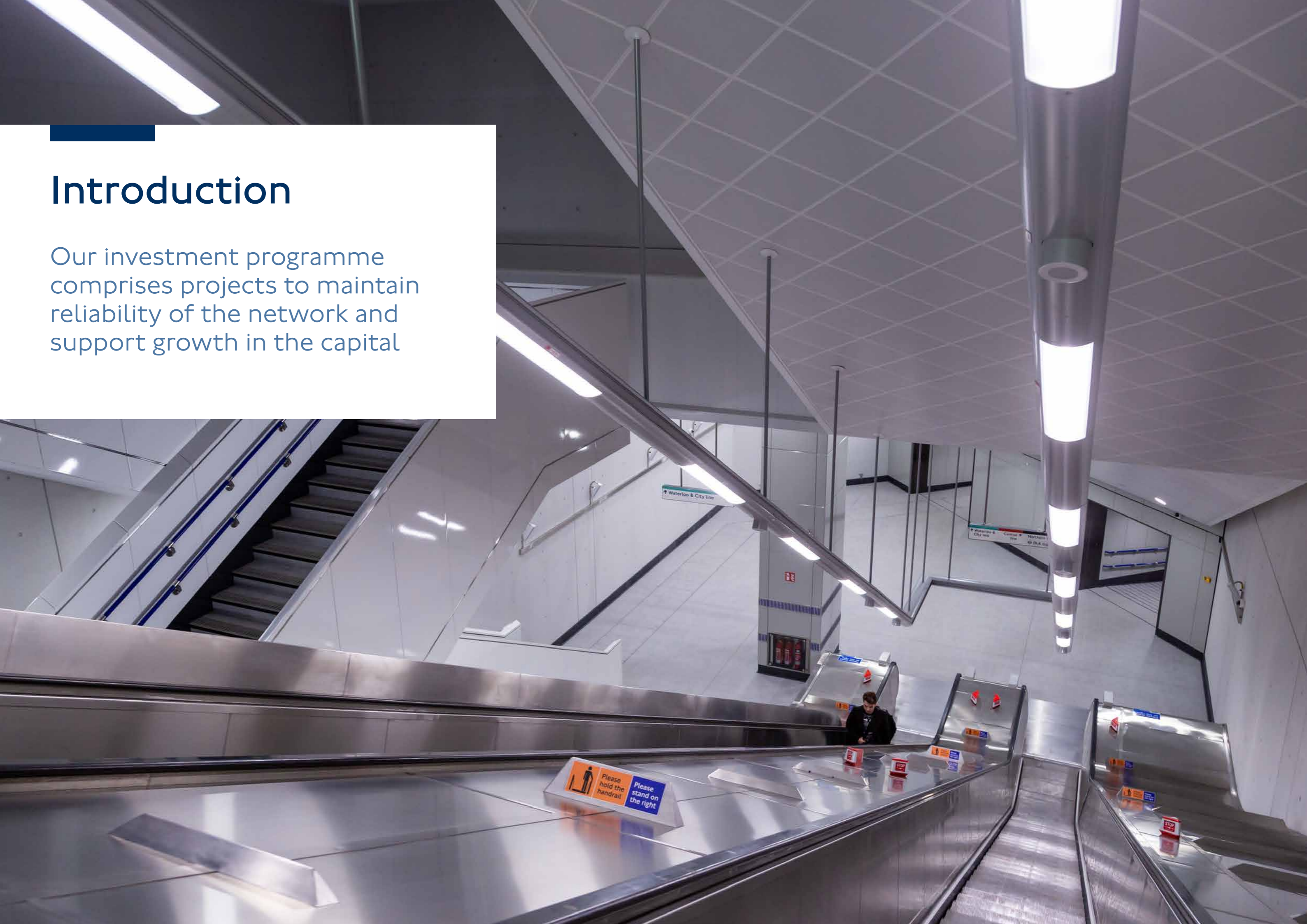
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Introduction

Our investment programme comprises projects to maintain reliability of the network and support growth in the capital



Purpose and scope

Purpose

Transport for London (TfL) is part of the Greater London Authority (GLA) family led by Mayor Sadiq Khan. We are the integrated transport authority responsible for delivering the Mayor's aims for transport.

We run most of London's public transport services, including London Underground, London Buses, the DLR, London Overground, TfL Rail, London Trams, London River Services, London Dial-a-Ride, Victoria Coach Station, Santander Cycles and the IFS Cloud Cable Car. The quality and accessibility of these services is fundamental to Londoners' quality of life. By improving and expanding transport, we can make people's lives easier and increase the appeal of sustainable travel.

We are moving ahead with many of London's most significant infrastructure projects, using transport to unlock growth. Supporting the delivery of high-density, mixed-use developments that are planned around active and sustainable travel will ensure that London's growth is good growth. We also use our own land to provide thousands of new affordable homes and our supply chain creates tens of thousands of jobs and apprenticeships across the country.

Scope

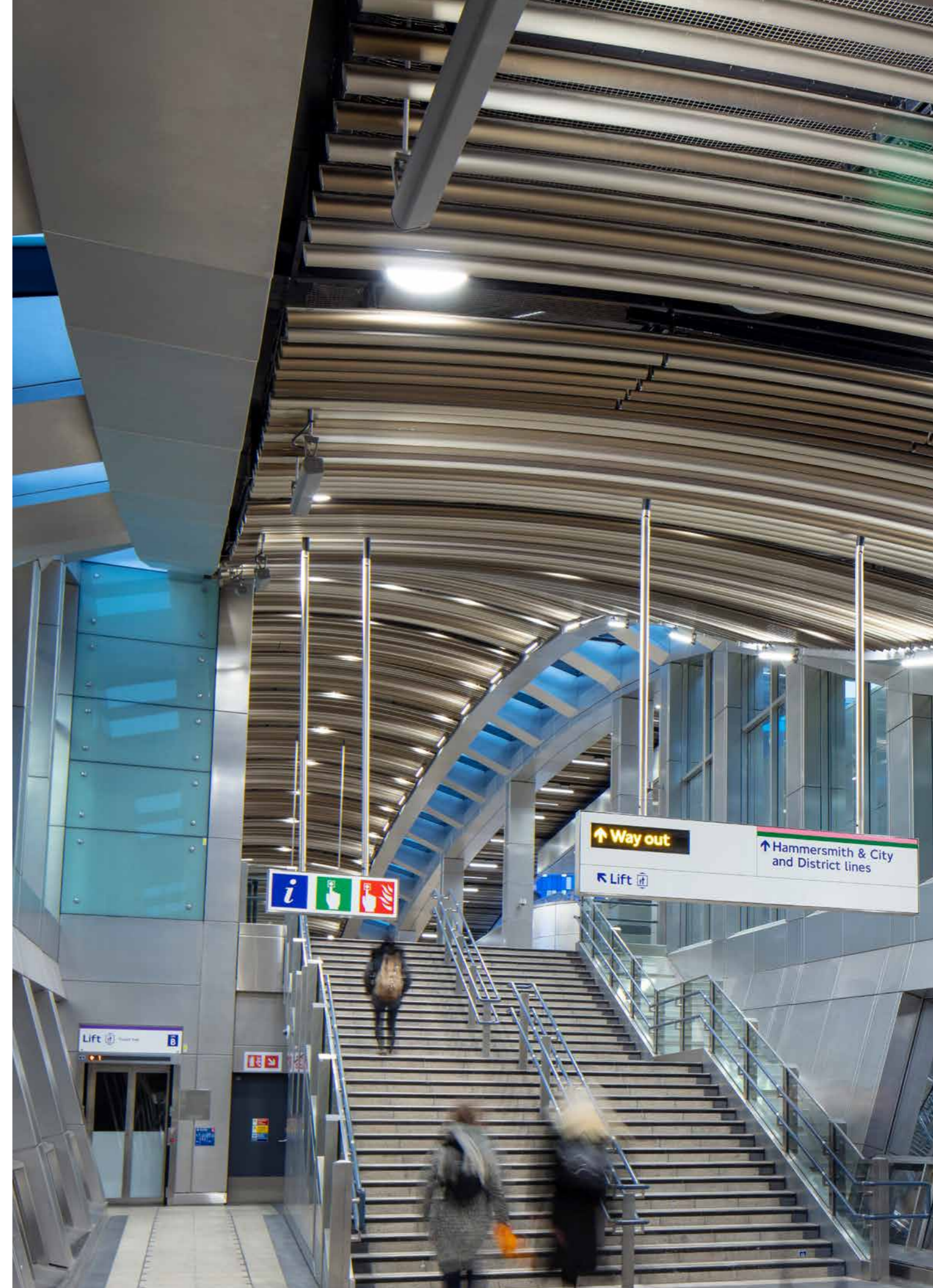
The report gives a progress update on the major projects and sub-programmes that seek authority each year (unless extraordinary approvals are needed) to the Programmes and Investment Committee. It also includes programmes comprising renewals and enhancements to maintain reliability and support growth. Renewing and replacing our assets is our required baseline to maintain our current

performance in terms of safety, reliability, capacity and asset condition. Additional enhancements can unlock new capacity and enable us to use our existing network more intensively. This report covers Quarter 2, which runs from 26 June to 17 September. For each key project or programme, the financial and milestone data represent the position at the end of Quarter 2 and includes commentary on key achievements, progress and challenges. It also updates on notable progress since the last report.

The data displayed differs depending on whether the programme or portfolio has a finite scope to deliver:

- For projects with a finite scope, financial records of spend to date, authority and estimated final cost (EFC) are provided which represent the entire duration of the programme or portfolio, except where stated. For these projects, a completion date is also provided, indicating the year and which quarter the specified event will occur
- For ongoing portfolios that aggregate a number of projects, financial records of spend to date and forecast cost are provided for a discrete period of time

Numbers in brackets represent a deficit in the figure or a decrease since the last report, and numbers without brackets represent a surplus in the figure or an increase since the last report. Where financial information is commercially sensitive, it has been redacted. The performance over time graphs illustrate financial performance over the last four quarters. The commentary below the graph explains any specific trends or changes to trends over a snapshot in time.



Investing in our services encourages people to travel sustainably



Our projects cover everything from air quality to station upgrades

Investment programme delivery structure

Our investment programme is delivered by the following areas of the business: Major projects, London Underground, Surface transport and Professional services. This is reflected in the structure of this report.

Major projects

This area is responsible for our largest and most complex projects. It comprises line upgrades, such as the Piccadilly line upgrade and the Four Lines Modernisation programme, as well as network extensions, major station upgrades, the Elizabeth line and Crossrail.

London Underground

This area covers enhancements, infrastructure renewals, train systems renewals and technology.

Surface transport

This area comprises healthy streets, air quality, public transport and asset investment.

Professional services

Our professional services area comprises technology and data, media and our growth fund.

During Quarter 2, on 1 September 2022, we created a new director structure. The changes will see the majority of capital works fall under Capital, the area overseen by the Chief Capital Officer. However, more detailed assessments to determine which teams sit within each director area are still ongoing, so for consistency with Quarter 1, there has been no change to how this report is structured.

Looking ahead, the most notable changes for Capital will include the incorporation of the Engineering and Asset Strategy teams, and the separation of the former London Underground Capital Delivery teams between the Capital and the Operations areas.

Our performance

We measure the safety and milestones progress of our investment programme schemes



Safety performance

In June 2022, we changed our customer and staff messaging to encourage people to take appropriate action to keep themselves safe, including wearing a face covering if this helps them to travel and work with confidence.

We also received the final report from Imperial College London on their sampling of our public transport network's surfaces. Between September 2020 and June 2022, only one positive sample was found, containing such low levels of the virus that it would not be expected to cause a transmissible level of viral load. The testing of samples was based on frequently touched surfaces at three London Underground stations (London Waterloo, London Euston and London Paddington). Air samples were also taken on a Northern line train and on the route 205 bus.

We have continued to implement measures to improve our short- and long-term safety, health and environmental performance. Coronavirus remained the top cause of short-term staff absence but significantly increased as a proportion of total staff absence, from 30 per cent in Quarter 1 to 44 per cent in Quarter 2. Mental health and musculoskeletal-related health remained the top two causes of long-term absence, which is in line with the national average. Our Occupational Health team continues to run events aimed at giving staff the tools to better look after their mental health.

Capital delivery

Capital works cover a broad range of activities across the Major Projects, Project and Programme Delivery and London Underground Capital Delivery. Some are essential asset renewals and maintenance to keep our frontline service operating efficiently. Other activities represent new and significant investments to improve existing infrastructure.

Quarterly performance

To enable accurate analysis of data, some of our key measurables are quoted as a frequency rate per 100,000 hours worked. Frequency rates are calculated using a moving annual average based on performance over the previous 13 periods.



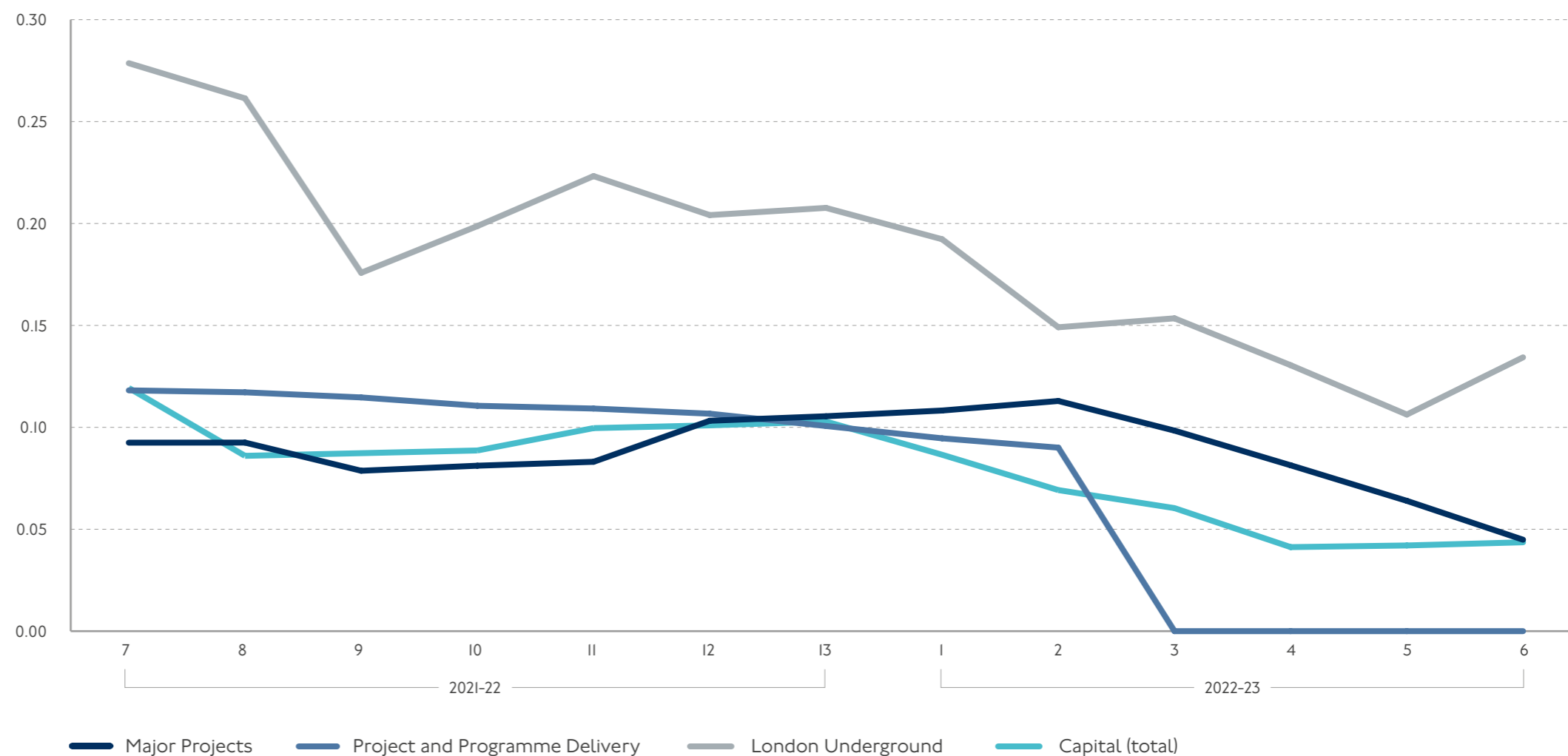
We continue to find new ways to improve safety

In Quarter 2, there was only one incident reported under the Reporting of Injuries Diseases and Dangerous Occurrences Regulations (RIDDOR) within the Capital area. As a result, the accident frequency rates continued to decrease across the Capital area of the business, with the overall rate ending the quarter at 0.04, below the 2022/23 annual target of 0.10. Our Major Projects and Project and Programme delivery areas have now gone two consecutive quarters without a RIDDOR being reported, demonstrating significantly improved performance from the same period last year.

The RIDDOR this quarter occurred in London Underground, where a member of the Rolling Stock team was hit in the eye by a piece of debris from a sanding belt. The injury required hospital treatment but was classified as minor, with the debris removed from the eye. The injured person remained off work for more than seven days.

In addition, there was a RIDDOR reported in Engineering where a surveyor on the Piccadilly Line Upgrade programme slipped on track ballast at night, sustaining a chipped bone and remained off work for more than seven days. While Engineering data is not currently featured within the Capital section of this report, we work closely with the team to identify root causes and share learnings so that we can continue to work together to reduce harm to our workforce.

RIDDOR accident frequency rate
(per 100,000 hours worked)

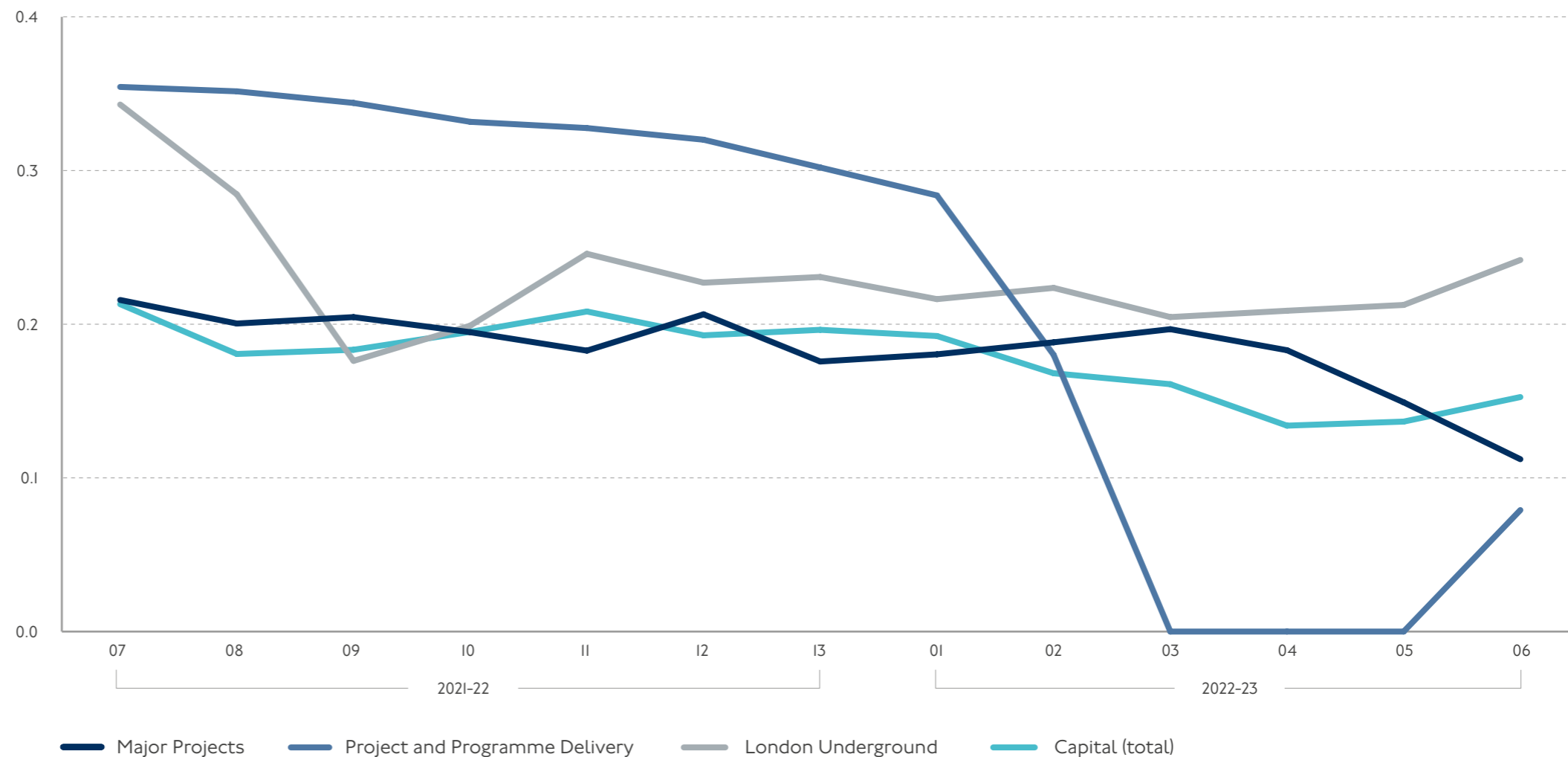


Lost time injuries (LTIs) are injuries which cause an employee to be absent for one or more shifts. There were five LTIs reported in our Capital teams during Quarter 2, an increase of two compared with Quarter 1. However, due to an overall reduction in the number of LTIs reported over the past 12 months, the lost time frequency rate for Capital ended the quarter at 0.15, below the target of 0.25.

All five LTIs in Quarter 2 were classified as minor injuries, with four occurring in our London Underground teams and one in Project and Programme Delivery. The use of machinery and equipment were a factor in three of the incidents, resulting in teams receiving additional briefings on how to safely conduct activities to avoid future injury.

At Old Street Roundabout, an operative was injured when the lid of a generator he was refuelling closed on his hand. While issues were identified with the communication between the operatives, subsequent investigation found that the risk assessment did not sufficiently consider how such a hazard should be effectively controlled and safety mechanisms were put in place to prevent the lid from shutting. This resulted in a review of all relevant risks assessments, operatives being re-briefed on the refuelling of generators and the team investigated the procurement of alternative models of generators with enhanced safety features.

Lost time injury frequency rate (LTIFR)
(per 100,000 hours worked)

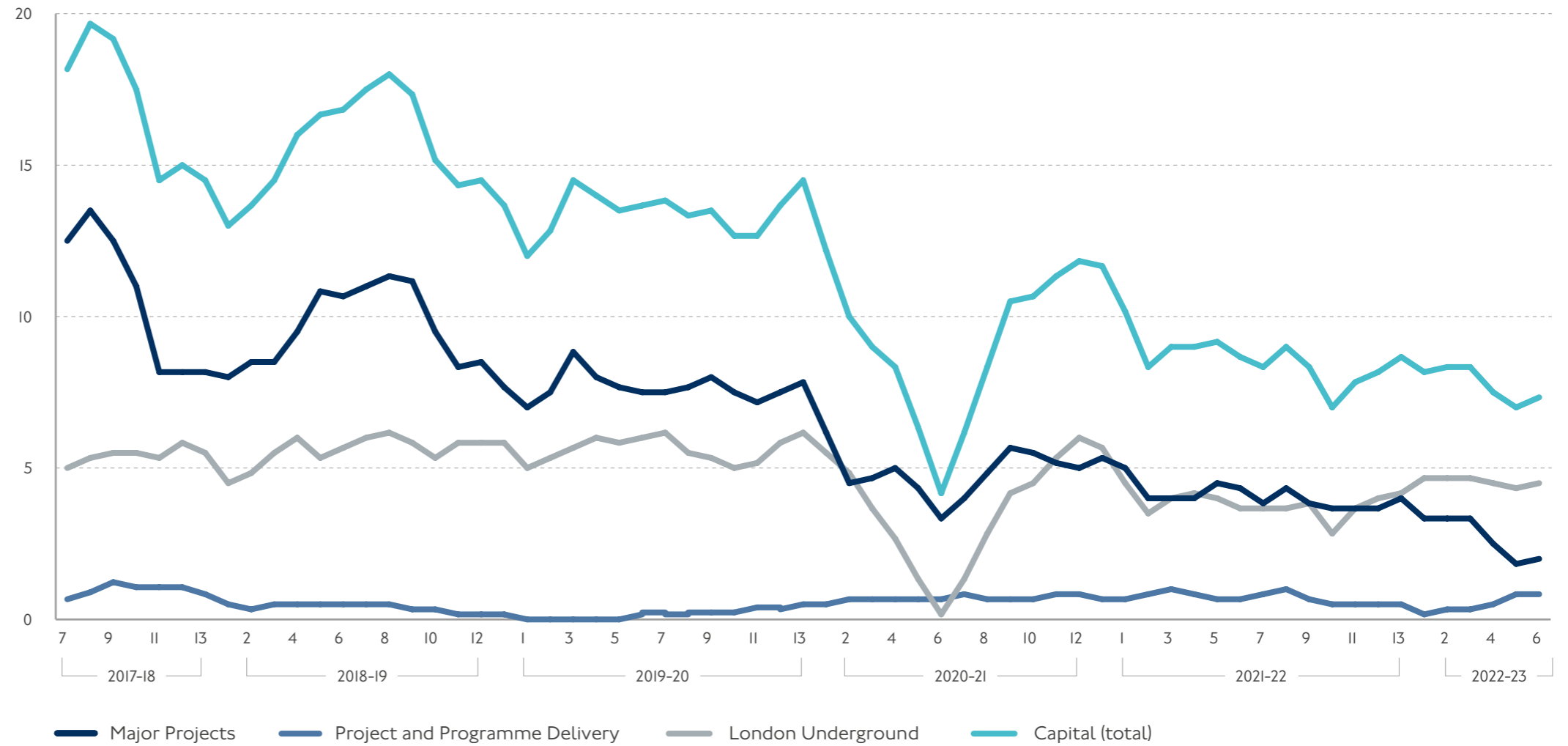


Long-term trend

There were 24 injuries reported in the Capital area during Quarter 2, which is an increase of four on the previous quarter. All were classified as minor injuries, which, given the range of activities and working environments our teams operate in, demonstrates a satisfactory degree of risk management. Manual handling was the top immediate cause of injury, with lack of communication and lack of physical controls identified as among the most common root causes.

The number of injuries falls well within our 'stretch targets' in Major Projects and Project and Programme Delivery of five injuries or fewer per four-week period, which is in line with our drive for improvement from last year.

Total Capital workforce injuries
(six-period average since 2017/18)





The first painted car of the new Piccadilly line stock

Schedule performance

We have achieved a number of scheduled milestones throughout the year

DLR rolling stock replacement programme

In April, dynamic testing (20,000km) started on the new DLR rolling stock.

Bank station upgrade

In May, following a 17-week closure, Bank station reopened with a new Northern line passenger concourse.

Piccadilly line upgrade

In June, the first car body was built and painted in the TfL livery.

London Underground

In August, we completed the heavy overhaul of the first 15 Metropolitan line trains.

London Underground

In June, seven new escalators were installed and brought into customer use.

Barking Riverside

In July, operational service begun between Barking Riverside and Gospel Oak.

Old Street

In July, the new station entrance at Old Street opened.

Brompton Road

In September a new Brompton Road entrance opened at Knightsbridge station.

Borough station

In August we completed the lift renewal and ticket hall enhancement at Borough station.

Westminster Bridge

In July, we completed construction of the Hostile Vehicle Mitigation programme at Westminster Bridge.

Silvertown Tunnel

In August, we begun using the tunnel boring machine in the Southbound tunnel.

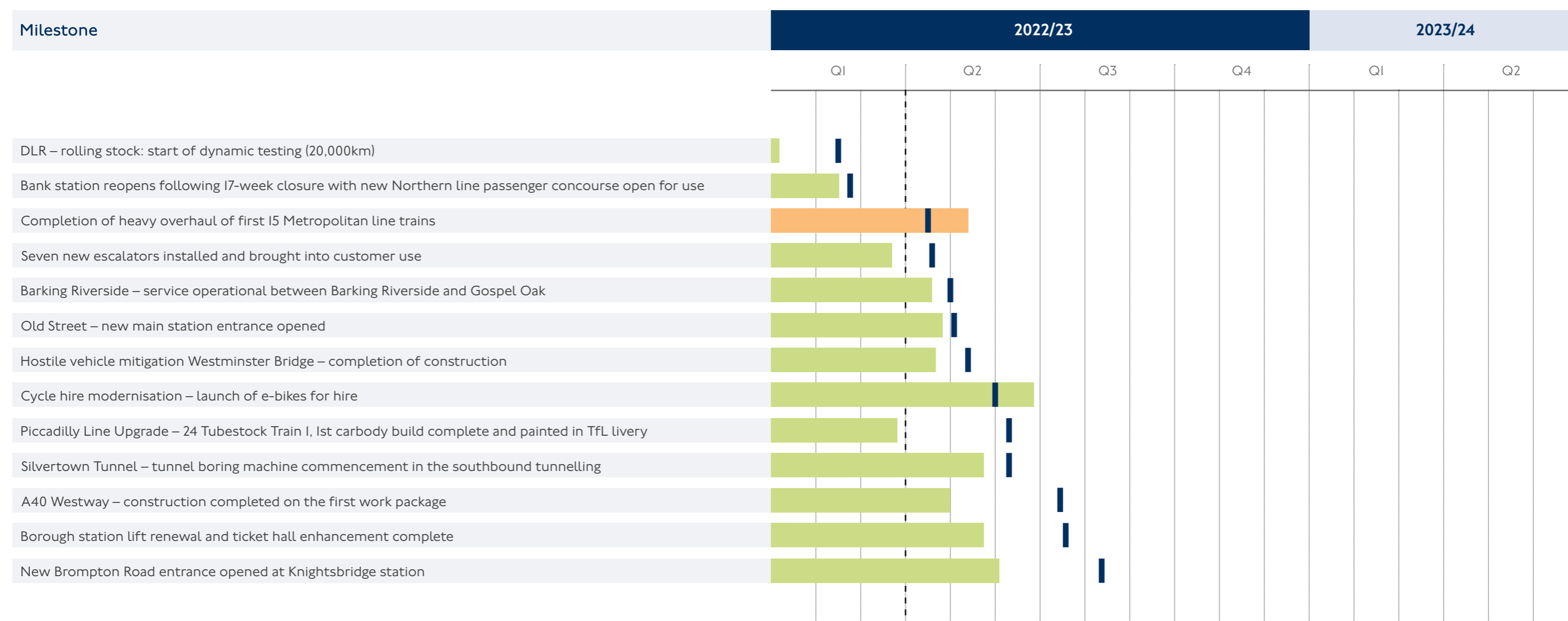
A40

In July, we completed construction of the A40 Westway.

Strategic milestones

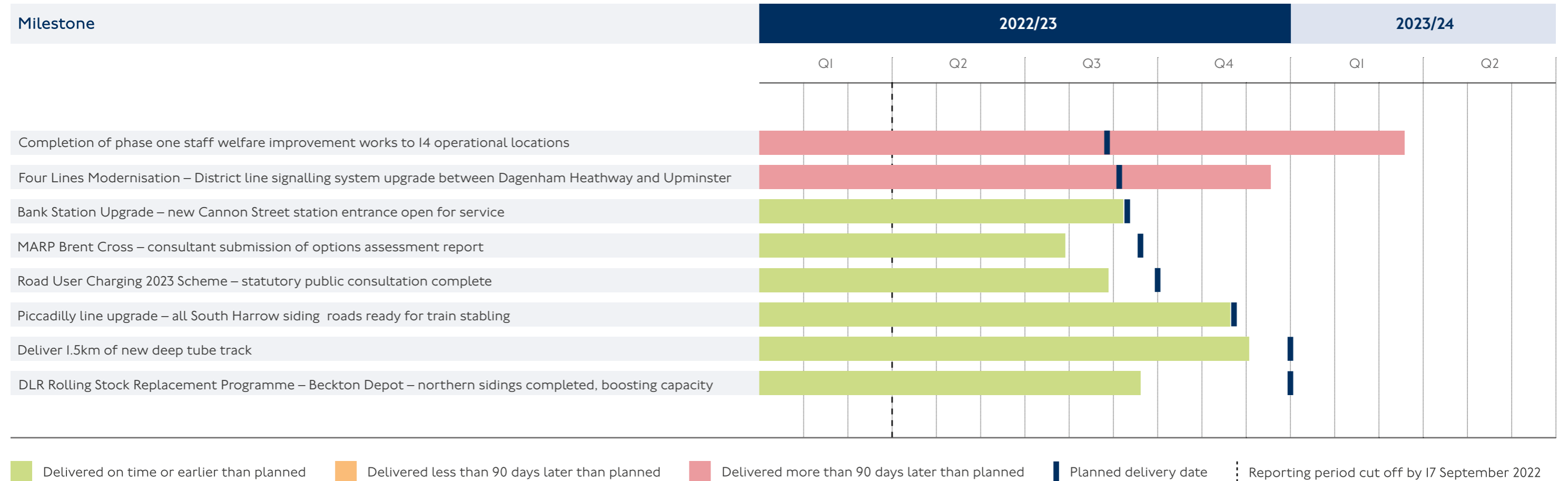
We have delivered 12 out of 21 strategic milestones either on time or early this year

These are our strategic milestones for 2022/23. The hollow box shows when the milestone was due to be met, while the coloured block shows when it was achieved or is forecast to be achieved.



■ Delivered on time or earlier than planned
 ■ Delivered less than 90 days later than planned
 ■ Delivered more than 90 days later than planned
 ■ Planned delivery date
 ⋮ Reporting period cut off by 17 September 2022

Strategic milestones 2022/23 (continued)



Milestones forecast to be late

Four Lines Modernisation

Signalling system upgrade on the District line passenger services

Since commissioning signal migration area five in March 2022, the underlying system performance has been good. A revenue software uplift was rolled out in November 2022 to address a safety issue identified following it being brought into revenue service. This means temporary mitigation measures can be removed.

Signal migration areas six and seven (eastern end of the District line) are planned to be brought into revenue service in January 2023 and March 2023 respectively.

London Underground – Infrastructure renewals – Built environment and civis

Completion of phase one staff welfare improvement works

The staff welfare improvement project is under way across a number of locations but has uncovered additional necessary compliance works across most of these locations. This has resulted in additional works and delays. This means the forecast completion date is now late and unrecoverable against the milestone date. Additional costs incurred in this project will need to be offset with other work across the programme.

London Underground – Train systems – Passenger Fleet

Completion of heavy overhaul of the first 15 Metropolitan line trains

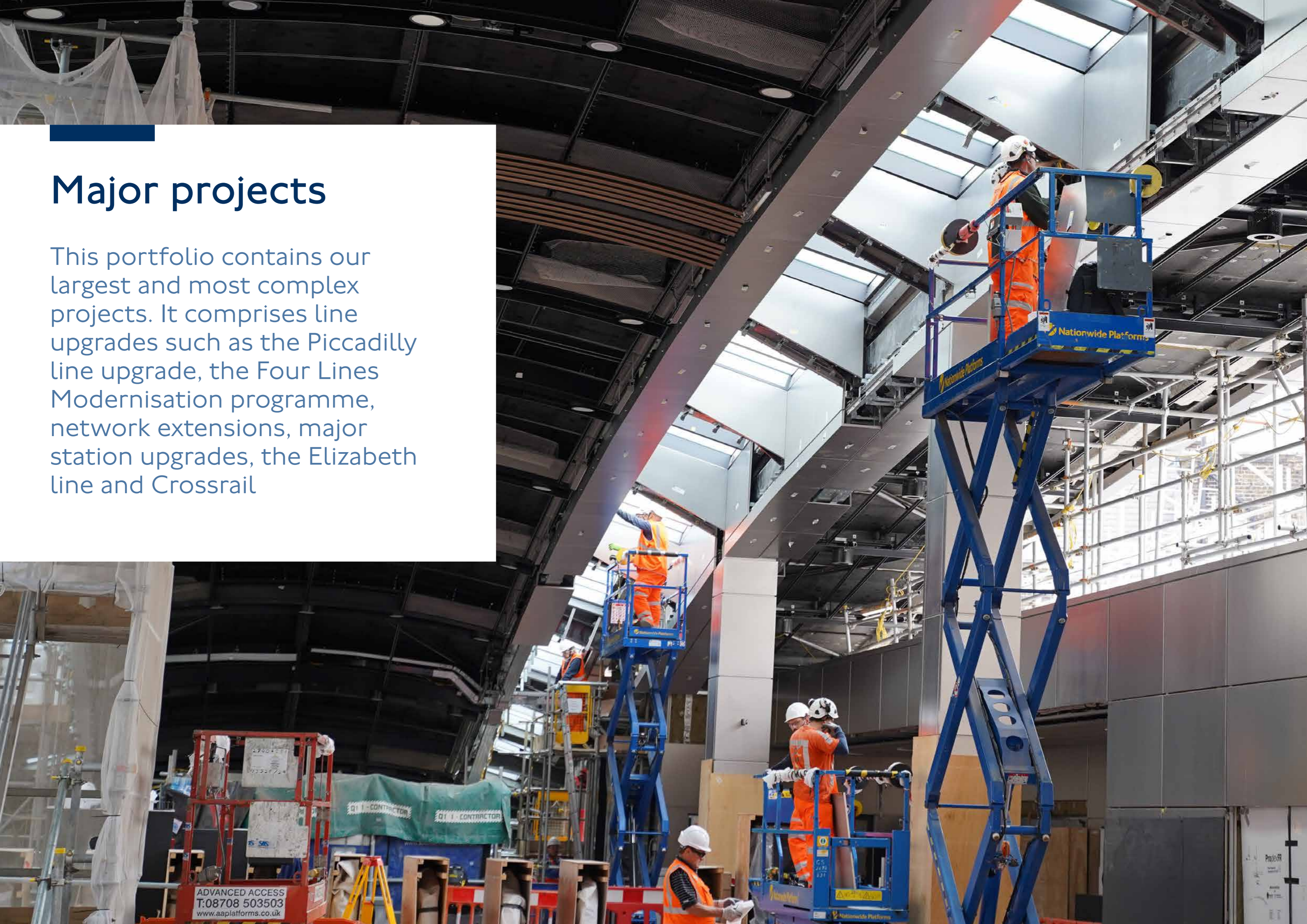
The project delivery timescales were delayed due to the slower than expected ramp up of bogie production. This was in turn due to delays in material deliveries from suppliers and development and approval of work instructions. The production rate was subsequently improved, however, industrial action further impacted production by two working days, with the final train being completed on 12 August, 28 days later than the target date.



We always try to mitigate delays to our projects

Major projects

This portfolio contains our largest and most complex projects. It comprises line upgrades such as the Piccadilly line upgrade, the Four Lines Modernisation programme, network extensions, major station upgrades, the Elizabeth line and Crossrail



Elizabeth line

Rolling stock

Forecast completion	Gross cost to date (£m)	Gross cost to go (£m)	Gross EFC (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
Q4 2024/25	996	10	1,006	1,149	143
Change since last Investment programme report					
No change	No change	No change	No change	No change	No change

Financial commentary

No movement since the last report.

Performance over time commentary

The forecast end date represents the delivery of the rolling stock and depot, including all additional changes. Since the authority award in 2013/14, our forecast end date has been delayed by approximately four years owing to delays to the overall Crossrail programme. Our authority increased in 2018/19, when five units were added. Since the authority was awarded in 2013/14, the EFC dropped from £1,090m to £1,006m because the trains have since been part of a sale and leaseback arrangement. They are now being leased from 345 Rail Leasing Limited on a 20-year agreement and the costs charged as operational costs.

Programme update

Class 345 trains

Passenger services between Reading and Paddington continued to operate with a combination of nine-car and seven-car

Class 345 trains, and between Liverpool Street and Shenfield with nine-car Class 345 trains. The three remaining seven-car trains will be withdrawn from service at the start of November for conversion to nine-car trains and will be reintroduced to the fleet by December 2022. On 6 November, the peak train frequency in the core central section will increase from 12 to 22 trains per hour with the introduction of through running services from Shenfield through to Paddington, without the need to change at Liverpool Street.

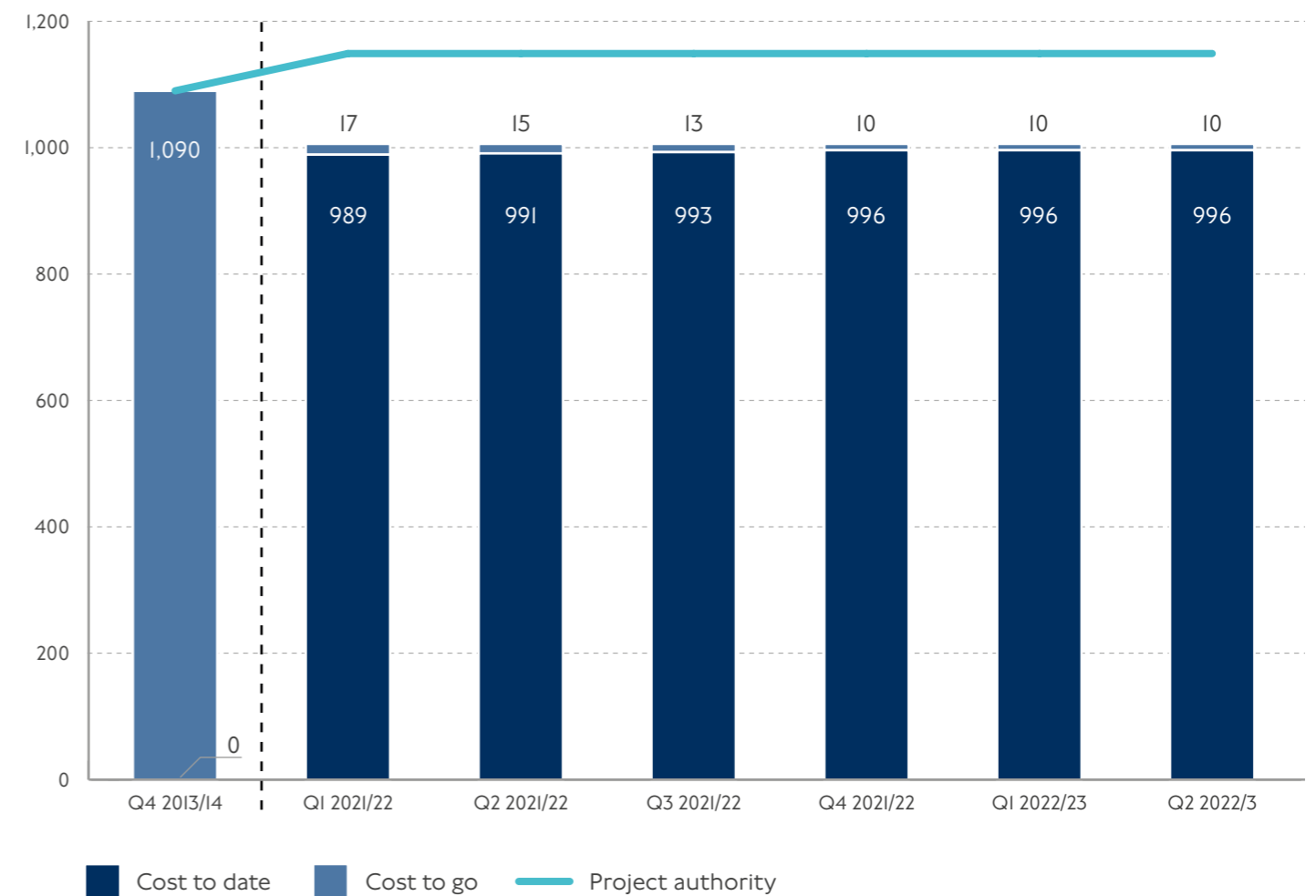
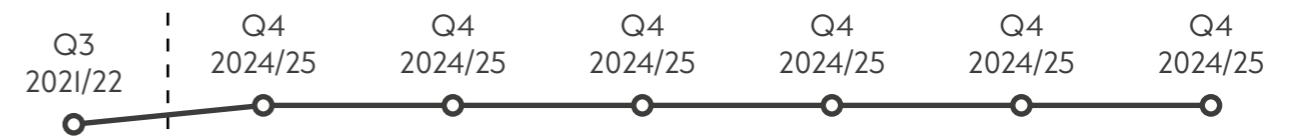
The manufacturers continue to apply incremental updates to the train and signalling system software, and we have provided for this in the rolling stock project forecast through to 2025.

Challenges

Fleet reliability has significantly improved, but Alstom, the manufacturer, are carrying out further reliability-focused modifications.

Estimated final cost performance over time (£m)

Forecast completion date



Crossrail

Forecast completion	Gross cost to date (£m)	Gross cost to go (£m)	Gross EFC (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
Q1 2023/24	15,737	200	15,937	15,789*	(148)
Change since last Investment programme report					
No change	59	(85)	(26)	No change	

Financial commentary

In Quarter 2, the EFC has reduced to £15,937m, £23m lower than previously forecast reflecting the realisation of opportunities and the lower risk profile for the remainder of the programme. Following the successful opening of the railway in May 2022, the cost to go includes works to achieve full end-to-end integration in May 2023, and provisions for the final handover and close out of the programme. Crossrail continues to be focused on managing the risks associated with implementing the additional functionality required to complete the final integration of the railway, alongside achieving the required level of operational resilience.

Performance over time commentary

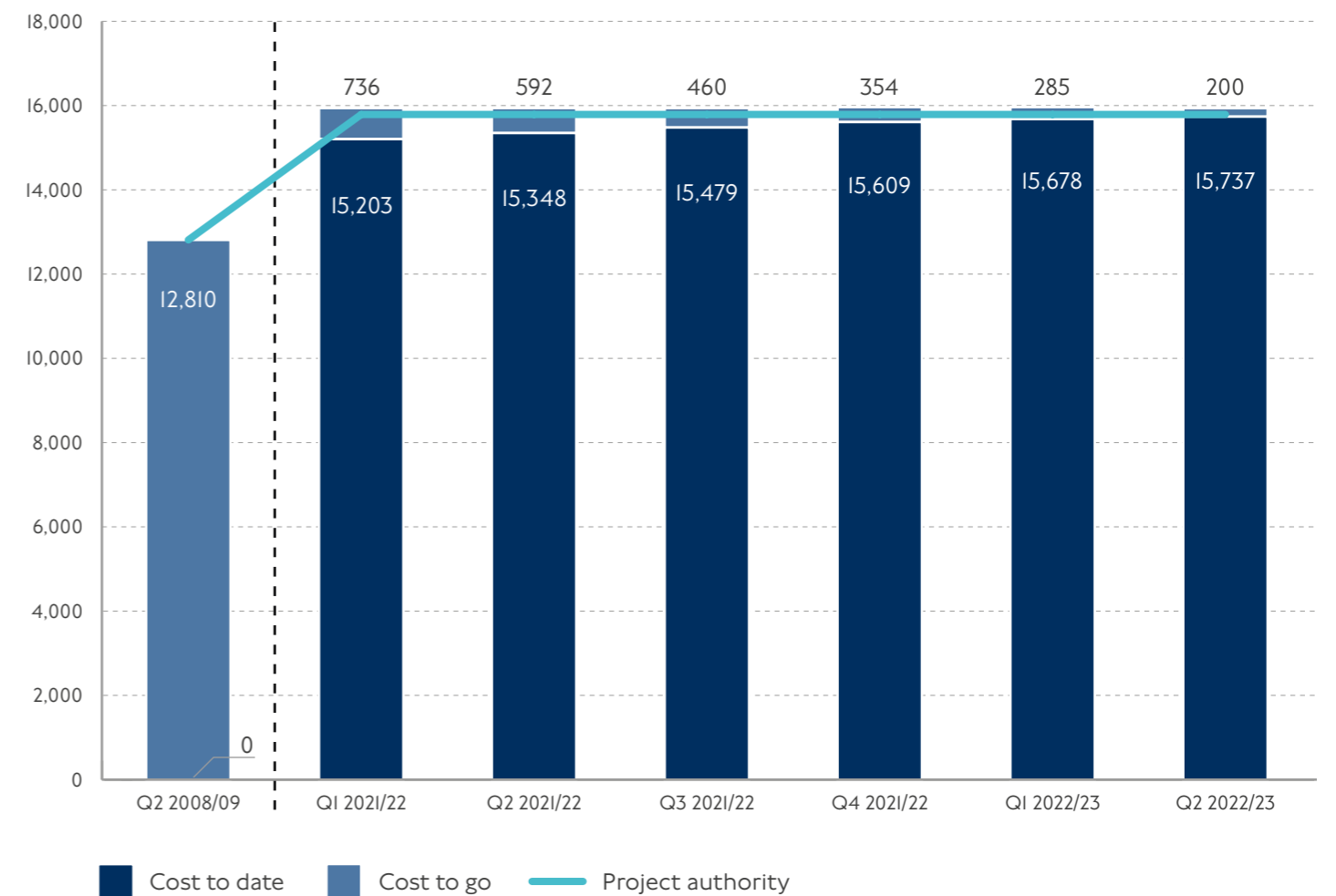
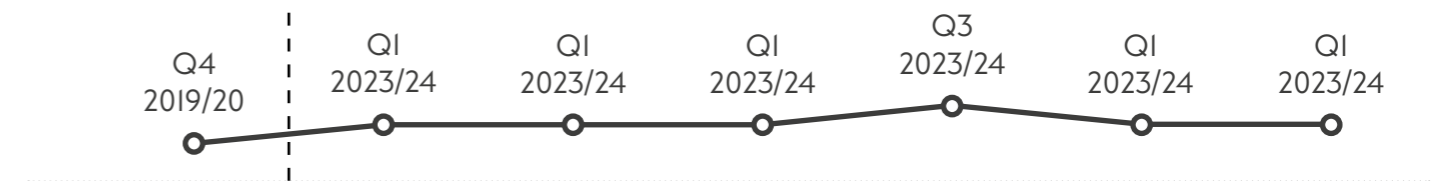
The reported forecast end date represents operation of a full service from Reading and Heathrow through the central section to Shenfield and Abbey Wood, with a peak service of 24 trains per hour on the central section between Paddington and Whitechapel stations.

The original forecast end date was autumn 2019. However, the schedule at that time assumed that installation of critical systems, construction of stations, and testing and commissioning could all be completed in parallel towards the latter stages of the programme. This was ultimately not achievable and led to a delay in completion. In addition, the coronavirus pandemic had an impact on productivity in 2020, although this has been mitigated from a schedule and cost perspective.

Since setting Delivery Control Schedule 1.2 in August 2021, costs have remained largely stable due to active management of the EFC. We have been able to realise a number of opportunities and risk retirements over this period through focused cost reduction initiatives, delivering as close as possible to the forecast schedule and revised risk profile. As a result of this the EFC has been reduced by £23m to £15,937m.

Estimated final cost performance over time (£m)

Forecast completion date



* Excludes on-network works carried out by Network Rail

Programme update

More than 70 million journeys have been recorded on the Elizabeth line since the central section of the railway opened in May this year. Around half of those journeys were carried out in the central section between Paddington and Abbey Wood. On Thursday 29 September there were 290,000 journeys completed in the central section, the highest number to date.

On 23 August 2022, just over three and a half months on from the opening of the Elizabeth line's central section, we announced that through-running services would start. This began on Sunday 6 November, with Sunday services also being introduced from this date.

Bond Street Elizabeth line station, offering step-free access and increased capacity at the heart of London's West End opened on 24 October.

Network Rail surface station enhancements are now largely complete across the 41 Elizabeth line stations, although final step-free accessibility improvements and some snagging works continue in a small number of locations.



The Elizabeth line is already proving to be very popular

Line upgrades

Four Lines Modernisation

Forecast completion	Gross cost to date (£m)	Gross cost to go (£m)	Gross EFC (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
Q4 2024/25	5,200	273	5,473	5,520	47
Change since last Investment programme report					
No change	30	(26)	4	No change	

Financial commentary

The EFC has increased by £4m since the last report. This is due to a contractual supplier resource rate adjustment reflecting increased inflation, rework required to the radio communication system and increased surveying and associated fees. Costs for access and protection have also increased owing to the extension of the installation works. A cost reduction plan is being pursued to mitigate these increases.

Of the EFC increase, £2m is expected to be offset by a combination of a reduction in project risk and a de-scope opportunity relating to radio communication works at Ealing Common. Owing to the timing of the updates this is not reflected in the above EFC figure but will be accommodated in the Quarter 3 report, along with a further cost review.

Our forecast completion date, when the final signal migration area I4 between Rayners Lane and Uxbridge, will be brought into service, is still Quarter 4 2025.

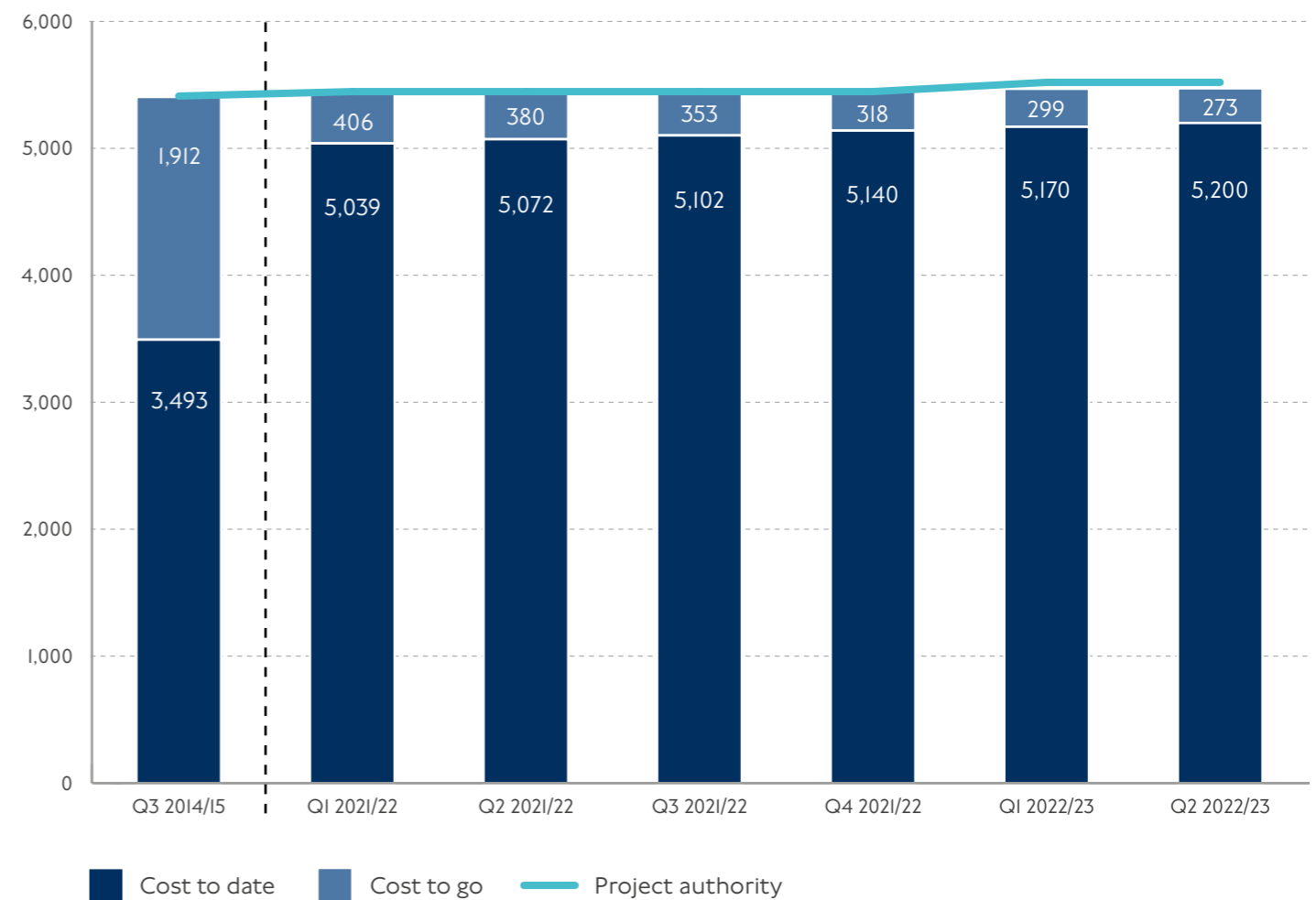
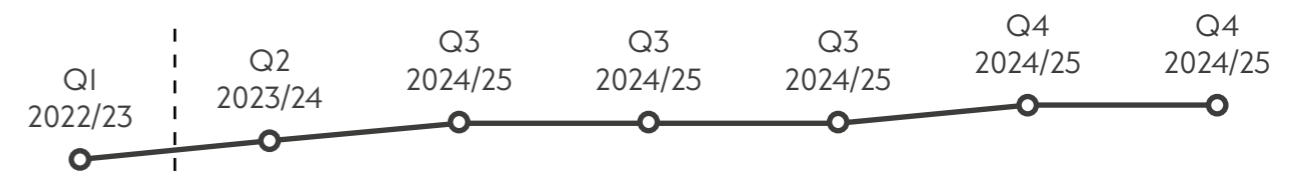
Performance over time commentary

The forecast completion date shows when the final signal migration area I4, between Rayners Lane and Uxbridge, will be brought into service.

Since the award of the signalling contract in July 2015, our forecast completion date for signal migration area I4 has been delayed and is now expected to be delivered in early 2025 (Quarter 4). The delays are principally owing to challenges with complex software development, testing and commissioning, closure availability and the impact of the coronavirus pandemic.

Estimated final cost performance over time (£m)

Forecast completion date





New signalling systems improve journey times

Programme update

On 11 September 2022, a new timetable was introduced enabling a journey time improvement of around five per cent on average on the Circle and District lines between Monument, Fulham Broadway, Barons Court and Paddington.

This improvement was enabled by the successful commissioning of the new signalling system between Sloane Square, Paddington, Fulham Broadway and Barons Court, called signal migration area five, in March 2022. This adds to the journey time improvements already introduced on the north side of the Circle line through a timetable change in September 2021.

Since commissioning signal migration area five in March 2022, the underlying system performance has been good. A revenue software uplift was rolled out in November 2022 to address a safety issue identified. This enables the temporary mitigation measures to be removed.

We are planning to introduce signal migration areas six and seven (eastern end of the District line) in January 2023 and signal migration area seven in March 2023. This will complete the rollout of Communications Based Train Control on the Hammersmith & City line and connect the first depot to the network.

Design and installation of trackside signalling assets continues on the Uxbridge and Amersham branches of the Metropolitan line beyond Preston Road. Installation is targeted for completion in March 2023.

The procurement is in progress for the planned upgrades to the heavy lifting shed at Neasden depot and the new staff accommodation block. When complete in 2024, this facility will enable the planned overhaul of Metropolitan line trains.

Line upgrades

DLR rolling stock and systems integration

Forecast completion	Gross cost to date (£m)	Gross cost to go (£m)	Gross EFC (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
Q2 2026/27	219	623	842	863	21
Change since last Investment programme report					
No change	18	(15)	3	No change	

Financial commentary

Since the last report, the EFC has increased by approximately £3m, primarily driven by inflationary pressure on material costs being greater than originally anticipated. The Programmes and Investment Committee update given on 19 October approved additional authority for £16.7m. The revised authority figure will be reflected in the Quarter 3 report. However, we continue to review options to mitigate and offset these cost increases.

Performance over time commentary

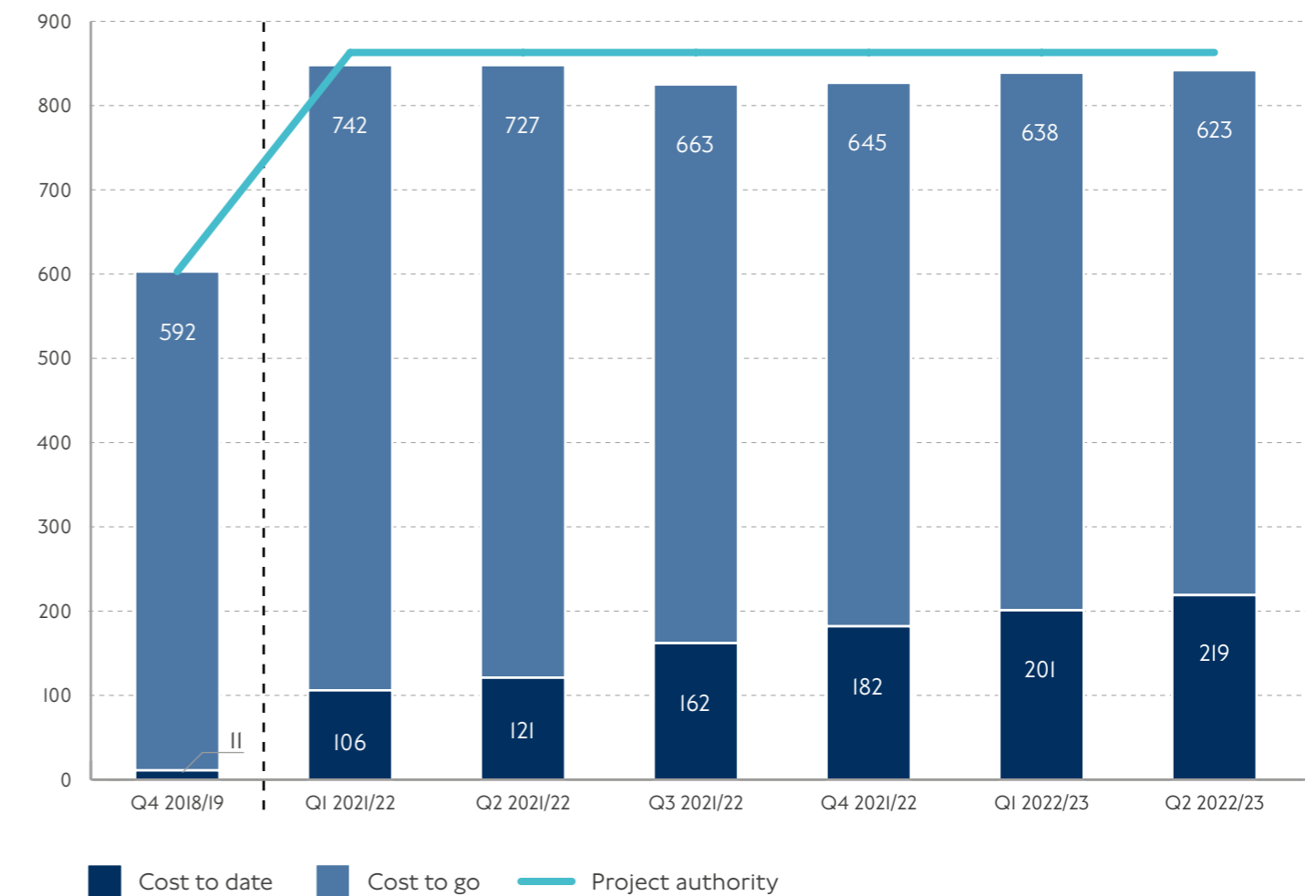
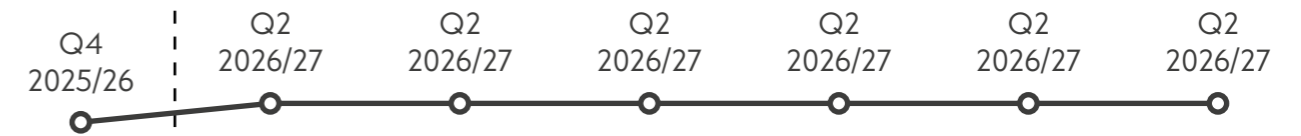
The forecast end date has not changed since the last report.

Since the original grant of programme and project authority in 2019, we proposed to increase the scope subject to funding from the Department for Levelling Up, Housing and Communities, taking the total number to 54 new trains.

We reduced our EFC to reflect procurement savings and by taking a proactive stance with the remaining risk exposure as the rolling stock design approaches completion. However, this is offset by countervailing inflationary pressures. The increase in EFC from Quarter 4 2018/2019 to Quarter 1 2021/2022 reflects the addition of £261m of grant funding from central government to deliver the Housing Infrastructure Fund scope of works.

Estimated final cost performance over time (£m)

Forecast completion date



Programme update

Rolling stock delivery

The manufacture of the new rolling stock in Spain is continuing to plan with four trains completed and on their test track to run checks before delivery of the first two trains to Beckton in early 2023. We anticipate having completed the manufacture of 12 trains by the end of this financial year.

Beckton depot and network infrastructure

At Beckton, work on the northern sidings and sub-station continues. Pre-possession works are in progress to deliver the end state northern sidings and power which will be commissioned in late 2022.

Tenders have now been returned for the maintenance facility building, and additional southern sidings and are in the process of being evaluated. We expect to award the contract later this year.

Housing Infrastructure Funding

We are still awaiting confirmation from the Government on our ability to activate an option to purchase 11 additional trains which, funded through the Housing Infrastructure Fund, would provide additional capacity, and unlock further housing benefits in the Royal Docks and Isle of Dogs.



We aim to build 12 new DLR trains by the end of the year

Line upgrades

Piccadilly line upgrade

Forecast completion	Gross cost to date (£m)	Gross cost to go (£m)	Gross EFC (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
Q4 2026/27	525	2,376	2,901	2,994	93
Change since last Investment programme report					
No change	49	(13)	36	No change	

Financial commentary

Since the last report our EFC has increased by approximately £36m. £25m of this relates to the inflationary impact which now supersedes previous assumptions reflecting external market forces. £11m relates to reassessment of Arnos Grove sidings works (£5.4m) and new risks raised across the programme which are being actively mitigated. These increases are partially offset by efficiencies delivered by the programme owing to active opportunities management.

Our forecast completion remains early 2027.

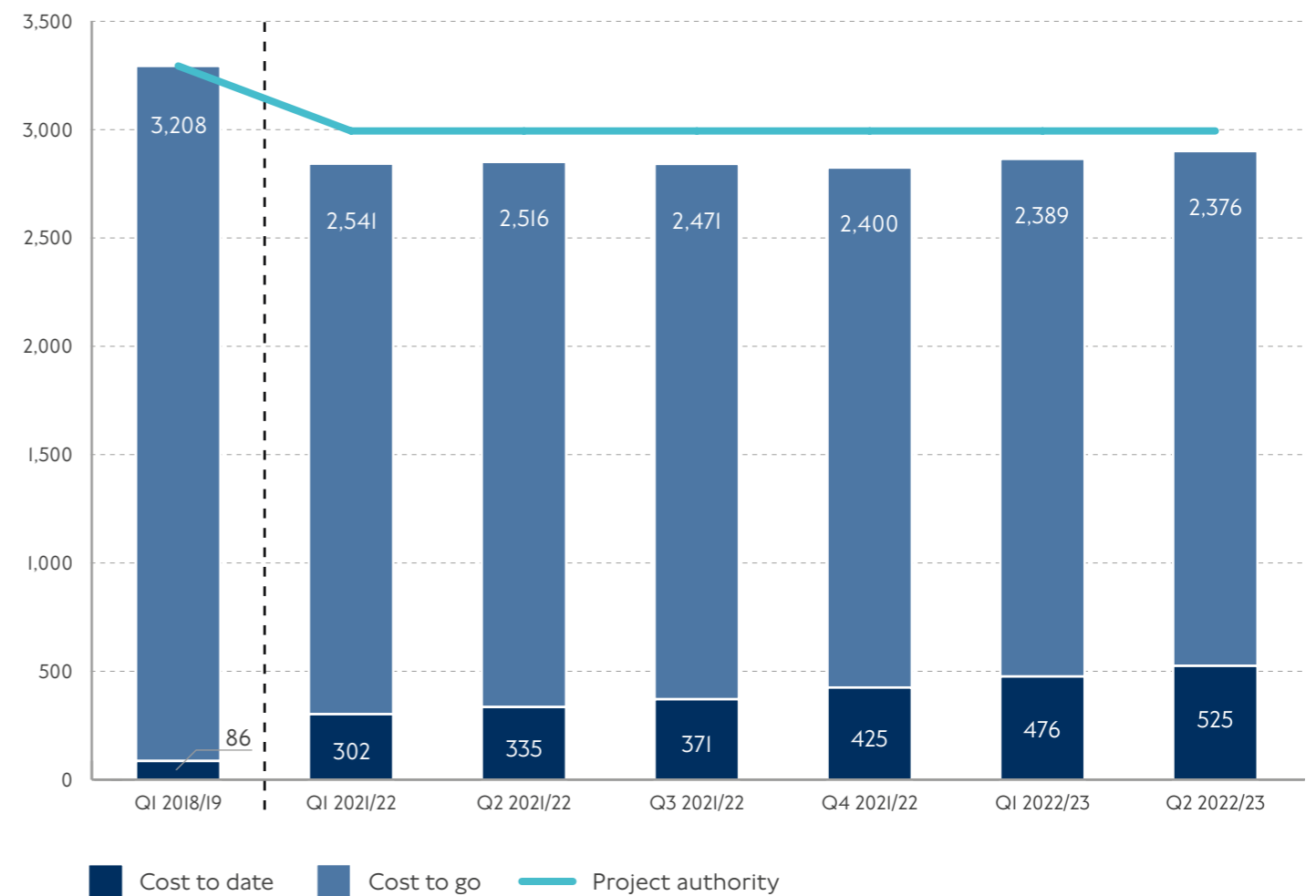
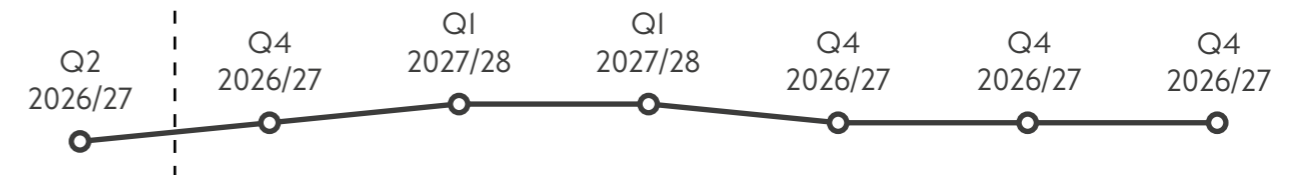
Performance over time commentary

The forecast end date represents the date when the new Piccadilly line trains and all supporting infrastructure will be in use. Since authority was originally awarded in May 2018, our forecast end date has been delayed from 2026 to 2027. This was driven by a decision to defer the start of third-party spend by six months (where possible) to help mitigate funding challenges due to the pandemic. As a result of an in-depth review of the critical path activities and driving schedule efficiency, the forecast completion has been brought forward from Quarter I 27/28 to Quarter 4 26/27. The new trains are now expected to begin entering service from summer 2025.

Since July 2021, industry price increases have led to updated inflation indices within our business, adding £65m to the overall EFC since the beginning of the financial year. This is being contained within the overall project authority through an ongoing focus on active opportunity management.

Estimated final cost performance over time (£m)

Forecast completion date





Our new rolling stock will be tested next summer

Programme update

Depots and stabling

In July, we successfully brought into use new stabling roads for four trains at South Harrow sidings. This included installation of the track and signalling works as well as new driver walkways and driver access platforms. The new stabling roads are compatible for both the existing and new Piccadilly line trains.

In August, we awarded Hegenscheidt the contract for the design, manufacture, and installation of a new under-floor tandem wheel lathe, which will be based at Cockfosters depot. This critical work forms part of the overall depots upgrade, with delivery scheduled from July 2023. This supports the decommissioning of existing facilities and the start of construction of new facilities across both Piccadilly line depots.

New rolling stock

Assembly of the first train continues to plan with the third of nine cars now assembled and painted with two further cars now in car body build. We remain on plan to deliver the first train fully assembled for testing at Siemens' test track in summer 2023.

Signalling

In August, we awarded Ark signalling consultancy the design contract for the legacy signalling modifications to take place on multiple sites across the Piccadilly line. This to accommodate for the new train being longer and having different sight lines from inside the driver's cab.

Innovation

In August, we completed the final two projects under the Department for Transport (DfT)-sponsored Transport Infrastructure Efficiency Strategy (TIES) Living Lab programme. Firstly, the cooling panel innovation that was initially trialled on a disused platform at Holborn station has been decommissioned and is now on display at our Tunnelling and Underground Construction Academy (TUCA). Secondly, the scalable modular equipment room unit, including a green and blue roof, has been delivered and is now also on display at TUCA. The academy will display these along with other recent innovations as part of our Innovation workstream under our Capital Efficiency Plan.

Network extensions

Silvertown Tunnel

Forecast completion	Net cost to date (£m)	Net cost to go (£m)	Net EFC (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
Q1 2025/26	73	112	185	173	(12)
Change since last Investment programme report					
No change	1	1	2	No change	

Financial commentary

The EFC is currently £12m over the delegated programme and project authority of £173m, owing to inflation increases and the agreed Safe Stop during the first lockdown during the coronavirus pandemic. The main change in EFC since the last report is owing to further inflationary pressure, particularly around land purchases and resource. The project team continues to seek opportunities including reviewing non-essential scope. Significant risks around land compensation and ground conditions remain and if these were to materialise, it may have a significant impact on the EFC.

Performance over time commentary

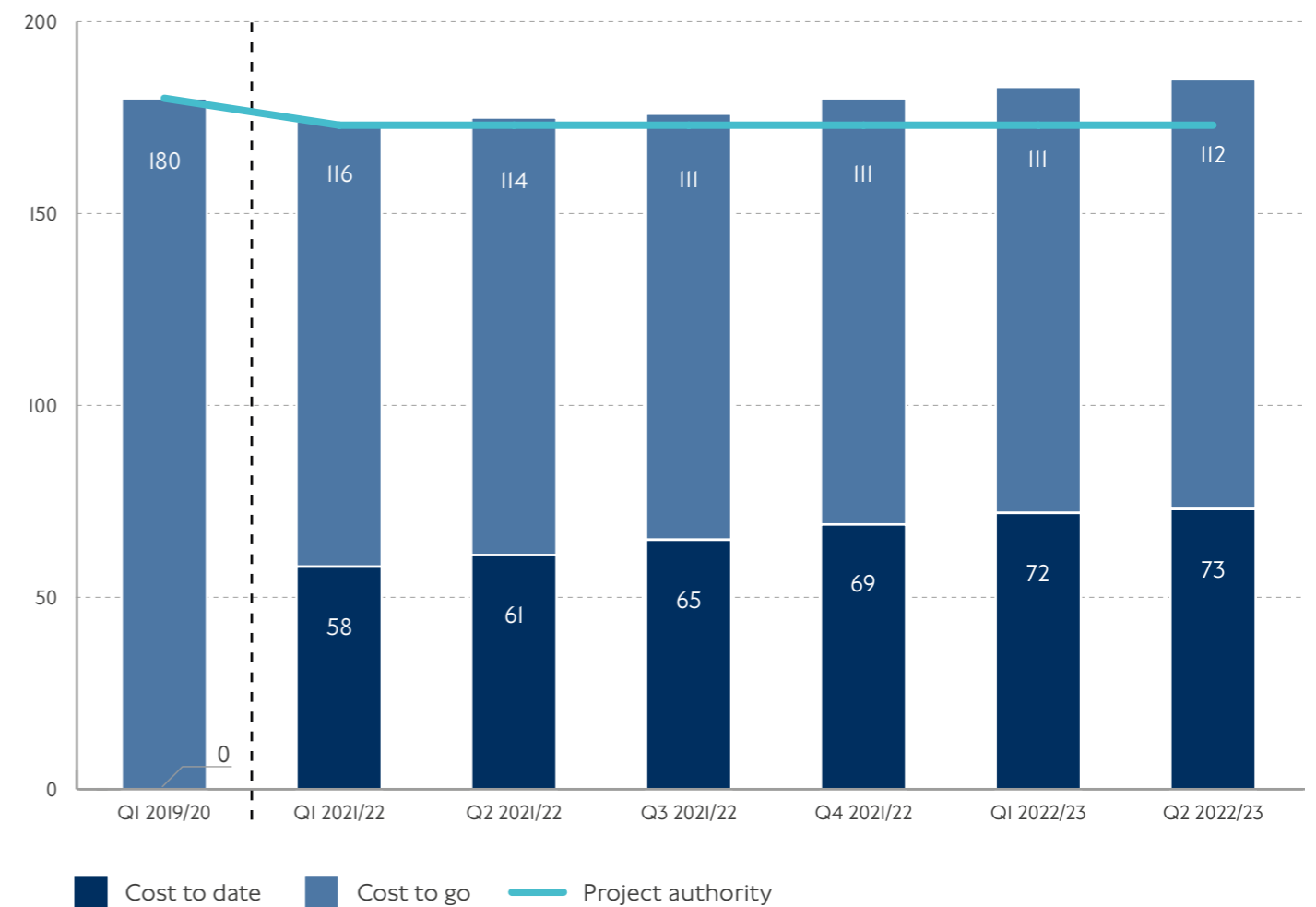
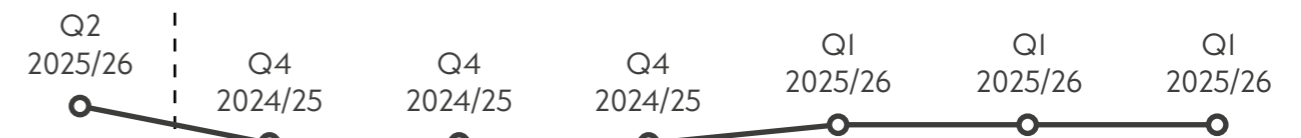
The forecast end date is when we obtain the permit from an independent assessor to use the new Silvertown Tunnel.

Our forecast end date has been relatively stable since the programme and project authority was approved in May 2019. Since the last report, however, ongoing shortages of skilled labour and supply of construction materials has seen a movement of 20 days, from mid-April to early-May 2025.

In the financial year 2020/21, our EFC increased to include additional costs for the implementation of the Road User Charging infrastructure. It was reduced in Quarter I 2021/22 after this scope and budget was transferred to the Road User Charging portfolio within the surface programme and project delivery team, to achieve synergies with our other Road User Charging schemes. Higher than originally assumed inflationary pressures in 2022/23 have resulted in an increase of around £4m in the EFC.

Estimated final cost performance over time (£m)

Forecast completion date



All numbers are shown as net of income and third-party contributions

Programme update

We have now taken temporary possession of much of the required land from existing tenants to enable handover to our contractor, Riverlinx. A total of 68 out of 71 of our Temporary Possession Notices have been served to date. Good progress continues on the issuing of notices for permanent land acquisition, with these planned to be completed in February 2023.

As is tradition, the team has named the tunnel boring machine and in this case they have chosen the name Jill after Jill Viner, London's first female bus driver in 1974. In August we were delighted to welcome Jill's family who did us the honour of cutting the ribbon to announce the launch.

The start of tunnelling began at the end of August which was a significant milestone and a huge step forward for this project. By the end of November, the tunnel boring machine had progressed by 190 metres and installed 91 tunnel rings.

Excavation works continued on the rotation chamber where the tunnel boring machine will be turned, and on the retrieval chamber from which it will be extracted following the completion of tunnelling.

Our contracts for further transport and traffic, as well as socioeconomic and environmental monitoring are progressing well, with significant further modelling and analysis work now under way. This will support us in setting the initial user charges at Silvertown and Blackwall tunnels, developing the new cross-river bus services, and enabling a refreshed assessment of the scheme's environmental effects in advance of opening in 2025.



Good progress has been made with tunnelling and excavation

Network extensions

Barking Riverside Extension

Forecast completion	Gross cost to date (£m)	Gross cost to go (£m)	Gross EFC (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
Q2 2022/23	328	0	328	329	1
Change since last Investment programme report					
No change	3	(2)	1	No change	

Financial commentary

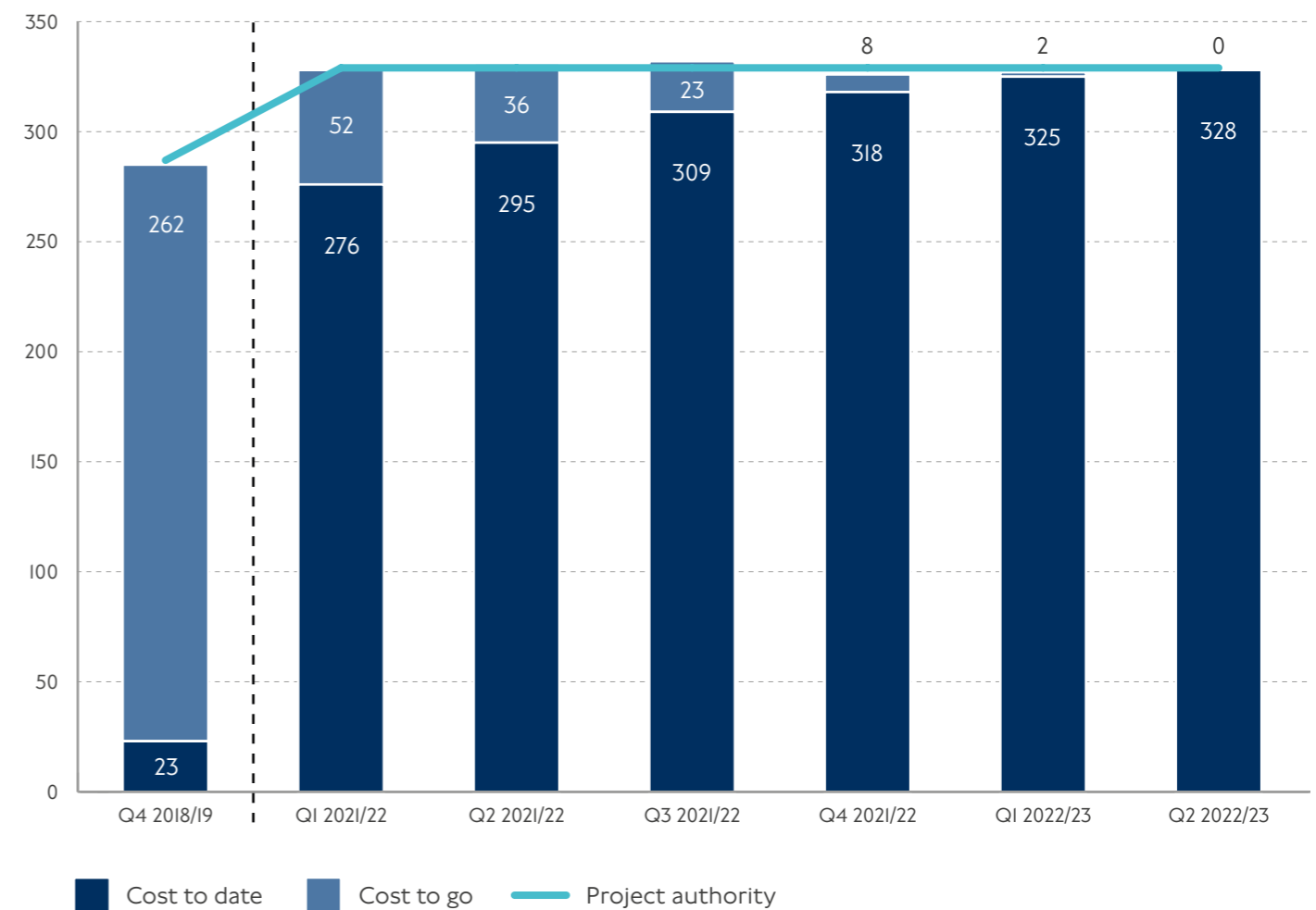
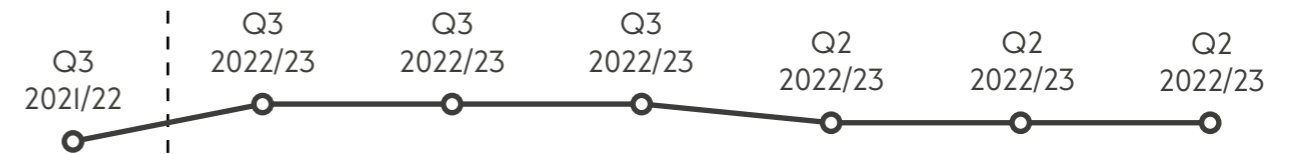
The EFC has increased by approximately £1m since the last report, owing to additional work, possession cancellations and repositioning of a signal to address an issue of the train driver's line of sight to the signals. This has impacted the main contractor's completion date. In turn, this has prolonged the end date of the Joint Venture contract due to Network Rail possessions to complete the work being unavailable until mid-January 2023. The cost to value is netted off against third party contributions giving a zero value.

Performance over time commentary

Our forecasted end date for when services will run between Gospel Oak and Barking Riverside has been delayed since programme and project authority was approved in 2018, following the discovery of uncharted utilities and the Safe Stop because of the pandemic. The Safe Stop resulted in rail systems works being replanned and Network Rail possessions rebooked, with the EFC increasing because there are only two opportunities a year for a four-day possession. Signal sighting concerns have resulted in additional works to resolve the issue and have impacted planned completion by the contractor.

Estimated final cost performance over time (£m)

Forecast completion date





Programme update

On Monday 18 July, the first passenger train ran on the new extension between Gospel Oak and Barking Riverside.

We are working with the contractor teams to formally handover all assets and submit the final health and safety files to Network Rail and London Overground before the end of 2022.

The final possession to commission the permanent solution for addressing the signal sighting issue has not been agreed with Network Rail and the wider industry, owing to the impacts of events such as the London Marathon and industrial action. It is likely that the final commissioning could move into early 2023 due to possession availability. Therefore, the six-month condition of the network change application has been updated to reflect this change.

Major station upgrades

Bank station capacity upgrade

Forecast completion	Gross cost to date (£m)	Gross cost to go (£m)	Gross EFC (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
Q3 2022/23	673	29	702	702	0
Change since last Investment programme report					
No change	16	(16)	No change	No change	

Financial commentary

The EFC has remained stable since the last report and spend is in line with current forecasts.

Performance over time commentary

The forecast end date represents the opening of the new Cannon Street ticket hall entrance at Bank station. Our estimated final cost has increased since the authority award in 2016, owing to site works being disrupted by the impact of the terrorist attack at London Bridge, the need for additional scope following the discovery of asbestos, and the impact of the pandemic.

Despite these challenges, our forecast end date has remained consistent.

Programme update

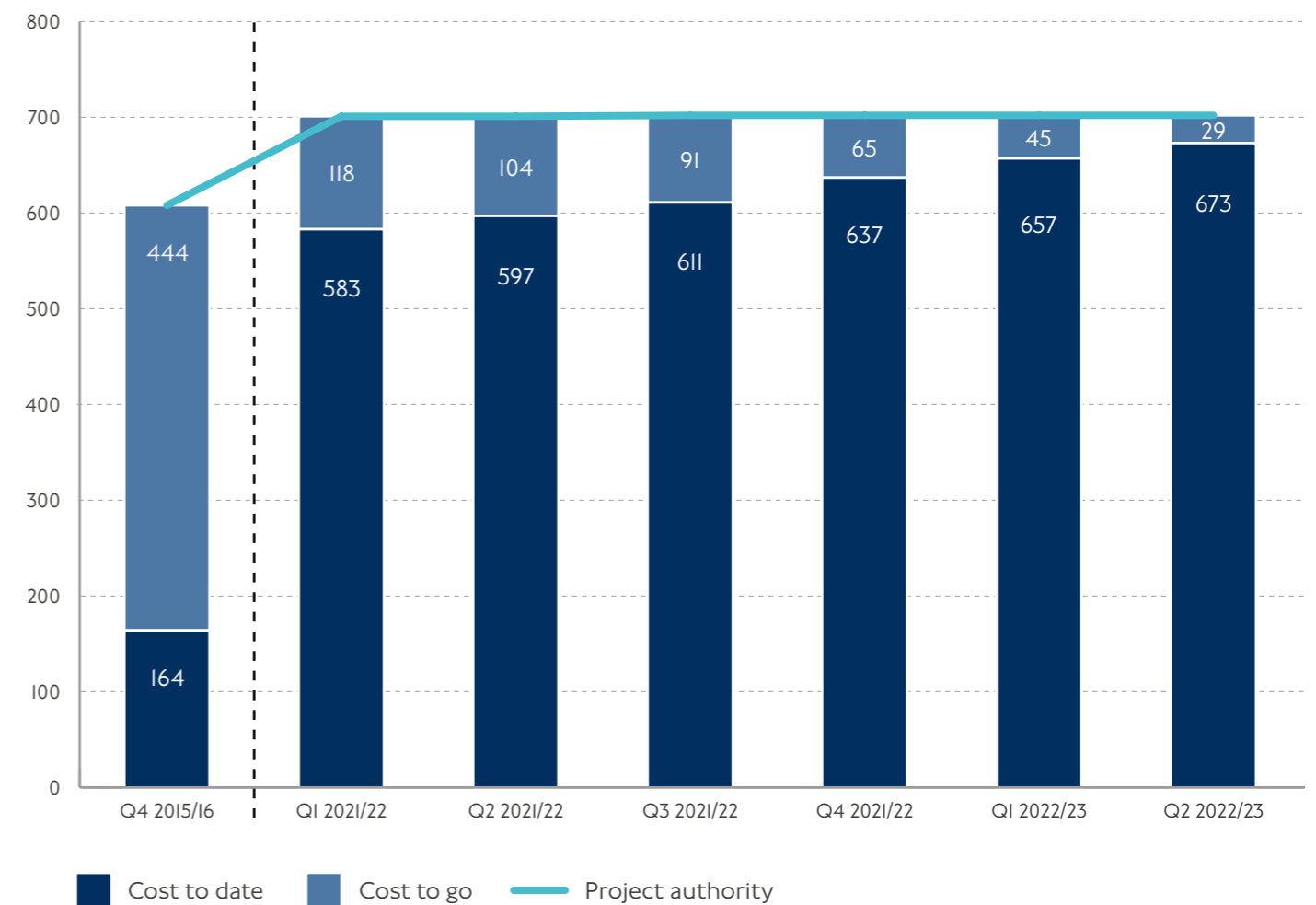
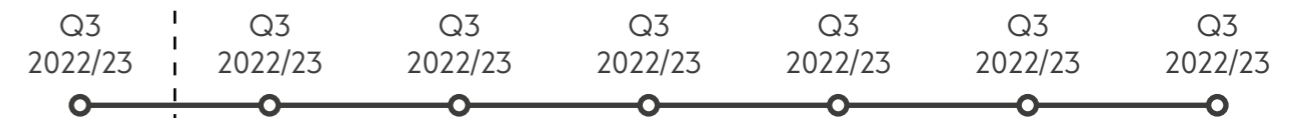
The new interchange route between the Northern line and DLR was opened by the former Transport Commissioner, Andy Byford, on 13 October. On 28 October, Interim Commissioner, Andy Lord, opened the two new 95-metre moving walkways and three new escalators behind the Northern and Central lines, to make journeys quicker and easier.

Bank station will see its capacity increase by 40 per cent when upgrade work finishes later this year. The capacity upgrades are alongside additional upgrades that will improve the passenger flows and overall experience. Improvements include step-free access to the Northern line, improved access to DLR platforms, two new moving walkways, 12 new escalators and two new lifts. There will also be more direct routes within the station and a new station entrance on Cannon Street.

Works have started to demobilise from key work sites on the project, with the removal of the gantry crane on Arthur Street and demolition of remaining basement levels at the whole block site location.

Estimated final cost performance over time (£m)

Forecast completion date



Elephant & Castle

Forecast completion	Gross cost to date (£m)	Gross cost to go (£m)	Gross EFC (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
Q4 2027/28	17	71	88	81	(7)
Change since last Investment programme report					
No change	2	2	4	No change	

Financial commentary

The forecast end date remains consistent, although in Quarter 1 2022/23 the Stage 1 EFC increased by £3m after applying revised inflation assumptions. We only applied increases to those items likely to attract an inflation uplift. For example, it was not applied to in-house resource costs but was applied to the externally procured main tunnelling contract estimates. The Programmes and Investment Committee approved an increase to authority of £5.5m in October and the updated figures will be reflected in the Quarter 3 report.

This increase in inflation has not been applied to the cost of the station box being constructed by the developer, as this is a fixed-price contract enshrined within the development agreement of December 2021. We continue to develop our understanding of the project risks, and actively seek to ensure risk provision is proactively managed and appropriate.

Performance over time commentary

During 2022/2023, the project EFC increased due to the impact of inflationary pressures. In October 2022, the Programmes and Investment Committee approved an increase of £5.5m to authority to cover the inflationary increase and bring forward scope from stage two to lower the risk of future communication works. The EFC will continue to be challenged, and opportunities have been reflected in our decision to engage the construction market much earlier than is the norm, allowing suppliers more time to identify opportunities in a competitive market.

Programme update

We are pushing ahead with the procurement arrangements for the new tunnels, and we issued an invitation to tender for the ancillary works in October.

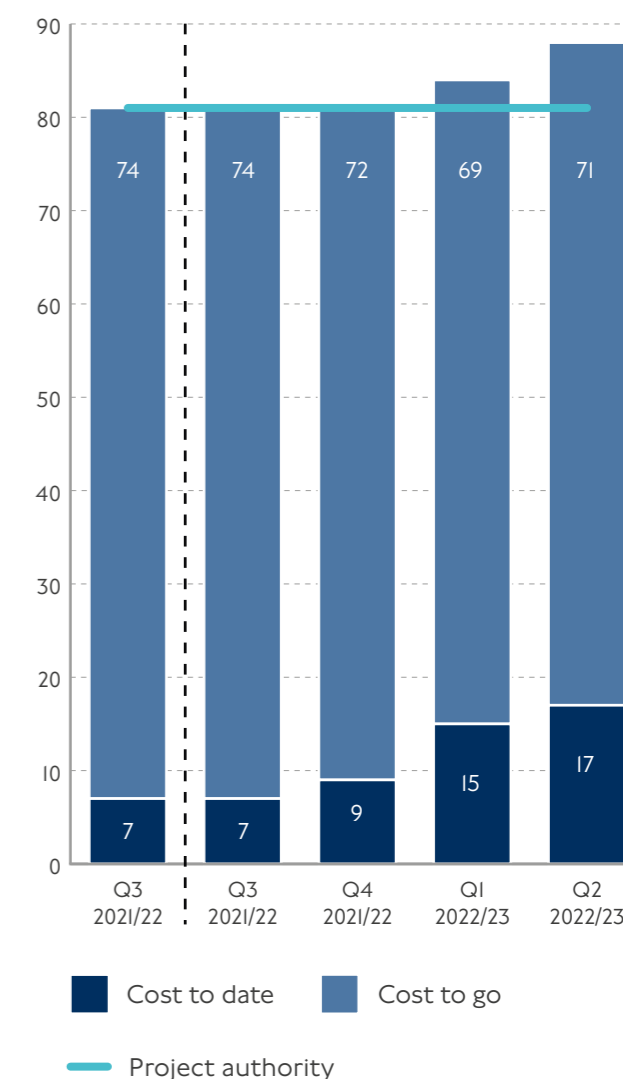
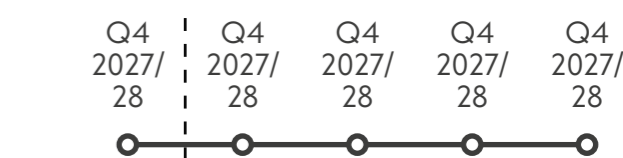
Additionally, procurement of a supplier to analyse and produce the best station fit out options is under way, with invitations to tender again issued in October this year. This all aligns with the approved procurement strategy.

Construction of the station box by the developer continues, with good progress already made on station box piling.

The project updated the Committee in October and was granted an increase in project authority to bring forward small packages of scope, minimising future risk. The increase in authority will be reflected in the next quarterly report.

Estimated final cost performance over time (£m)

Forecast completion date



High Speed 2

Forecast completion	Cost to date (£m)	Cost to go (£m)	EFC (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
Q2 2033/34	26	43	69	34	(35)
Change since last Investment programme report					
8 quarters earlier	2	(2)	No change	6	

Financial commentary

Programme and project authority is £35m lower than EFC, as it is granted on an annual basis for the following years spend. All costs are fully reimbursable from the third-party High Speed 2 (HS2) project. As part of the annual Programmes and Investment Committee submission, it was increased by £6m in May 2022.

The reported forecast end date has been amended to 2033 since the last report and reflects the earliest completion date of works at Euston as advised by HS2 Ltd.

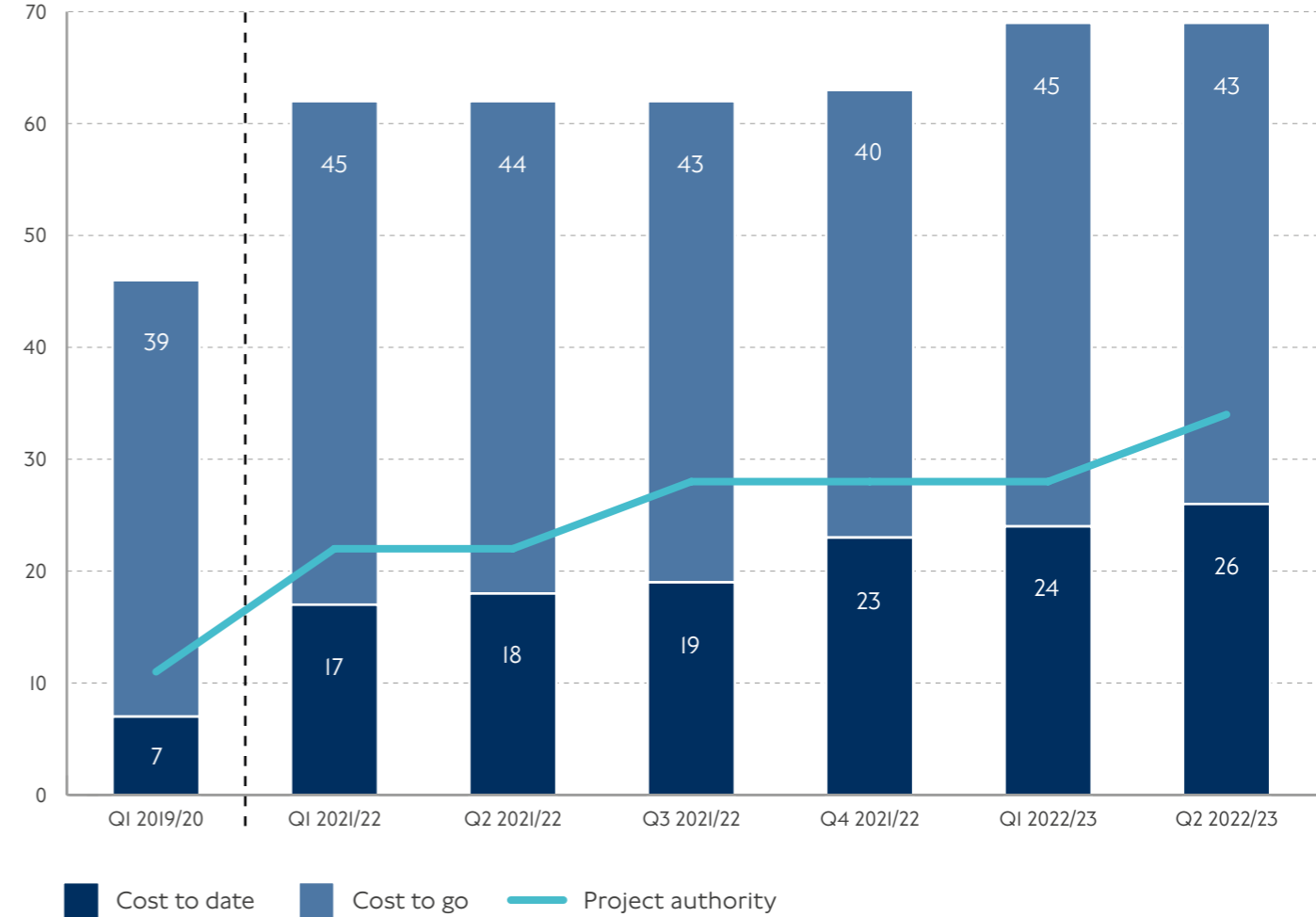
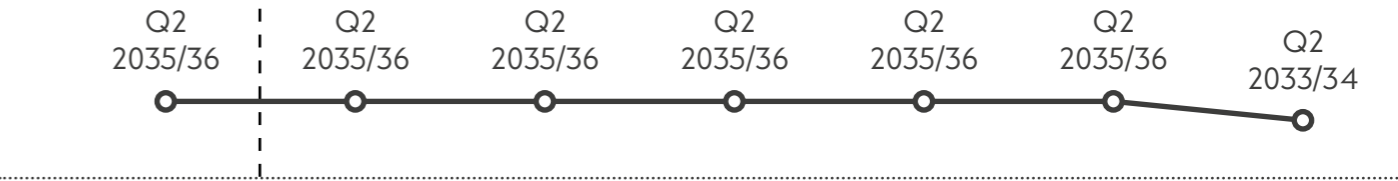
Performance over time commentary

The reported forecast end date has been amended to 2033 since the last report and reflects the earliest completion date of works at Euston as advised by HS2 Ltd. This programme comprises our new assets, infrastructure and operational facilities at Euston and Old Oak Common to interface with the new railway.

Since this programme was included in our Major Projects portfolio in 2019, forecast costs have increased due to increased scope being requested by HS2 Ltd. As part of the annual Programmes and Investment Committee submission, the authority was increased by £6m in May 2022.

Estimated final cost performance over time (£m)

Forecast completion date





The new Old Oak station is under construction

Programme update

HS2 Ltd's construction of the new Northern line traction substation and ventilation building continues at Euston with main construction activity now focused on the basement box sub-structure. Design of the Tube station and interchange box at Euston is progressing, and we continue to attend workshops and support design reviews.

Detailed planning is under way for the major utility works on Euston Road with enabling works expected to start in early 2023. These will require lane closures on Euston Road. We continue to work closely with Camden council, HS2 Ltd, and its supply chain to manage and mitigate the impact of the lane closures, particularly for bus passengers, people walking and cycling, and other road users. Ahead of HS2 works starting in early 2023, public information will be issued to enable customers and road users to plan ahead.

The Oakervee Report commissioned by DfT, which considers options for transporting excavated materials to reduce the number of construction lorries at Euston was shared in August 2022. The stakeholders at Euston are now considering the feasibility of the suggestions. Engagement with the Euston Partnership on the integrated development of the Euston Campus also continues, including the refurbishment of the existing Euston Network Rail station. At Old Oak Common, HS2 Ltd works continue at pace on the construction of the new station box that will be served by HS2, Elizabeth line and Great Western National Rail services. We continue to work with HS2 Ltd on the design development of the new surface intermodal area to ensure our bus requirements are met.

Railway systems enhancements

Forecast completion	Gross cost to date (£m)	Gross cost to go (£m)	Forecast cost (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
2018/19 to 2028/29	146	17	163	171	8
Change since last Investment programme report					
No change	1	(1)	No change	No change	

Financial commentary

The EFC has remained stable since the last quarterly report and spend is in line with current forecasts.

Performance over time

Our costs and authority both reduced in Quarter 4 2021/22, driven by the decision to defer the enhanced signalling for the Jubilee line and fleet improvements, and to descope from this programme owing to funding challenges in the wake of the coronavirus pandemic.

Programme update

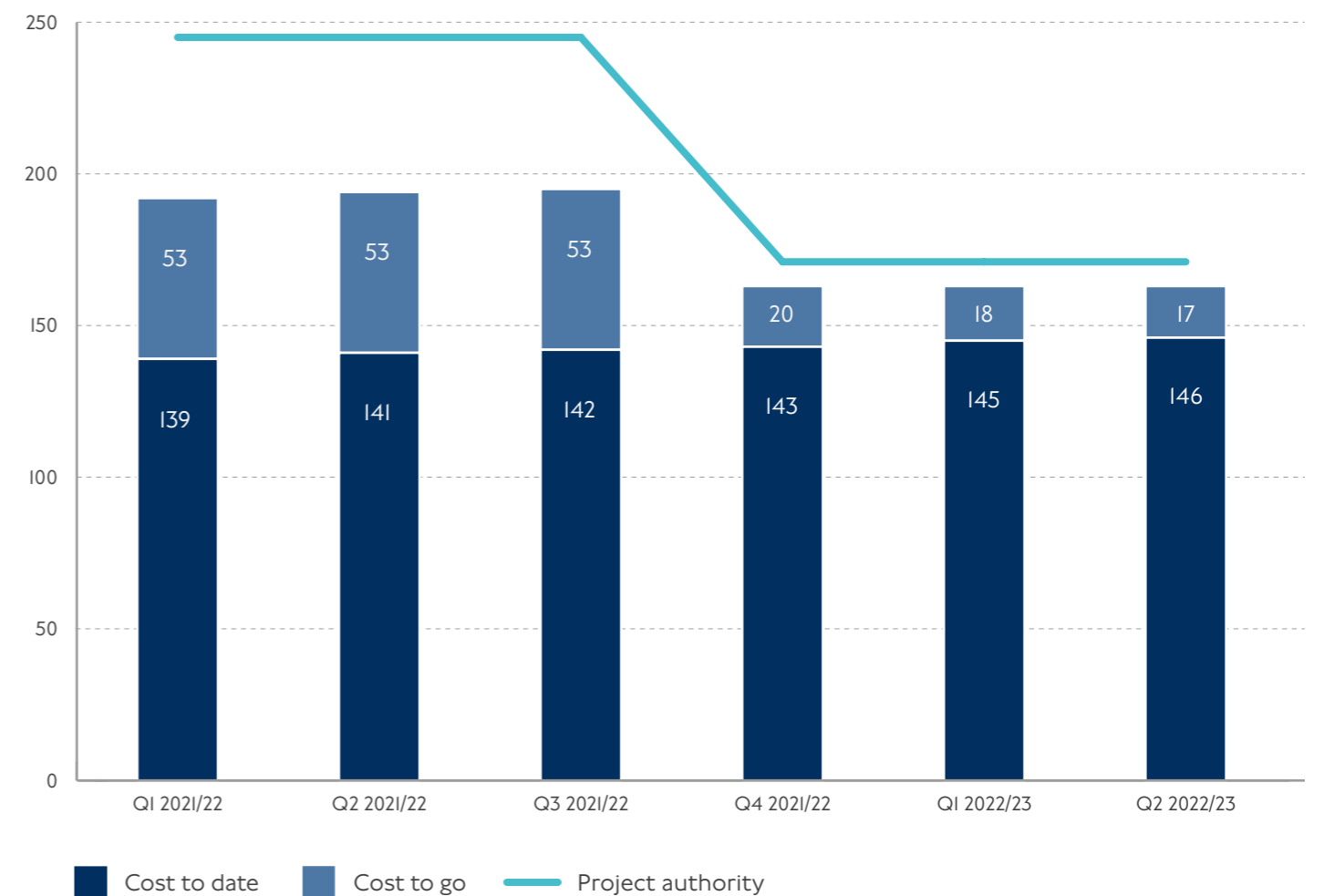
Delivery of the final scheduled Northern line signalling software updates continues, with the first release targeted for commissioning on the railway in the second quarter of 2022 and the last in the third quarter of 2023. These software updates address residual issues and requirements following completion of the Northern Line Extension and the Bank station closure works.

Delivery of the Jubilee line signalling software updates continues, with the updates addressing residual issues. The first software release will be commissioned onto the railway in Quarter 4 2022/2023, and the final software release is being planned, accounting for dependencies on other projects such as the Four Lines Modernisation programme.

The enhancement work for the Northern line power supply is due to be completed soon, in Quarter 4. This will provide system capacity and resilience for reliable services during planned or unplanned outages.

The rolling stock works to enable an increase in entry and exit speeds at Neasden depot are on target for completion in Quarter 4. These will support Metropolitan line service uplifts.

Estimated final cost performance over time (£m)



London Underground

We deliver enhancements using internal and third-party investment to provide increased accessibility and station capacity improvements. Our three renewals programmes ensure the safety and reliability of the existing network across infrastructure, train systems and technology



Enhancements

Forecast completion	Cost to date (£m)	Cost to go (£m)	Forecast cost (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
2022/23 to 2027/28	548	61	609	655	46
Change since last Investment programme report					
No change	118	(9)	110	3	

Financial commentary

The enhancements programme reports the full gross costs of projects over their whole life. The change since the Quarter I report is due to the inclusion of the financials for the Mayoral step-free access programme in the Enhancements programme, as this was omitted in error in the Quarter I report. The variance between forecast and programme authority reflects the difference between the committed and inflight projects and original funding assumptions. The programme will be re-baselined as part of the 2023 Business Plan.

An additional £3m of programme and project authority has been gained to enable progress on the third-party funded step-free access works at King's Cross St Pancras Underground station.

Performance over time commentary

Progress is being measured through regular reviews and it is expected that the programme will recover within the year from delays due to mobilisation of ventilation projects and delays to starting on site at Ickenham station. We have also identified a number of cost savings and efficiencies that have been embedded in the programme.

Key risks for the remainder of the year include mobilisation of new projects such as the demolition of the warehouse at Acton depot. The programme will be reviewed in line with the outcomes of the Business Plan.

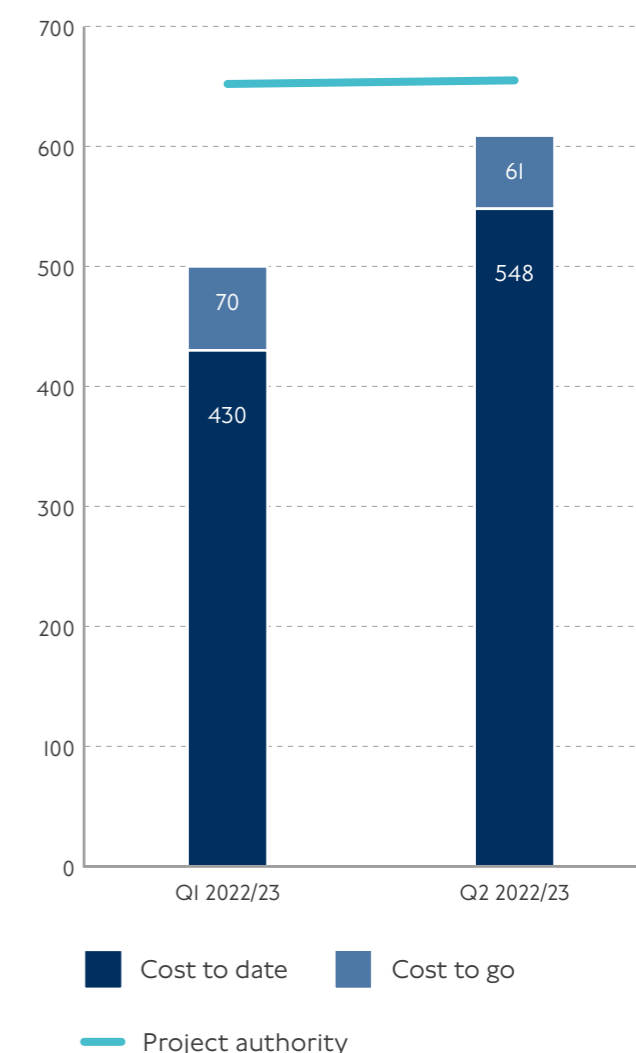
Programme update

The enhancements programme covers a range of improvement projects, mainly to stations and depots. We improve stations by enhancing accessibility, relieving congestion and carrying out capacity upgrades. Owing to less funding for step-free access improvements and the congestion relief scheme, a number of projects are paused while we investigate third-party funded options.

The programme has had a successful quarter, delivering our strategic milestone at Knightsbridge which saw the new Brompton Road entrance open to customers in October.

We submitted a bid with the GLA to the central Government Levelling Up Fund for Colindale and Leyton stations upgrades, which would include providing step-free access. If successful, this would be combined with other external funding sources. Until we know the outcome of this funding bid, the projects are excluded from the forecasted spend.

Enhancements performance over time (£m)



Tottenham Hale

Following the completion of redevelopment works at Tottenham Hale in December 2021, the project has completed the reinstatement of the work site and is progressing snagging and handover works, which are forecast to conclude in 2022/23.

Paddington – Bakerloo line

The two step-free access lift installations are under way, and work continues on the fit out of the new areas of the station entrance. The final structural works to tie the old ticket hall to the new one are due to complete around the end of the calendar year. The project is expecting to open in Quarter 2 2023, with testing and commissioning of the enhanced and step-free entrance to begin in early 2023.

Colindale

The detailed design and early contractor involvement phase have been completed for the new station building at Colindale, with increased capacity and step-free access. The project is ready for a construction phase, with greater confidence in costs, schedule and construction readiness ahead of a future decision on financial and contractual commitment to progress into construction delivery. The project is currently paused pending availability of funding.

The Colindale project was included within the GLA's Levelling Up Fund bid, Transforming Colindale and Leyton for All, to deliver the build phase of the Colindale project. A decision is expected later this year.

King's Cross St Pancras

Negotiations are nearly finished on a development agreement to secure a

developer-funded scheme to upgrade the entrances on the south side of Euston Road, as part of a wider redevelopment of the area. The scheme unlocks a London Underground retail opportunity to mitigate any increase in operational cost as a result of a new lift in place between the street and Tube station.

Knightsbridge

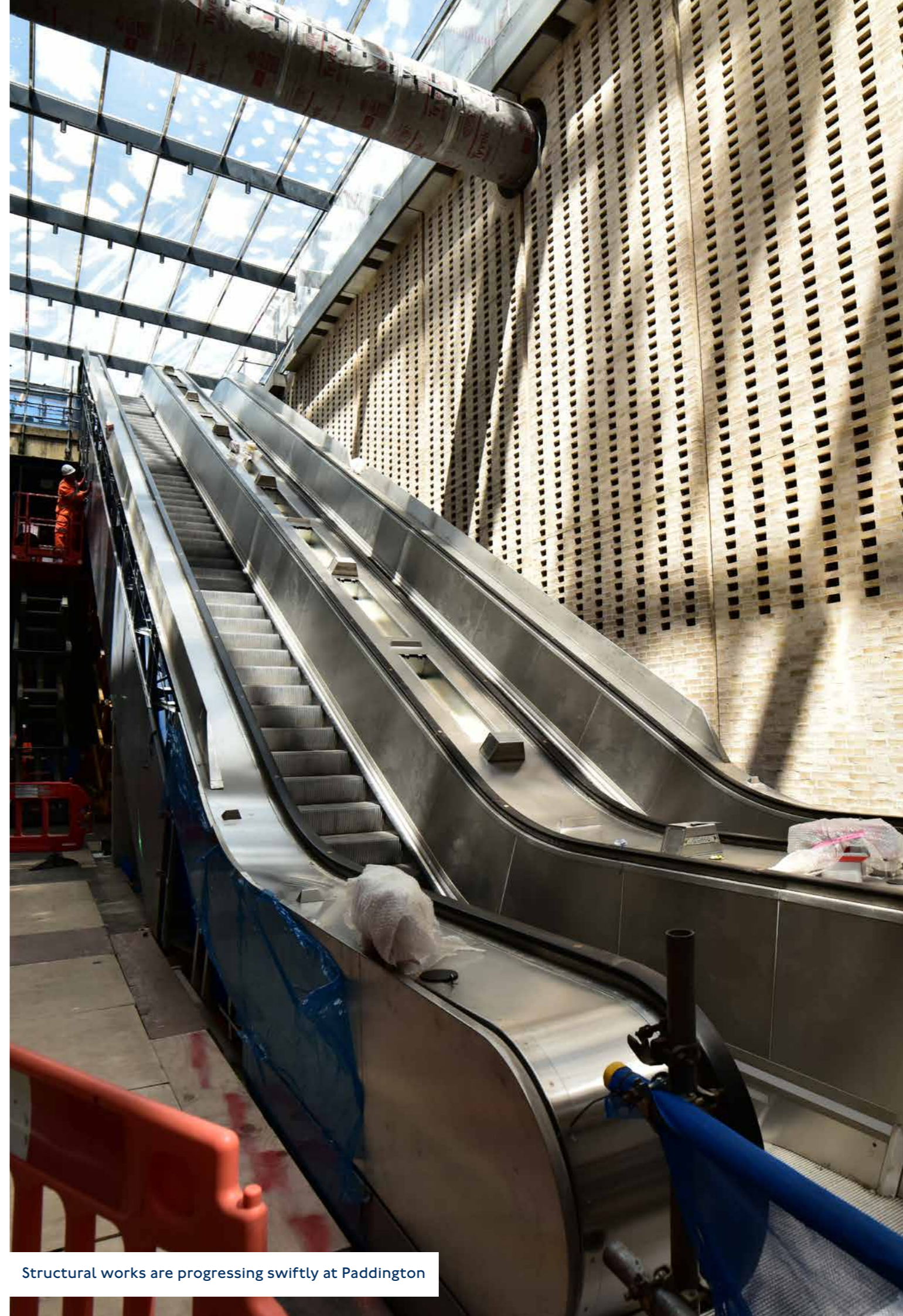
The new Brompton Road entrance is now open while the new Hooper's Court entrance, connecting passageways and providing two lifts, is still under construction. The project remains on target to open this new entrance and provide step-free access in summer 2023.

Leyton

We continue to work closely with our key stakeholder, the London Borough of Waltham Forest, to develop plans for a new ticket hall, with the aim of increasing capacity and providing step-free access for customers. The £500,000 grant from the GLA has enabled the project to progress the concept design towards completion (planned later this year), to undertake value engineering reviews and construction planning workshops.

Following the completion of the concept design, the project will be paused until additional funding is secured.

The Leyton project was included within the GLA's Levelling Up Fund bid, Transforming Colindale and Leyton for All. The London Borough of Waltham Forest also submitted a Levelling Up Fund bid which included a request for Leyton station, reaffirming its commitment to progress this project. A decision is expected later this year.



Structural works are progressing swiftly at Paddington



We are planning to build a new London Bridge entrance

London Bridge

We are working with a third-party developer to open a new Borough High Street entrance. This would result in reduced journey times and congestion at street level, especially on Borough High Street itself. The next phase of the design will begin once the developer has secured planning consent.

West Ham

We are working with the developer Berkeley Homes on a new ticket hall to serve the Twelve Trees Park housing development at West Ham. The main construction works associated with the new entrance are progressing well, with the construction of the main abutment walls, which will support the bridge deck over the Jubilee line, now complete. The new footbridge just to the north of the station was lifted into place on 19 June 2022.

Waterloo

As part of a wider redevelopment scheme at Waterloo that will see Elizabeth House demolished, we are progressing agreements to ensure step-free access to the Northern line platforms is secured. This would involve constructing shaft structures and connections to the northbound platforms during the progression of the development works. This will enable the future fit-out of the shaft after the development, subject to future affordability.

Stratford

A new south-western entrance is planned to open at Stratford regional station in early 2024. It is a collaborative venture between the London Legacy Development Corporation, London Borough of Newham

and the GLA, which are fully funding the capital works. Detailed design is under way, alongside preparation for construction to begin on site in early 2023.

Acton warehouse

Following the successful completion of the essential clearance works within the building, good progress is now being made so that the next phase contract can be awarded in the autumn.

Detailed survey works associated with existing services and utilities are continuing and will inform and facilitate extensive relocation and diversions.

Substation ventilation

A total of 17 substations have now been upgraded, with a further three at Shepherd's Bush, Victoria and Notting Hill Gate currently progressing or nearing completion. Development of the final two sites continues, following the contract award for Bouverie Place on 30 June and Barons Court expected to award in autumn 2022.

Step-free access

From 2 November 2021 to 10 February 2022, we held a 14-week public consultation about our future step-free access priorities and improvements. We published the results of the step-free access consultation on 16 November 2022.

We have begun a process to develop prioritised lists of different step-free options, taking into account both the results of the consultation as well as funding considerations.

Infrastructure renewals

Forecast completion	Cost to date (£m)	Cost to go (£m)	Forecast cost (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
2022/23 to 2027/28	29	599	628	1,192	564
Change since last Investment programme report					
No change	16	(16)	No change	No change	

Financial commentary

Future spend will depend on the outcome of the 2023 Business Plan, which we expect to be able to report on in the next quarter. The scope of the programme will adjust to fit within the available funding by reprofiling timing of works, including acceleration or deferral of work as required.

Performance over time commentary

Our performance this quarter is in line with targets, with acceleration in certain projects offsetting slippage of key power projects and the pausing of the LED lighting replacement programme – which we have now restarted.

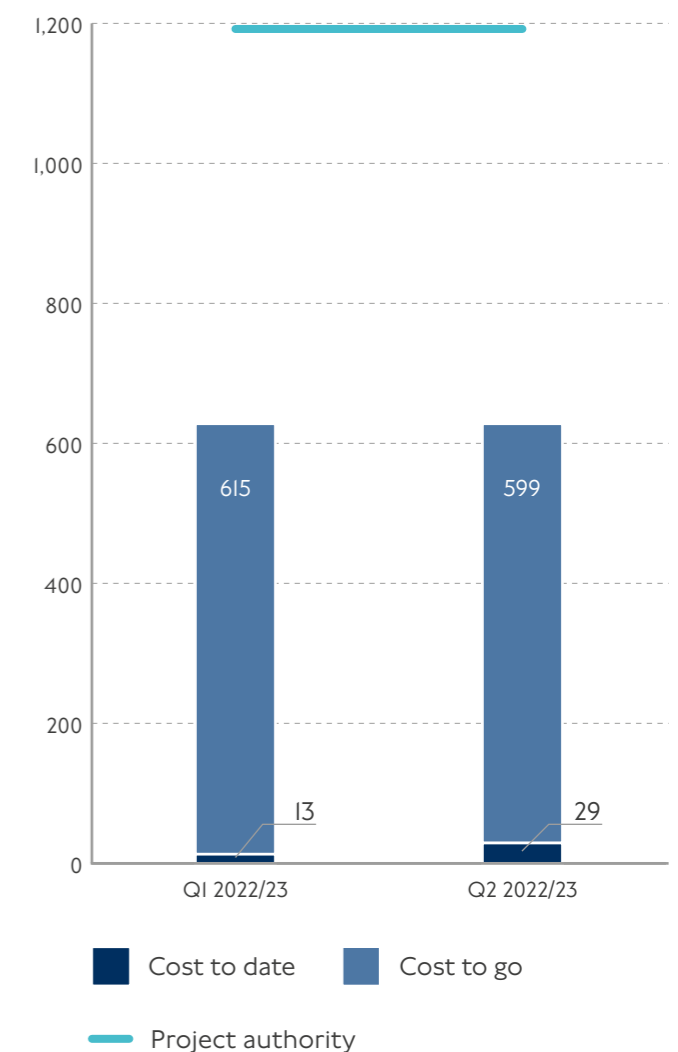
We are undertaking regular performance reviews to help us identify and mitigate risks and dependencies far earlier and are confident that the programme will meet its full year targets. We are also closely monitoring cost inflation and how this will affect affordability of our plans in the future.

Programme update

The infrastructure programme delivers critical renewals to the assets that support the London Underground train system. The programme includes renewals work on built environment, civils and structures as well as all systems assets (mechanical, fire, communications, power and electrical). The work bank is prioritised to address asset condition concerns to maintain safety and reliability of the railway.

Key successes across the programme include a Health and Safety Executive Beacon Award and a Quality Benchmarking Award for our project at Grange Hill to Chigwell which will stabilise a large cutting on the Central line to reduce the risk of asset failure and protect the Underground network. At London Bridge and Marylebone, we have installed two escalators and started on site for one more at each station. We have completed two sets of fire doors and begun the next two sets at Liverpool Street while also carrying out surveys in the staff welfare areas. Procurement for the design and build of Kentish Town escalators and Holloway Road lifts has also begun.

Infrastructure renewals performance over time (£m)



Infrastructure renewals

Built environment and civils

We have 30,000 building and civil assets across the network, providing structural support, stability and protection to the railway. The asset base includes more than 16,000 bridges and structures, and 235km of embankments and cuttings, as well as tunnels, lighting masks and flood protection assets. We are assessing their condition to improve our understanding of our asset base, which will help us to plan future interventions.

Water ingress

Feasibility surveys for remedial works have been completed at St Paul's and Chancery Lane and options are now being finalised. Intrusive site surveys at Liverpool Street and Charing Cross are now completed and concept design to address water ingress is under way. Concept design is also under way for Mayor Sworder's Arches with targeted surveys planned.

Cutting and embankments

Works to remediate the cutting between Park Royal and Alperton (Piccadilly line) are now complete. Works continue to schedule on stabilising the cutting between Grange Hill and Chigwell on the Central line to ensure the continued safe running of the railway. It is due to be completed in May 2023. Feasibility works for five future interventions to embankments and cuttings continue to progress at priority locations.

Rail vehicle accessibility regulations

Permanent works to Paddington Bakerloo line are now complete and installation of manual boarding ramps is also complete at all planned stations. This was delivered to plan in Quarter 2.

Welfare facility renewals

The main works contract has been awarded and works have started on 16 sites to carry out targeted renewals of staff welfare facilities at prioritised locations. The renewals will improve the condition of the facilities and the environment.



We are continually monitoring and assessing our huge asset base



We ensure that all our assets are in a state of good repair

Infrastructure renewals

Building systems

Our building systems ensure that stations, depots and other sites operate safely and effectively. The work is prioritised on the state of good repair of the assets and to address specific asset condition concerns.

King's Cross St Pancras communications

Works to replace a range of obsolete communications equipment at King's Cross St Pancras station (including station management systems, video, audio and alarm systems) are progressing into the systems migration phase.

Jubilee line communication systems

We are finalising the detailed designs for the final batch (batch four) of two stations to replace station information management systems, public address and voice alarm systems, as well as the passenger Help Point systems. Batch three has been instructed to begin delivery and batches one and two (four stations) are in delivery.

Jubilee line ventilation systems

We are progressing with works to upgrade the obsolete tunnel ventilation control panels and to refurbish the fans of the staircase pressurisation system at the Jubilee line extension stations (Southwark to Canning Town) and intermediate shafts. We are also upgrading the obsolete hardware and software for the tunnel ventilation central control system located at Neasden Service Control Centre and Stratford Market depot. Intrusive surveys to support detailed design have started.

Smoke and heat ventilation

We are progressing with work replacing and refurbishing life-expired components that form part of the smoke and heat exhaust ventilation systems located in the roofs of Bermondsey station and Stratford Market depot. The contractor is engaged and intrusive surveys to support detailed design started this quarter.

Infrastructure renewals

Lifts and escalators

With the opening of the Elizabeth line and other major station projects, there are now 526 escalators, 327 lifts and four passenger conveyors on the London Underground network. These are essential to ensuring customers have safe, reliable and quick access to our services.

This programme provides the rolling asset renewals work to keep these assets in operation. Maintaining and improving lift and escalator availability requires ongoing refurbishment and renewal. Typically, escalators need replacing every 40 years and lifts every 20 to 40 years, depending on the type. This means we need to replace around 2.5 per cent of our escalator assets and four per cent of our lift assets each year to maintain the current level of good repair.

Marylebone

Two out of the three escalators are now in place with works under way on the final escalator. All works are due to be finished in 2023.

Jubilee line

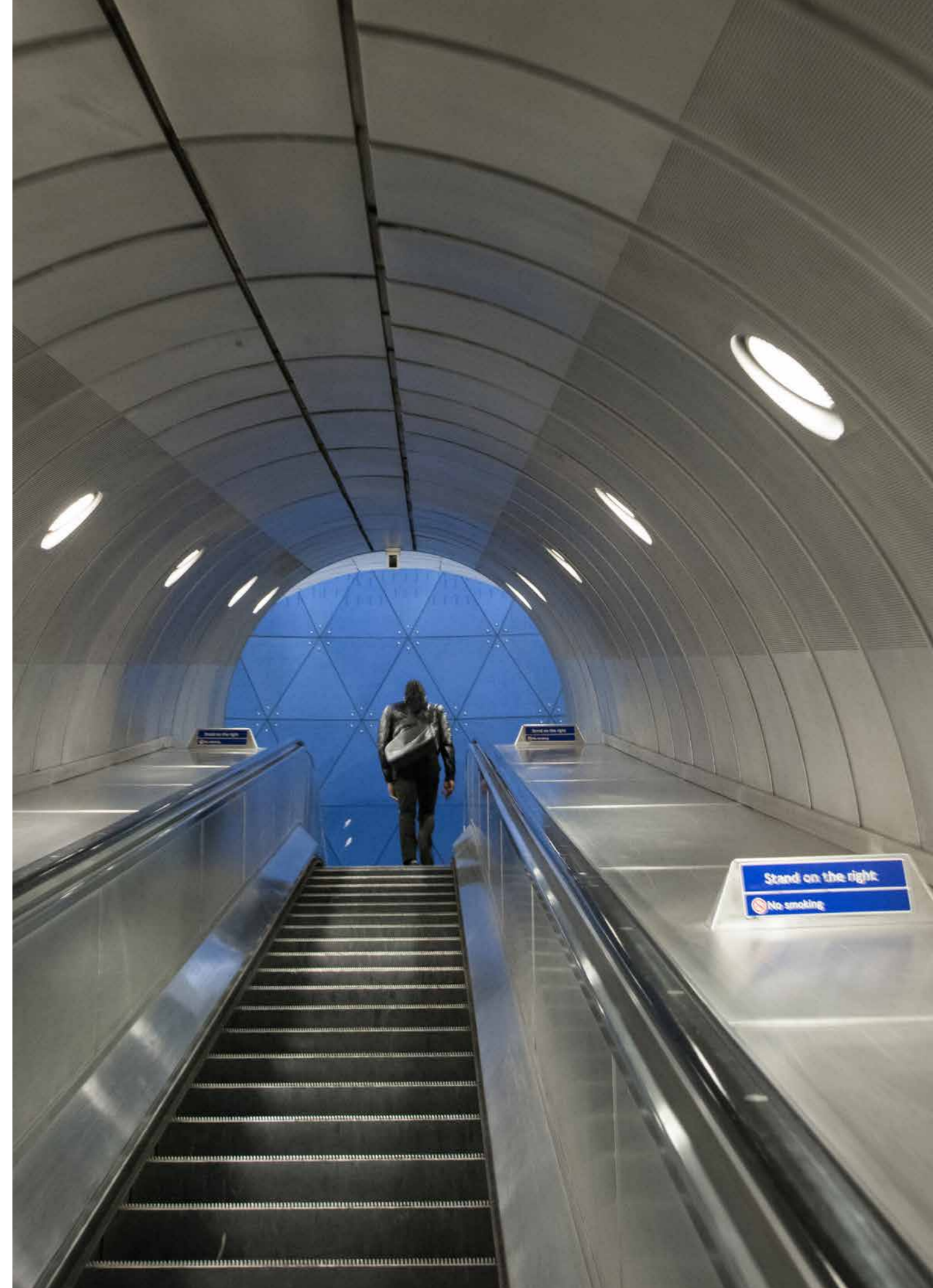
The rolling escalator refurbishment project has delivered three refurbishments in this quarter taking us to a total of five in the financial year as planned. Works are ongoing on the next three refurbishments. A review of opportunities has begun to maximise the 2022/23 delivery output.

Liverpool Street

Works are under way to install 12 sets of fire doors ahead of the replacement of three escalators. The first two sets of fire doors have been installed. Works are ongoing with the next two sets. All fire door works are due to complete in 2022/23.

Holloway Road

The concept design is now complete and the instruction to design and manufacture the lifts is to be issued imminently. Works are due to start on site in spring 2023.



We continually assess our escalators and lifts for safety and reliability



We check safety concerns and improve power supply resilience

Infrastructure renewals

Power and electrical

London Underground is the largest consumer of power in London. We operate our own high-voltage distribution network and backup power generation. Based on the state of the assets and their expected lifespan, we deliver a rolling programme of renewals to maintain the integrity of power delivery to the railway.

Uninterruptable power supply

Work is nearing completion, with 20 of 22 life-expired units replaced and commissioned to ensure a continuous power supply to critical signalling assets on the railway. Arrangements are in place for commissioning of the two remaining units, which have had to be scheduled with access availability. Procurement for the award of a new contract to replace the next tranche of 31 units is nearing completion, which will enable continuous delivery into 2023/24.

Offline battery power inverters

The procurement of 20 emergency lighting battery systems was paused due to market responses and reassessment of the strategy. We have now resumed procurement to obtain a better value and quicker replacement programme of prioritised units. The contract was awarded on 3 November 2022.

Traction power

Detailed design work has been completed for the replacement of 11 traction isolation switches at Ruislip depot to address equipment non-compliances and remove operational restrictions. Works started on site in June and are on target for completion by the end of 2022/23. Detailed design work for subsequent packages of work have begun.

A replacement high-voltage switchboard has been commissioned into service at Greenford substation in July 2022. This removed an existing safety concern and will improve power supply resilience. A contract was awarded in May 2022 for the replacement of the DC traction switchboard at Holborn. These works will address existing operational restrictions and safety risks at this key Central line site. Initial site survey and design works have now started.

Power control

We have completed the site acceptance testing of the replacement network-wide power control system. This comprises control centres linking to circuit breakers across the network, which enable train traction control. Operator and maintainer training has been completed with migration to the new system due in Quarter 3 following user confidence testing. The second of the control system upgrades on the electricity generators at Greenwich Power Station has been completed after some delays due to age-related equipment faults.

LED lighting

We have continued the conversion of traditional fluorescent lights to low energy LED lighting, improving efficiency and reducing ongoing maintenance costs. The total number of conversions now sits at around 10 per cent of stations, including those carried out under this programme. Progression of these works has now resumed following the allocation of additional budget, with procurement restarting and the contract being awarded on 18 November 2022.

Train systems

Forecast completion	Cost to date (£m)	Cost to go (£m)	Forecast cost (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
2022/23 to 2027/28	101	1,894	1,995	1,791	(204)
Change since last Investment programme report					
No change	47	180	227	No change	

Financial commentary

Forecast cost to go has increased by £227m since Period 3 following the reprioritisation of renewals across the business leading to increases in work across all critical train systems renewals. This will be confirmed subject to a renewals prioritisation exercise; however, the projects within Train Systems have some flexibility to reprofile if required to fit within the available funding.

Performance over time commentary

Year to date performance is ahead of budget, primarily due to an acceleration in fleet overhauls and track renewals programmes. This reinforces the strategy to initiate more work in the early periods of the year and actively manage the work bank in later periods when there is more certainty of the funding position.

We are continuing to build confidence in our forecasts by undertaking regular performance reviews to help us identify risks and dependencies far earlier and we have augmented our efficiency identification and tracking processes.

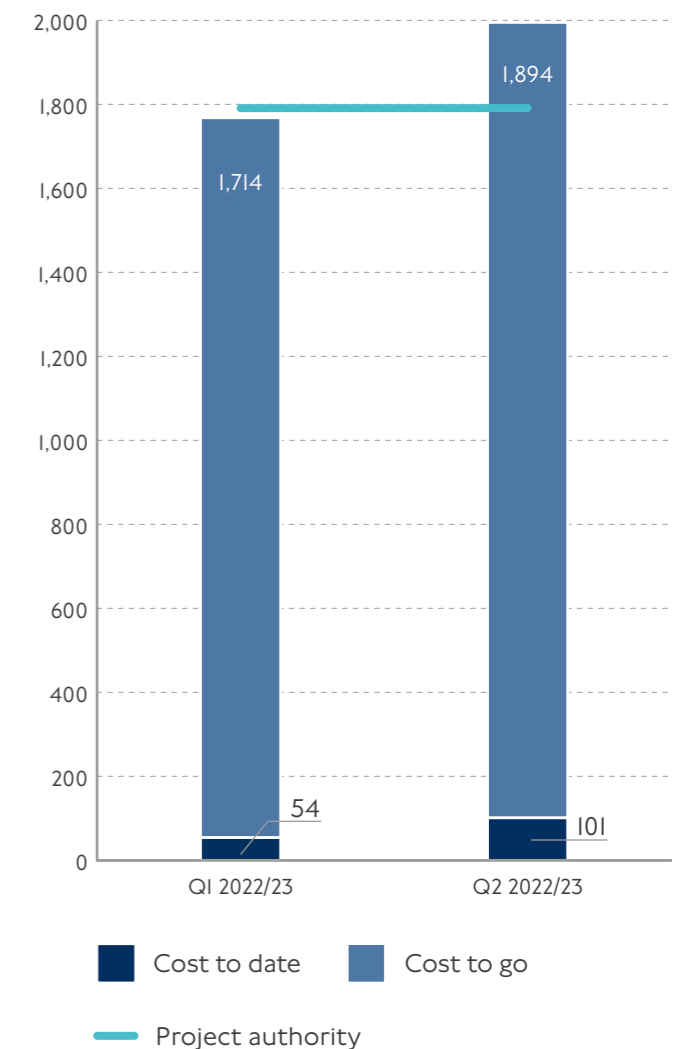
In common with other parts of the economy we are experiencing labour shortages in certain skills, which may impact our ability to ramp up delivery on some projects. To mitigate this, we are reviewing future resource requirements earlier and more comprehensively than we have in the past. We are also closely monitoring cost inflation and how this will affect affordability of our plans in the future.

Programme update

The train systems programme delivers critical renewals across multiple asset groups that function as an integrated train system. The programme includes work on track, passenger and engineering fleet, and signalling.

There have been a number of notable successes over the quarter, including a major points and crossings installation at Tower Hill, continued good performance in fleet heavy overhaul and continued success in completing design and test activities on the Central line fleet. These interventions respectively provide improved service recovery during service disruption, ensure the maximum numbers of trains are available for operational service and extend the useful life of the Central line trains.

Train systems performance over time (£m)



Train systems

Track

Our track assets are an essential component of a safe and reliable railway. Track is continually degrading and needs rolling maintenance and renewals to maintain it. Each section of track may have a residual life of 40 to 60 years, meaning we must renew two to three per cent of our track every year, as well as making ongoing component replacements.

Where possible, we also aim to progressively install high-integrity, low-maintenance, flat-bottomed rail on concrete sleepers, replacing bullhead rail on timber sleepers, some of which has been in service since the early 1900s. This modern track is more stable and reliable.

Between July and September, we converted 1,227 meters of bullhead rail with the more modern flat-bottom form. In addition, we completed 387 meters of Deep Tube reconditioning works, bringing the Deep Tube total delivered to date to 906.6m against a required scorecard run rate of 750m.

In July, we installed a new set of points at Tower Hill. Once the new automatic signalling is commissioned, the points will provide reversing capability which will improve service recovery during disruptions and reduce the closure limits during engineering works. This is planned to be delivered before the end of the financial year.

In Quarter 2 we installed 131 meters of drainage at Acton Town to resolve significant service disruptions caused by flooding.



We renew two to three per cent of our track each year

Train systems

Passenger fleet

We have more than 600 Tube trains operating across 11 lines, with the oldest trains having entered service in the 1970s. To better predict interventions, we have developed a 25-year fleet cost model, which feeds into our long-term capital plan.

To ensure train fleets remain safe and reliable for an increasing in-service life, we conduct a range of planned interventions consisting of heavy overhauls and renewals (mid-life refurbishments and life-extension projects). In addition, we deliver specific work to improve accessibility and customer satisfaction, such as better lighting and CCTV. These works address changes in regulations arising from safety issues, poor reliability and performance, unacceptable costs or system obsolescence.

Our heavy overhauls work delivers large-scale activities on our existing fleet of passenger rolling stock and rail adhesion trains to ensure all core systems meet the required standards. The work requires each train to be removed from service for several days or weeks and includes overhauling suspension, wheelsets, motors, brake systems and auxiliary equipment.

Victoria line (overhaul)

Work continued on upgrading the pressurised ventilation fan system to reduce maintenance costs, with a further three trains completed, taking the total to 28 of 37 trains. Delivery of the coupler overhauls continued, with an additional 10 completed taking the total to 24 of 37. Door overhauls started in June and four trains have completed their phase one works.

Metropolitan line (overhaul)

Seven additional bogie overhauls were delivered taking the total to 18 out of 60 trains. Work has progressed on increasing the time in service prior to overhauls which will enable delivery rate optimisation towards the end of the financial year.

District line (overhaul)

Work continued to prepare for start of bogie overhaul which is planned to follow directly after the Metropolitan line overhaul.

Jubilee line (overhaul and component renewal)

The first phase of the overhaul programme continued to plan and the second more significant phase, including the bogie overhaul, started at the end of August. The project has supported mitigations needed to keep the trains in operation until heavy overhaul takes place. Due diligence is progressing as part of the preparations for invitation to tender for reliability works.

Piccadilly line (overhaul)

We have completed 98 per cent of the floor modification, as part of the life extension works, and this will be fully complete in Quarter 3. There has been some disruption to wheel and motor overhauls owing to supply chain issues, but recovery is anticipated by the end of the financial year. We have now completed 45 per cent of the second lift cycle to take the fleet to the end of its operational life.

Central line (renewals)

The large-scale renewals programme continues to progress. We have identified a fix for the minor integration issues identified in Quarter 1 for the prototype trains and we are working through a schedule for introduction with our suppliers. Furthermore, we now have completed hardware design including CCTV and can move into procurement for these elements. We are preparing for production readiness as designs have progressively been signed off and training undertaken.

We transferred the prototype trains into the new facility at Acton for further works while another train was being prepared for conditional assessment to support the programme lift. We also pulled forward critical doors overhaul items and started technical review to overhaul seats.

The next major milestone is the completion of the final design review and sign off, which is expected to be achieved before the end of 2022.

Bakerloo line (overhaul and LED lighting conversion)

Work has continued on ongoing heavy overhaul activities. There has been some disruption to materials supply due to challenges with suppliers, but this is expected to be recovered by the end of the financial year. Fitting new LED lighting on 10 of 36 Bakerloo line trains was completed at the end of September as planned. We expect to complete the full fleet in 2024 calendar year.

Bakerloo, Central and Waterloo & City lines (accessibility)

On the Bakerloo, Central and Waterloo & City line fleets we have a programme of works critical to improving accessibility. Passenger information prototype system testing for the Bakerloo line fleet is progressing, and materials have been procured for the next train installation at Stonebridge Park. We have procured passenger information systems, wheelchair units and flooring kits for the Central line fleet after completing prototype tests.

Adhesion train (overhaul)

Overhauls were successfully completed on the Central line rail adhesion trains to enable their operation during the leaf fall season.

Engineering vehicles (renewals)

The engineering vehicle fleet supports the track renewals programme and comprises battery locomotives, wagons for different activities and plant equipment such as cranes and tampers. We aim to improve the reliability of this non-passenger fleet, responding to component obsolescence problems and supporting our overarching aim of mechanising track-based activities where possible. Our intention is to facilitate enhanced productivity and an improved safety culture.

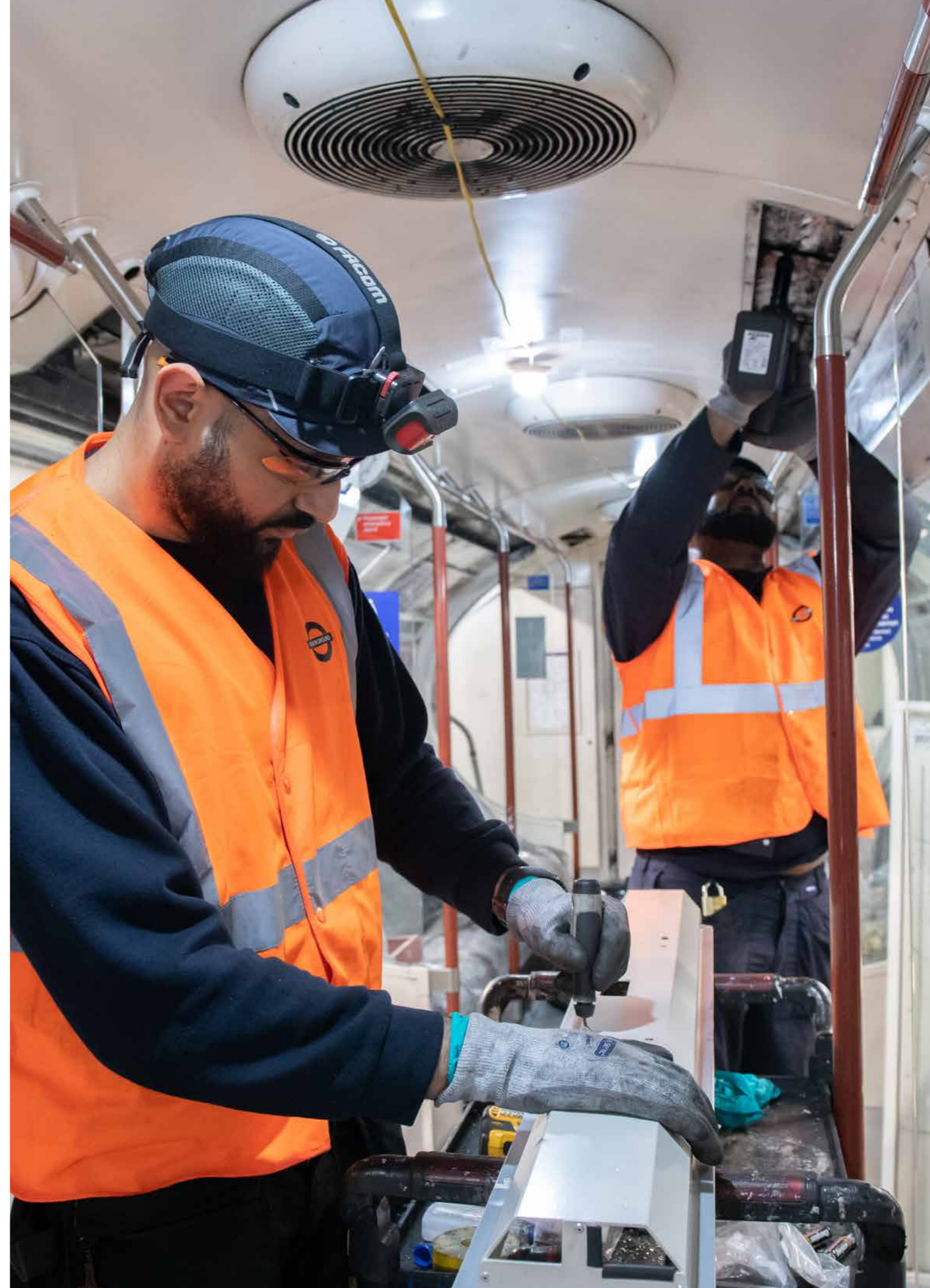
The first live site for our prototype mechanised track renewal vehicle has been identified and agreed at Marylebone on the Bakerloo line and is expected to start trials in early 2023.

We are purchasing a new fleet of engineering wagons from the world's largest rolling stock manufacturer. The five wagons delivered to the UK are undergoing testing to comply with rail interoperability standards. Ruislip depot has also completed all groundworks to the areas affected by the new stabling roads.

The two rail-mounted cranes and eight tilting wagons purchased in 2019 from Kirow in Germany are being progressively used for ore work across the track delivery programme. In addition to the depot and open section approvals for these vehicles, we are now working towards two crane tandem lifting, and sub-surface environment approvals.

A new project (deep Tube tamper) has been initiated, with work under way to develop the requirements and business case for critical track maintenance. This tamper will replace the existing London Underground single deep Tube tamper, which is approaching the end of its life. Another new project, engineering vehicle braking has made good progress on developing an improved fix to better adjust the braking performance of our existing tampers and vehicles to match the existing battery locomotives. This solution will extend to other new engineering vehicles.

The delivery of the engineering vehicles overhaul programme has been impacted by supply chain issues. Mitigations are being developed through the use of alternative suppliers and utilising in-house expertise where possible to assist with the overhaul of specialist parts. Works on the 7.5 tonne crane are nearing completion and, in order to deliver increased efficiencies in new overhaul programmes, the team has conducted various analyses to ensure best value. One example is the in-house strategy for the delivery of the overhaul programmes on plain line tampers.



We periodically check trains for safety issues and obsolescence



We keep our systems to a high standard through upgrades

Train systems Signalling

Signalling and control upgrades continue to keep our systems up to date and in serviceable condition. This avoids higher costs at a later stage, while also ensuring safety is paramount and that the overall cost is spread across a closely monitored timeline.

Signalling renewals

Progress continues on the Central line life-extension projects, with design work continuing for the obsolete systems. The communications works have been completed in advance of the equipment replacement which we have been preparing with our contract to start in the coming weeks. This is critical to ensure that the systems continue to operate until the incremental signalling upgrade takes place on the Central line.

Our two obsolescence projects, the midlife overhaul of the platform edge doors on the Jubilee line and replacing life expired wiring at Acton Town machine room, are now working through the feasibility and design stages respectively. Platform edge door feasibility will continue into Quarter 2 of 2023/24. It is expected that works at Acton Town will be completed in 2024 as this completes design in this financial year. These works ensure that the systems continue to operate safely and reliably.

We have made progress on the Northumberland Park depot with the Operations and Maintenance concepts completed. Work is ongoing to translate this into detailed requirements for a wider depots strategy which will inform the next phase of the projects.

Incremental signalling upgrade

The procurement of signalling equipment is ongoing for the Bakerloo line control room fit out works and the control system upgrade. The design stage of the first contract for the Jubilee and Northern lines incremental upgrade is progressing well with the second contract procurement well under way.

We have completed our work on the Queen's Park equipment room and begun installing the key signalling and control interface equipment at Kilburn Park for the Bakerloo line.

Technology

Forecast completion	Cost to date (£m)	Cost to go (£m)	Forecast cost (£m)	Programme and project authority (£m)	Variance: EFC versus authority (£m)
2022/23 to 2027/28	11	332	343	226	(117)
Change since last Investment programme report					
No change	6	(6)	No change	No change	

Financial commentary

The programme's performance in Quarter 2 has been in line with budget. Eight new projects began in this quarter, earlier than anticipated in the budget which have offset rephasing of the Connect Motorola Transceiver System and Asset Management Information System programmes. As these early-stage projects progress in the following months, the project cost plans will mature. The new projects will improve cyber security, data management and resource planning.

Programme update

Our technology assets include a network-wide radio system and data network as well as all the software to manage our assets and deliver customer service. The fast-evolving IT market requires a programme to keep software in manufacturer support, as well as taking advantage of new technology to improve the way we deliver our services.

Networks and connectivity

We are continuing to work well with our suppliers to upgrade key components of our Connect radio system, focusing now on rolling out new radio hardware base-stations. We have replaced key hardware at more than 150 of the required 293 locations. This work will enable the Connect system to continue to function into the 2030s and we are now beginning to plan the long-term future of our operational networks.

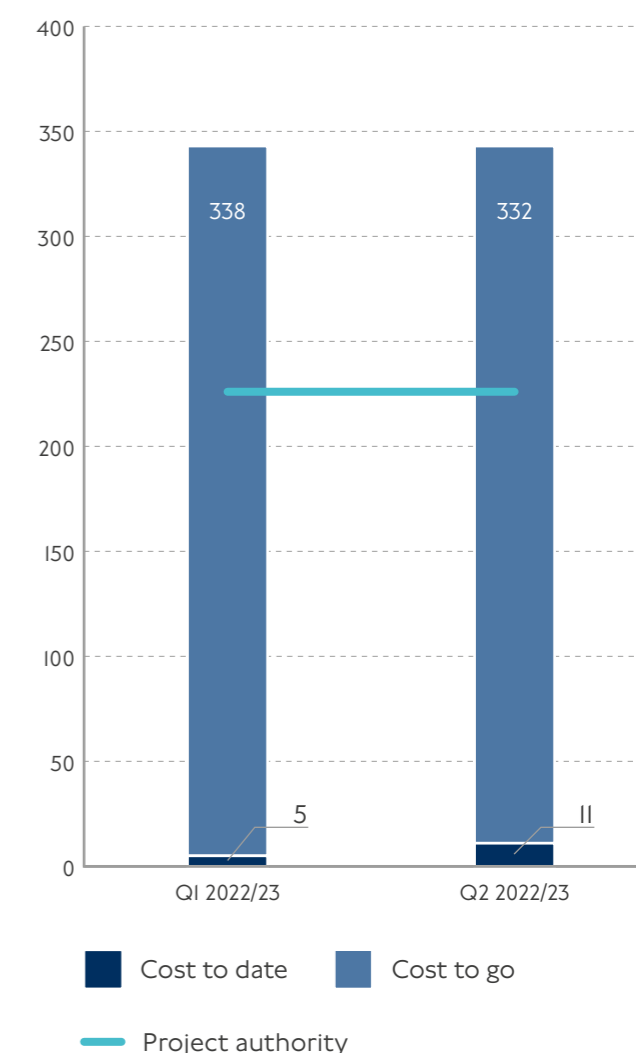
We have also delivered Critical Incident Management, a range of interventions that enable us to respond effectively to emergencies or safety incidents, at a total of 72 stations, and upgraded our CCTV capability at 74 stations. These improvements enable us to effectively manage these stations during a critical incident and other key events. We are continuing to roll out this important safety functionality, and plan to have completed all works by early 2025.

Assets and staff tools

To improve our approach to asset management and long-term planning, we are consolidating our asset management information systems into a single tool for London Underground and London Trams. We are currently migrating London Underground assets onto this new single platform and have successfully completed the migration of several significant asset classes. The full scope of works is anticipated to be delivered in early 2023.

We are also working to develop a new Competency Management System for our train operators, enabling us to improve how we develop and support our operational staff. We are currently finalising the development of the tool, with testing planned for late 2022 in advance of rolling this out more widely.

Technology performance over time (£m)



Surface transport

This comprises Healthy Streets, air quality, asset investment, public transport and surface technology



Healthy Streets

Reporting period	Cost to date (£m)	Cost to go (£m)	Forecast cost (£m)	Programme and project authority (£m)	Variance: Forecast vs authority (£m)
2020/21 to 2024/25	302	265	567	531	(36)
Change since last Investment programme report					
No change	15	192	207	212	

Financial commentary

The five-year forecast from 2020/21 to 2024/25 has increased by £207m since the last report.

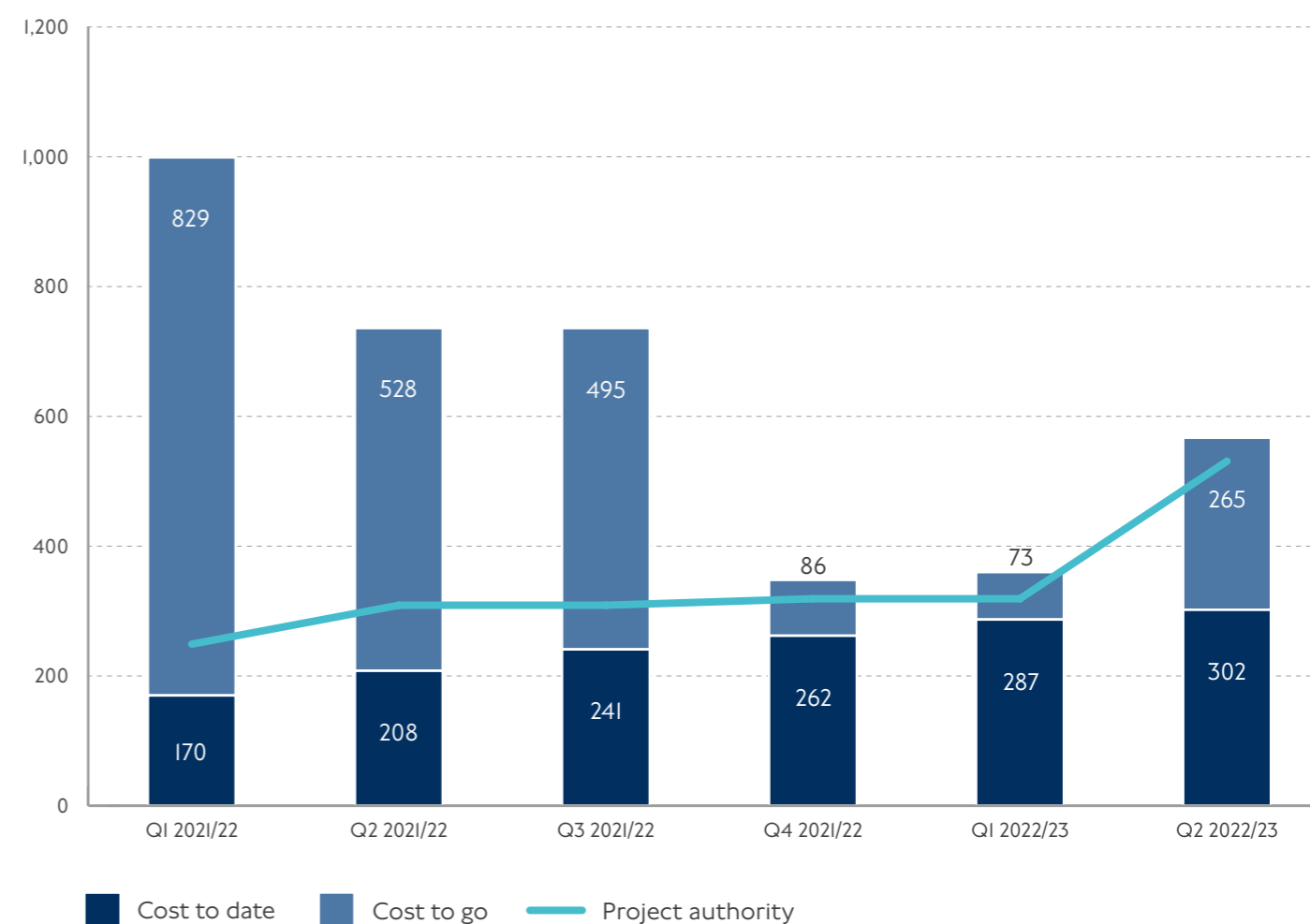
The increase in spend reflects current delivery plans in line with the latest DfT funding settlement and a change from the previous managed decline forecast reported in Quarter I. The latest forecast includes the delivery of our active travel and bus priority projects, delivered in collaboration with the London boroughs, and demonstrates how the allocation links to the DfT funding agreement. Continued investment in active travel will need to form part of the Business Plan for future years.

Performance over time commentary

Over the last six quarters, forecast spend on Healthy Streets was significantly reduced to reflect our ongoing funding constraints during the coronavirus pandemic as we forecast spend in line with a managed decline scenario. Following the latest funding announcement, the Healthy Streets forecast has increased to £567m over five years and the projects have been remobilised.

The programme and project authority has also increased to £531m following approval at the October 2022 Programmes and Investment Committee meeting. The approval covers forecasted spend to March 2024. The remaining £36m (£567m less £531m) of spend to March 2025 will be requested at a future Programmes and Investment Committee meeting and is subject to business planning.

Estimated final cost performance over time (£m)



Programme update

The Healthy Streets programme continues to reduce road danger in line with the Vision Zero action plan, as well as making it easier to walk, cycle and travel by bus across London. It will also accelerate progress towards mode shift, decarbonisation, economic recovery and tackling health inequalities. Recent highlights across the programme include the decision to permanently retain a number of temporary active travel measures, which were installed in response to the pandemic. Further improvements to support buses have been completed on the temporary Park Lane cycle lanes, ahead of wider consultation on that scheme in the autumn. Works have completed on Evelyn Street of Cycleway 4, with the route opening to cyclists in September. We have recently carried out 50 traffic signal timing reviews to enable faster bus progression at junctions, saving more than 1,200 passenger hours every day.

Healthy Streets complements our other initiatives such as Crossrail, the electrification of the bus fleet and future Road User Charging programmes, as well as helping to power London's wider recovery. Funding, albeit at reduced levels compared to before the pandemic, is provided to London's boroughs to achieve these outcomes on their highway networks.

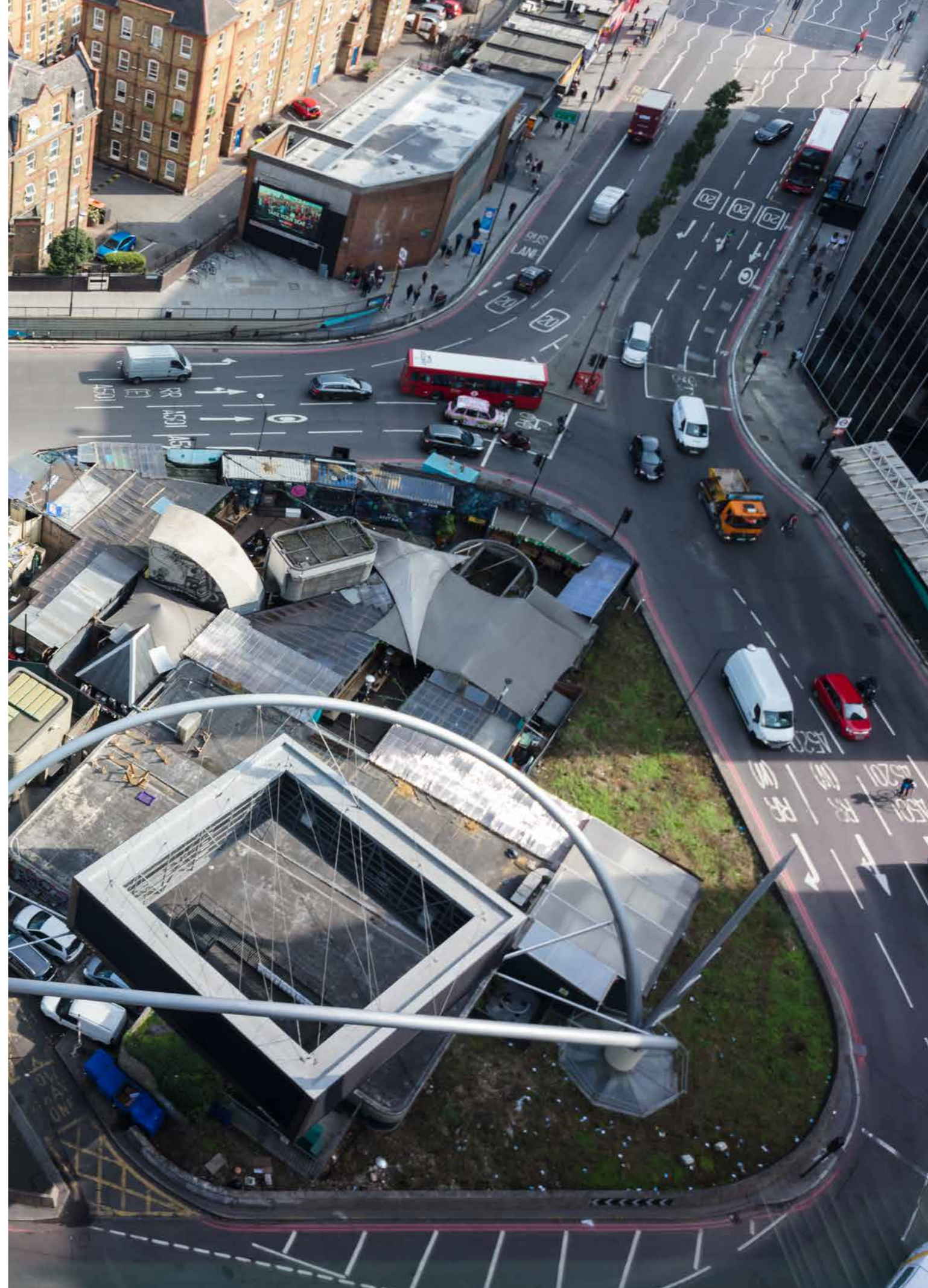
A funding agreement with Government was confirmed on 30 August 2022, which allocates £160m to TfL-led active travel projects and £138m to London boroughs. This confirmation of funding to March 2024 will re-energise the Healthy Streets portfolio, helping to achieve the objectives to improve safety and enable more people to choose sustainable travel options.

Old Street Roundabout

The Old Street Roundabout project team continues to work to complete the project in spring 2023. The main station entrance stairs were opened to the public in July 2022 along with the permanent closure of Subway 3, enabling highway works and the construction of new cycle lanes to begin on the southwestern side of the junction.

Construction of the concrete shafts for both the new passenger lift and new goods lift are completed and installation of the new lift cars began in September. The superstructure, roofing and glazing of the new main station entrance is continuing. Refurbishment of the clerestory roof structure has continued, with installation of the external cladding and construction of the bin store concrete walls and base slab. Refurbishment of the subsurface concourse area continues with installation of new mechanical, electrical and communications equipment including floor tiling and installation of new shop fronts for the retail units.

The project is still experiencing upward cost pressures and significant risk to the forecast completion date. Both the contractor, Morgan Sindall, and our team, are working together to identify mitigations to reduce the cost pressure and achieve scheduled completion.



Old Street Roundabout is on track for completion in the spring

Cycleway 4

Construction work along Evelyn Street is complete, and following the final weekend of carriageway resurfacing, the route opened to cyclists on 13 September from Bestwood Street to Deptford Church Street. The project team, representatives from the supply chain and key stakeholders met with walking and cycling commissioner Will Norman, and Councillor Louise Krupski, Lewisham's Cabinet Member for Environment and Climate, for a press opening event on 27 September. The Royal Borough of Greenwich's works to Creek Road Bridge are scheduled to take place this winter. London Borough of Southwark's scheme for Lower Road is due to start in early 2023, which will complete the final section of a protected cycling route between London Bridge and New Charlton.

Cycleway 9

Snagging works on Hammersmith Gyrotory and Chiswick High Road from Chiswick Lane to Goldhawk Road are ongoing following completion of construction on 30 June and 8 July respectively. The next phase of works on Chiswick High Road between Chiswick Lane and Heathfield Terrace is being delivered by the London Borough of Hounslow and works started as planned on 13 October.

Cycleway 23

Construction work by the London Borough of Hackney on the Millfields Park section of the route is complete and opened to cyclists on 15 August. The detailed design for Lea Bridge Roundabout is progressing and construction is planned for early 2023. The London Borough of Hackney has started detailed design work for Lea Bridge Road westbound.

Responding to the coronavirus pandemic

The DfT's active travel fund has now delivered more than 25km of new or improved cycling infrastructure. Boroughs worked tirelessly to deliver ambitious schemes within short timescales, significantly expanding London's cycle network. Building on the success of the programme, cycling delivery will continue across London via the borough cycling programme. The programme will see both delivery and design of new cycling schemes by the end of this financial year.

Work continues on the Future of Temporary Schemes programme to determine the next steps for each scheme delivered through the Streetspace for London programme.

During the summer, we delivered improvements for buses on the temporary cycle lane on Park Lane, ahead of a public consultation that launched on 13 October to help inform a decision on the future of the scheme. A public consultation on CS7 Clapham to Oval also launched in September.

We have removed the temporary cycle lane on Euston Road, in part to resolve congestion which had been causing delays to bus passengers along this exceptionally busy corridor, but also ahead of upcoming roadworks that will require the road space for the HS2 construction programme.

Decisions were taken to retain three experimental schemes on a permanent basis, after a review of their performance and consultation feedback. These include the scheme to upgrade Cycleway 8 between Chelsea Bridge and Wandsworth on Battersea Park Road; Cycle Superhighway 7 between Oval and Elephant and Castle on Kennington Park Road; and a cycle scheme on Tooley Street linking Cycleway 4 to London Bridge. London boroughs continue to work towards implementation of the new Low Traffic Neighbourhood (LTN) schemes delivered under the active travel fund. Barking and Dagenham is in the final phase of delivery of its four LTN schemes with Pondfields now complete and Barking Town Centre to follow, and Haringey has delivered LTNs at Bounds Green and St Anne's (Green Lanes). All schemes delivered through the fund are expected to be complete by the end of this calendar year.

Lowering speed limits

Lowering the speed of vehicles in London is key to reducing both the likelihood of a collision occurring and the severity of the outcome. The second phase of the programme is under way, and as detailed in the recent Vision Zero progress report, aims to reduce speeds on a further 140km of our roads.

Raised pedestrian crossings will soon be introduced at eight locations in Westminster and Enfield to further reduce danger to people walking and increase compliance with the newly reduced speed limit, as well as introducing accessibility benefits for mobility-impaired customers.

Works have begun on site on the A205 in Wandsworth, where a further 1.5km of our roads will see a 20mph speed limit introduced. Detailed design work is under way on proposals for a 30mph speed limit in Gants Hill town centre (currently 40mph) and 40mph on the A4 Bath Road (currently 50mph). Detailed design work has started to introduce a new 20mph speed limit on a further 31km of our roads – which we plan to deliver by the end of this year. This will see a consistent 20mph speed limit across the majority of roads in Camden, Islington, Hackney, Tower Hamlets and Haringey.

Concept design work has also started to lower the current speed limit on a further 73km of our roads, which will comprise the third wave of delivery under phase two of the programme.



Our Safer Junctions programme aims to reduce road danger

Safer Junctions

In April 2017, the Safer Junctions programme highlighted 73 of the most dangerous junctions on our road network, defined as those with the highest vulnerable road user collision rates. Improvements have been made at 43 of these junctions. Design work continues on the remaining 30 junctions, including detailed design of York Road roundabout and Holloway Road/Drayton Park, which are respectively delivering motorcycle and pedestrian safety measures. Work has started on a new 20mph speed limit through the junction of A205 Upper Richmond Road with Putney Hill/Putney High Street. This is the first phase of a three-stage approach to reduce road danger at this location.

In November 2021, a new pedestrian crossing was commissioned at Battersea Bridge, where a pedestrian was tragically killed at the beginning of 2021. We have now completed feasibility design on the second phase of improvements which will include new crossings on all other arms of the junction, as well as safety enhancements for cyclists. Now that funding has been secured, we propose public engagement on potential changes to 10 further Safer Junctions by 2024.

Bus Priority Programme

The first tranche of bus-focused multimodal corridor schemes is soon to complete the outcome definition phase and will then progress to the formal design stages. Delivery of these schemes, which will provide significantly enhanced bus priority infrastructure on designated strategic bus corridors, is expected to start in 2025.

We are prioritising schemes that will deliver journey time improvements across the network and contribute towards the target of delivering 25km of new bus lane by 2025.

Progression of schemes on the bus priority programme have resumed. As part of this we have met the traffic order to have bus lanes operational 24 hours a day, seven days a week.

Work is under way to identify additional locations for new bus lanes to be implemented by March 2025, and we will work with our delivery partners to progress these as quickly as possible.

Air quality

Reporting period	Cost to date (£m)	Cost to go (£m)	Forecast cost (£m)	Programme and project authority (£m)	Variance: Forecast vs authority (£m)
2020/21 to 2024/25	250	287	537	459	(78)
Change since last Investment programme report					
No change	15	86	101	140	

Financial commentary

The five-year forecast cost from 2020/21 to 2024/25 has increased by £101m since the publication of the last report. This is primarily due to the inclusion of the proposed ULEZ expansion for 2023, progression of which is subject to Mayoral consideration, as well as the associated scrappage scheme.

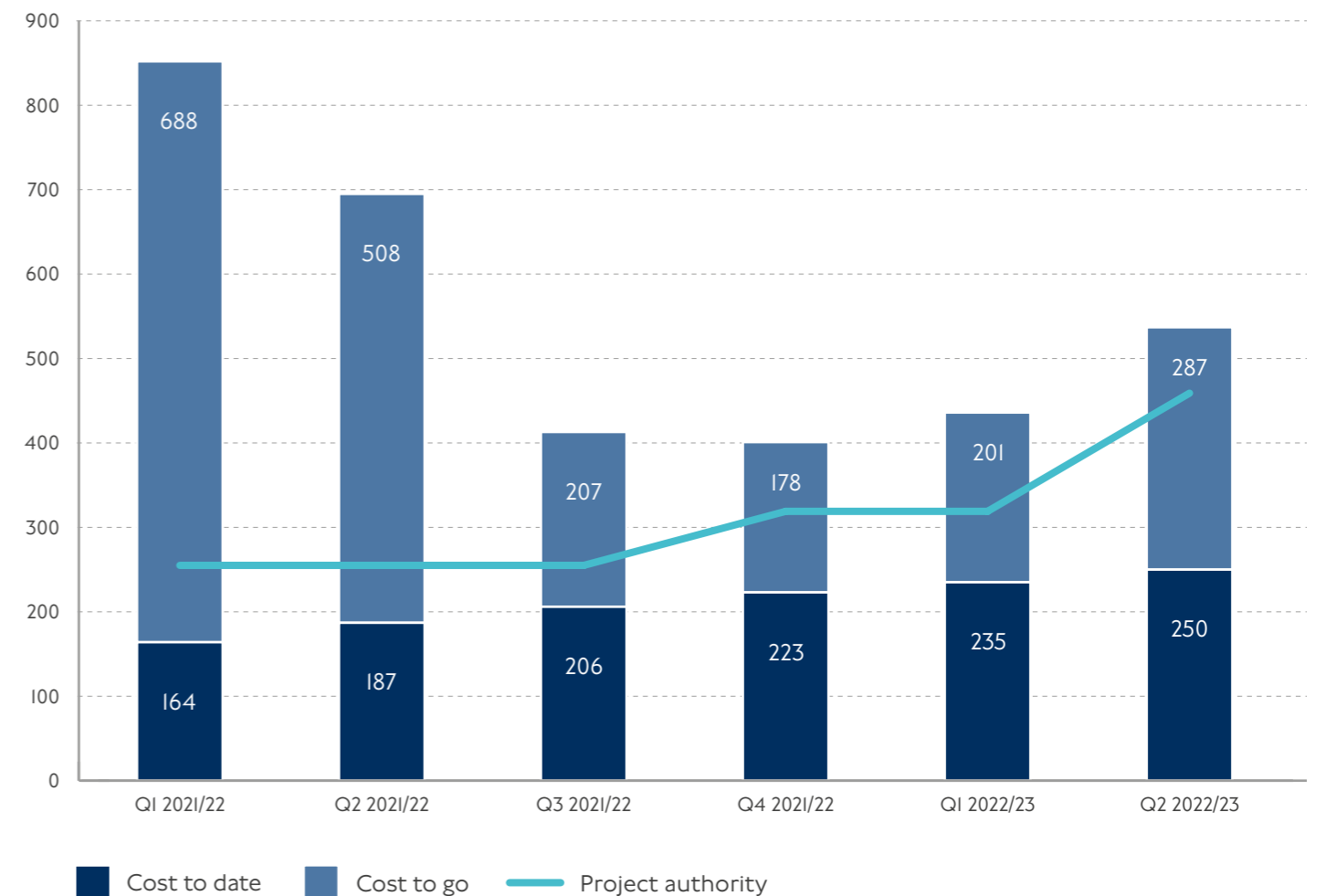
Additionally, the forecast expenditure relating to the potential second phase of the Direct Vision Standard, which is funded via the active travel programme, has been included.

Performance over time commentary

Over the last six financial quarters, our forecast cost has fluctuated, driven by funding challenges brought about by the pandemic, which has meant several projects had to be put on hold. However, since Quarter 1 2022/23 and the funding agreement that was confirmed in August 2022, the position has improved. The proposed ULEZ expansion for 2023, progression of which is subject to Mayoral consideration, as well as the associated scrappage scheme, is now part of the portfolio forecast.

Our programme and project authority has increased following the Programmes and Investment Committee Chairs' action in September 2022, which supported the continued development of the following proposed Road User Charging (RUC) projects: London-wide Ultra Low Emission Zone (ULEZ), Scrappage Scheme, Future RUC and Business Operations in-house system.

Estimated final cost performance over time (£m)



Programme update

Electric vehicle infrastructure delivery

In December 2021, we published the Electric Vehicle Infrastructure Strategy. In the document, the ‘most likely’ modelling scenario suggests London will need between 40,000 to 60,000 electric vehicle charging points by 2030, and up to 4,000 of these would be rapid chargers. This infrastructure could help support a reduction of carbon dioxide emissions of between 1.5 and 2.6 million tonnes per year by 2030. While private sector delivery of charge points has substantially increased in London, there is still a need for the public sector to support the wider roll out of electric vehicle infrastructure, to meet exponential growth in demand and help achieve a net zero-carbon London by 2030.

The Electric Vehicle Infrastructure Delivery project is identified as the keystone commitment within the new strategy, designed to use GLA member organisations’ land to accommodate charge point infrastructure. Work continues at pace on the first tranche – aiming to deliver the initial 100 rapid charging bays before further expansion.

Following some detailed market engagement, including interviews with key industry suppliers and charge point operators, we have finalised a procurement strategy. The project is on track to tender the first batch of sites to the market in late November, employing a delivery model that negates longer term capital investment from us or GLA member organisations, while leasing out sites to charge point operators and negotiating a share of revenue.

We have now assessed more than 1,300 potential charge point locations across the GLA estate, with approximately 70 per cent passing the initial stage of site evaluation. Plans for future tranches of delivery are also being developed.

Zero-emission bus fleet

We continue to increase the number of zero-emission buses as we aim for an entirely zero-emission bus fleet by 2034 – three years earlier than our original timeframe. This target date could be brought forward to 2030 with additional government funding, although none is currently available specifically for electrifying the bus fleet.

The fleet now has more than 850 zero-emission buses, across multiple routes in the capital. This is an important step in helping the Government tackle the climate change emergency and contribute towards the UK’s targets of a 68 per cent cut in carbon dioxide by 2030, rising to a 78 per cent net reduction by 2035.

We are keeping an open mind when considering the technology between now and 2034 – including hydrogen fuel-cell, with 20 double-deck vehicles operating on route 7 between East Acton and Oxford Circus, and some on route 245 for journeys between Alperton and Golders Green – so that we have the most promising options available for now and later.

Around 10 per cent of London’s fleet is expected to be zero emission by early next year, helping to support British manufacturing and jobs and reducing reliance on fossil fuels.

Road User Charging

The Mayor’s announcement of two significant Road User Charging (RUC) projects in January and March 2022 aim to take further bold action to tackle London’s toxic air pollution, the climate emergency and traffic congestion. The first of these was the proposal for a London-wide expansion of the Ultra-Low Emission Zone (ULEZ), potentially in August 2023. The second was for us to explore a new ‘smart road user charging’ scheme that could potentially replace existing schemes, such as the Congestion Charge, LEZ and ULEZ, with a single RUC scheme that uses more sophisticated technology to make it as simple and fair as possible for Londoners.

The proposed expansion of the ULEZ would have a significant positive effect on emissions, as well as helping to tackle the climate emergency and traffic congestion. It is estimated that the number of cars not meeting the ULEZ standards each day in outer London would fall from 160,000 to 46,000 and the number of vans from 42,000 to 26,000. A public consultation on the proposals took place between 20 May and 29 July, with feedback being analysed to inform the next steps. Following this, the Mayor is expected to make a decision on the proposals later this calendar year. Also included in the consultation were high level policy questions that sought the views of Londoners on the potential ‘smart road user charging’ scheme. Responses are being used to guide the early development of the potential scheme.

Should proposals for a London-wide expansion of ULEZ progress, a third party-funded vehicle scrappage scheme is likely to be launched, which could go live at least six months before the expansion. It is expected that, if the scheme proceeds, eligible applicants would be offered an incentive to scrap their non-compliant vehicle, either in the form of a grant payment or alternatives such as mobility credits or vouchers.

Asset investment

Reporting period	Cost to date (£m)	Cost to go (£m)	Forecast cost (£m)	Programme and project authority (£m)	Variance: Forecast vs authority (£m)
2020/21 to 2024/25	266	313	578	494	(84)
Change since last Investment programme report					
No change	22	(81)	(59)	No change	

Financial commentary

The five-year cost forecast from 2020/21 to 2024/25 has reduced by £59m since the publication of the last report, as it was necessary to defer activities under several larger schemes to ensure that an affordable programme aligns with our most critical asset priorities. This deferral has also lowered the required programme and project authority up to 2024/25 by the portfolio. The current level of programme and project authority granted in May 2022 covers some, but not all, of the expected spend for 2024/25, so further authority is likely to be required to ensure sufficient funding for that period, though the level of funding needed will be kept under constant review.

The portfolio is actively seeking further funding from external sources, such as under the major road network programme, to enable an acceleration of key renewal schemes such as Gallows Corner flyover and Brent Cross structures.

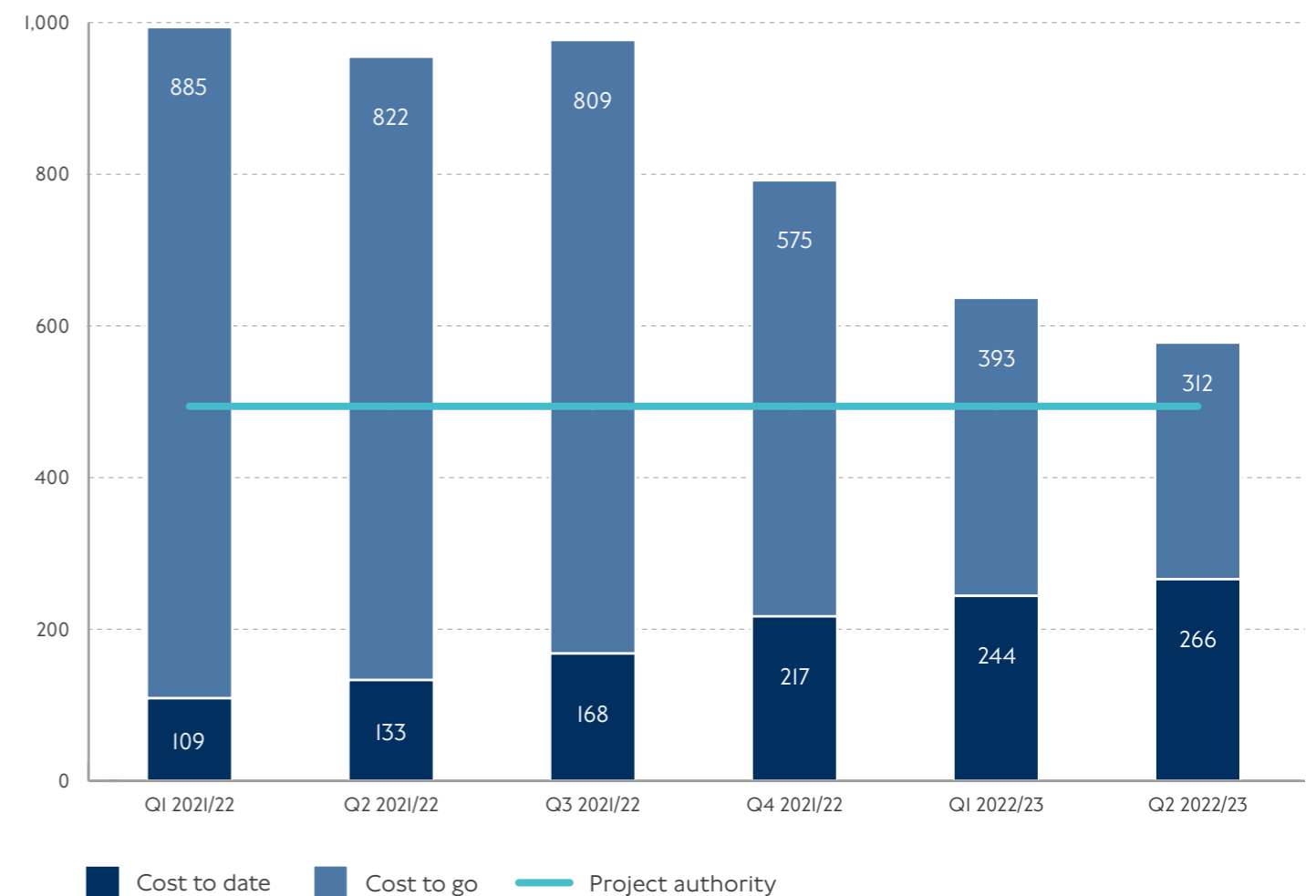
Also, the asset investment portfolio has delivered £4.7m of cost reductions thus far this financial year, as project teams found more efficient ways of working and gained increased value for money from suppliers. This represents an improvement on the savings found at this same stage of the previous financial year.

Performance over time commentary

Over the last six financial quarters, our forecast cost has seen a general decreasing trend, driven by funding challenges following the recent pandemic. This has resulted in several projects being deferred.

Due to the above, our programme and project authority was not required to be increased at the May 2022 Programmes and Investment Committee meeting. This includes all spend up to the end of 2023/24.

Estimated final cost performance over time (£m)





We have created a work schedule for Blackwall Tunnel

Programme update

Work is under way to ensure the safety and operability of our highest priority assets that need urgent renewals, including critical tunnels and structures.

Blackwall Tunnel southbound

The project aims to renew critical systems that support tunnel operation, including lighting, concrete repairs and CCTV. Following detailed modelling assessments, we have selected a preferred construction option: a series of weekend and night closures to minimise impacts on people and goods needing to cross the river. The tender documents for the detailed design and build stages were issued in September. We plan to appoint a contractor to progress the next stages of the project by February 2023, subject to the updated business case demonstrating the scope, cost and programme provides the best value for money solution.

Gallows Corner

The Gallows Corner flyover is one of our highest-priority assets to renew due to its age, condition and the current restrictions in place. Following the completion of design and feasibility work, we have selected a preferred option to fully refurbish and strengthen the flyover. We have briefed external stakeholders who are supportive of the selected option. We have submitted a draft outline business case to the DfT seeking a funding contribution through the major road network programme and have received comments from the DfT.

Site investigation works have been initiated and the result of these are due by year end. A separate concept design contract has also been awarded and will utilise the investigation outputs to ensure a robust design is completed. We are now updating a final version of the outline business case which we will submit to the DfT following completion of the investigations.

A40 Westway

Following the successful completion of the major joint replacement, the project is now focused on delivering the remaining scope and work packages. This includes further joint replacements, parapet renewals and repairs to concrete deterioration.

Concept design work for the remaining elements is under way and due to be completed by December 2022. Planning work to determine the best delivery approach considering asset, risk, financial constraints, network access and the route to market is under way and expected to be finished by early 2023.

Rotherhithe Tunnel

We have completed the design work and preparation of tender documents for the detailed design and build procurement stages of the refurbishment project. However, due to the need to retain sufficient cross river travel opportunities while the works take place at the Blackwall Tunnel (the next nearest road crossing in the east) it is now expected that the full refurbishment of Rotherhithe will not take place until after the Silvertown Tunnel opens in 2025.

A series of short-term capital interventions are being put in place to ensure the tunnel remains safe and operable until the main refurbishment project is progressed. The procurement activity for some of the short-term capital interventions has been completed and a contract awarded to progress feasibility work. This is due to be completed by February 2023 to make time for decisions on the best value for money.

Hammersmith Bridge

We released our third of the share of the costs of the stabilisation works and the London Borough of Hammersmith & Fulham subsequently started works earlier in 2022. These works are expected to be completed in early 2023. Alongside the DfT, we continue to support the borough in developing a business case for the longer-term strengthening works. We expect to receive a draft of the business case before the end of 2022.

Carriageway renewal

Work to renew 130,000 square metres of carriageway continues at pace, with more than 60,000 square metres delivered to date. We have now completed 11 resurfacing schemes which includes recently completed works on the A23 Brighton Road and on two sections of Vauxhall Bridge Road. In the next quarter we plan to deliver more schemes on the network, including A4 Cedars Road, A127 Southend Arterial Road and A201 Farringdon Road. Design work to facilitate future years' renewals is also progressing well with eighteen preliminary designs and fourteen detailed designs now completed.



Hammersmith Bridge stabilisation work is under way

Public transport

Reporting period	Cost to date (£m)	Cost to go (£m)	Forecast cost (£m)	Programme and project authority (£m)	Variance: Forecast vs authority (£m)
2020/21 to 2024/25	158	341	499	283	(216)
Change since last Investment programme report					
No change	16	14	30	34	

Financial commentary

Since the last report, the public transport portfolio forecast has increased by £30m. The portfolio also reflects an increase of £34m in programme and project authority following the July Programmes and Investment Committee submission.

The forecast includes a £57m increase in our forecast for renewal delivery across the rail network of assets to help ensure our network remains reliable. This increase is subject to a renewals prioritisation exercise that will be carried out later this year.

The five-year view has been reduced by £16.2m following a revised delivery timeline for the Tram Replacement Rolling Stock programme. The project is set to address the existing in-service fleet of CR4000 trams built in 1998/99. Activity has been deferred by a year into 2025/26, as options are being refined until a decision is taken on the basis of robust costs and programme. The impact defers £16.2m into 2025/26.

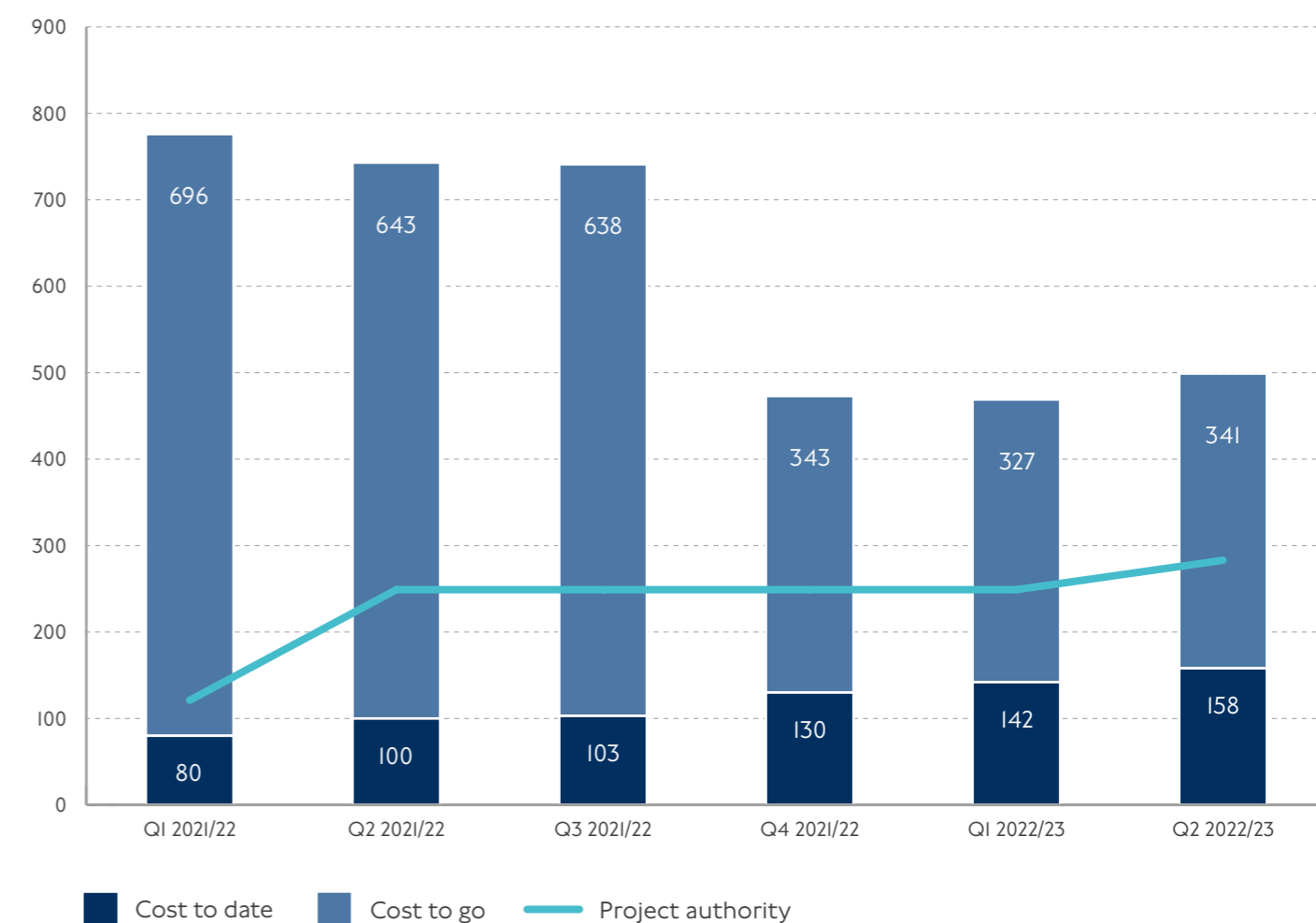
The East London line Housing Infrastructure Fund programme was granted Programmes and Investment Committee authority in July 2022 of £92.65m for phase one. It has been agreed that the delivery will follow a two-phase approach. Authority approved for phase one includes station enhancements at Surrey Quays, signalling, power and bus upgrades at Canada Water. In addition, development funding is available for phase two which includes additional train stabling and Surrey Canal station. The impact of the revised approach delays the full implementation of phase two.

The five-year view also reflects increased costs of £3m required for the completion of safety activity and handover of London Overground projects to Network Rail and Trams project, including Sandilands upgrades.

Performance over time commentary

The five-year forecast cost reduced in Quarter 4 2021/22 due to a number of pipeline enhancement projects being paused as we moved to a managed decline scenario.

Estimated final cost performance over time (£m)





Automatic people counters are now in place at 22 DLR stations

Programme update

London Overground

We have now concluded the Governance for Railway Investment Projects of the project life cycle. This means we are now at the detail design stage for the East London line infrastructure projects. Phase one of the two-phased approach includes expansion of the existing Surrey Quays station, together with power and signal upgrades.

This is in support of proposed significant housing growth, with the infrastructure being funded through both the Housing Infrastructure Fund and developer contributions. The project was signed off in July 2022 and we are awaiting the final revision of the Engineering Compliance certificate.

A paper was approved by the Programmes and Investment Committee on 20 July for endorsement to move forward to Detailed Design Stage 5 and then the construction phase of these works.

In addition to the main Surrey Quays stations works, as per the Grant Determination Agreement, the team is also progressing traction power and signalling upgrades to support service uplift from 16 trains per hour to 20 trains per hour. The works are progressing well. We entered into the design contract with Network Rail on 7 October for the power upgrade and we are progressing the invitation to tender for the signalling works.

Class 710 trains

Manufacturer Alstom has delivered 50 of 54 Class 710 trains to London Overground. The last four trains, two of which are being used by Alstom for further train software development, are expected to be delivered in Quarters 3 and 4 2022/23.

DLR

Procurement activities for the renewal portfolio continue, with priority given to critical and safety-related projects. The team, including our contractors, continues to assess the impact of price rises and the availability of materials such as steel and resources in the current volatile market. Retaining key staff is a concern, with several engineers having left the business this period.

The replacement bogie frame project for the B92 train type is progressing well, with 110 new frames ordered and 90 delivered. Loco CT30 has started stability testing.

High voltage projects have been impacted by the UKPN sub-station fire at Poplar in March 2022, which has required some key projects to be re-programmed so as not to impact services. Royal Mint Street transformers have been installed successfully and are both in service.

Automatic people counters at 22 stations have been installed and commissioned into service across the network. For the renewal of long line public address systems, site surveys and design have begun. This system will make station announcements, which is essential for evacuations as the majority of DLR stations are unstaffed.

Canary Wharf and Heron Quays low voltage renewals have started works on-site after designs approval. We will replace old lighting with new LED fittings and expect to see significant drops in our consequent power usage at these key stations.

The lift system upgrade project continued to make good progress, with more than 70 per cent of the lifts now completed and back into service. Escalator refurbishments at Cutty Sark and Tower Gateway return to service this period. South Quays escalator hoarding has been erected and the machine has been taken out of service.

Platform surfaces have been renewed at London City Airport, Bank and Shadwell stations. The life-expired stair treads have been replaced at the Prince Regent station access staircases. The third phase of works has begun at Limehouse Arches, and early engagement with the Canal & River Trust has meant we have secured our licence to work.

The GLA-funded Royal Docks stations programme has seen concept design progress for Pontoon Dock and bids are being reviewed for the enhancements proposed at Royal Victoria. An options study has also been progressing for the proposed new station at Thames Wharf.

London Trams

Our rolling stock replacement programme will replace the life-expired Bombardier CR4000 trams, which are experiencing declining reliability and have one of the lowest states of good repair categorisations across our fleets. Early market engagement has been completed, which has informed the procurement strategy that will be considered at the next stage gate meeting which has been rescheduled for December.

Initial assessments of infrastructure requirements to facilitate a new fleet have also been completed, which has informed the overall programme update, also due to be considered at the gate meeting in November.

Installation work for both the wayside and on-tram upgrades to tram communications equipment was paused in December 2021 so that the project team could investigate and rectify an increase in the number of communication faults, which are affecting the reliability of tram operations. Wayside site installation works are currently ongoing, which is a precursor to deployment of a correct-side door enable system on the Bombardier CR4000 trams. The wayside installation works were completed in mid-November 2022.

Our renewals programme continues across five asset groups: rolling stock, power, civils, systems, and permanent way infrastructure.



We plan to replace our current trams with a new fleet



The first phase of the Mitcham-to-Mitcham Junction ballasted track renewal works was completed as planned during a 10-day part closure of the tramway from 4 to 12 April 2022. The second phase was delivered during another 10-day part-closure of the tramway from 22 August to 1 September 2022. The final phase is scheduled for February 2023.

The tender process for a new framework contract for embedded track renewals was concluded in June 2022, and the contract was awarded in August 2022. It was originally planned to deliver Church Street track renewal as the first package under this contract in October 2022, however this has now been rescheduled for April 2023 owing to delays for materials with a longer procurement lead time to delivery.

Site work started in April 2022 to replace the retaining wall and step-free access ramp at Birkbeck tram stop. Following completion of site investigations, the current plan is to postpone the works, with a target start on site of 1 March 2023 and bringing into use by 23 July 2023. This is to allow for an additional utilities survey to take place to facilitate lowering of shallow services by the utility companies, and for the contractor to adequately protect mature trees within the worksite.

Following detailed investigations and asset condition assessment, the recommendation to proceed with replacing the underframe of Tram 2547 (Bombardier-type tram) was accepted and Alstom instructed to proceed with the works to return the tram to service in April 2023.

A contract was awarded to start the planned works in May 2022 to replace fire

doors at the London Trams depot and to ensure compliance with current fire safety standards. However, due to supplier delays, works are now expected to start in mid-December 2022.

The tender process to refurbish key components of the CR4000 Bombardier tram fleet (flooring, doors and rooftop) was concluded in June 2022, and the contract was awarded in August 2022.

Woolwich Ferry (London River Services)

The Woolwich Ferry resilience and renewals programme is made up of schemes across several disciplines, which are all currently at various stages of the project delivery life cycle.

The key aim of these schemes is to reduce operating expenses, maximising use of assets and exploiting opportunities to generate additional revenue where possible. Projects in the resilience and renewals work bank will support the delivery of the Woolwich Ferry business strategy, improve operational safety and make the services more reliable.

The focus for the past few periods has been on establishing clear priorities across the work bank and understanding which schemes are able to progress in 2022/2023 and 2023/2024. These schemes have formally begun the feasibility stage and are expected to develop over 2022/2023, with a few schemes such as the North terminal road works having started design work. Other high priority maintenance schemes include the link-span maintenance contract which is currently out for tender and the dry-dock/refit works, which have begun recently with the aim to procure a contractor before the end of 2022/2023.

Technology

Reporting period	Gross cost to date (£m)	Gross cost to go (£m)	Forecast cost (£m)	Programme and project authority (£m)	Variance: Forecast vs authority (£m)
2020/21 to 2024/25	65	126	191	173	(18)
Change since last Investment programme report					
No change	7	8	(42)	15	

Financial commentary

The five-year forecast for 2020/21 to 2024/25 has reduced by £42m since the last report. This is primarily due to the alignment of the work programme against available funding, requiring the deferral of a number of schemes.

The £18m variance to EFC versus authority is due to programme and project authority only being sought for 2022/23 and future known commitments whereas the forecast cost is to the end of 2024/25 for all known expenditure.

The Technology portfolio continues to face financial constraints and key decisions are needed on prioritisation of schemes in order to meet contractual, legal, safety and regulatory requirements.

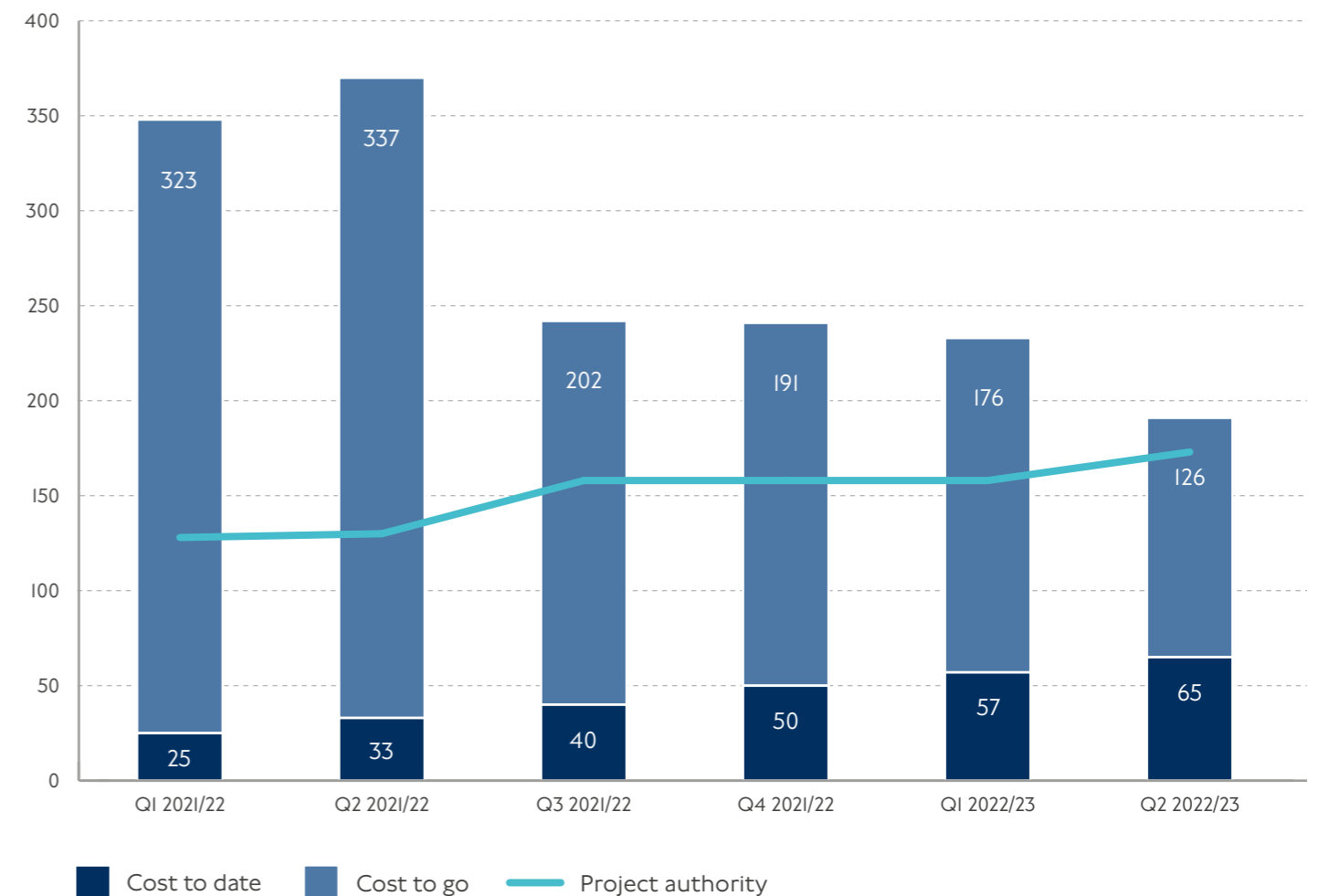
Performance over time commentary

Over the last four quarters, forecast spend for Surface Technology was significantly reduced to reflect our ongoing funding constraints during the coronavirus pandemic as we forecast spend in line with a managed decline scenario. This meant that only the enhancements required to secure legal compliance or future financial sustainability could be progressed. Any additional funding would significantly improve outcomes from enhancements projects that are currently paused, in key areas such as operational staff safety and reducing delay for road users, particularly for people who want to walk, cycle or travel by bus.

The latest submission to the Programmes and Investment Committee was approved at the meeting on 20 July. The approved submission covers the requirements for 2022/23 and commitments that span into future years.

Further Programmes and Investment Committee authority will be requested in July 2023 which will bridge the gap of £18m.

Estimated final cost performance over time (£m)



Programme updates

Compliance, enforcement and safety technology

We are continuing to progress the roll out of deployable enforcement cameras on our road network. These cameras allow us to target specific safety and non-compliance hot spots and will make a significant contribution to helping us meet our Vision Zero goal. These cameras are operational at 41 high-priority locations, selected on the basis of their recent safety and compliance records. These cameras have already resulted in more than 29,000 penalty charge notices being issued. We are now closely monitoring the impact these cameras are having on driver behaviour and road safety, with early indications suggesting they have already delivered some significant benefits. To build upon this early success we have begun a second phase of camera installations, aiming to expand the use of these cameras further.

Any money recovered from the penalty charge notices will be reinvested into maintaining a safe and efficient road network for everyone travelling in the capital. The cameras are used for enforcement of civil traffic rules only and are fully compliant with data protection legislation.

Road technology

We are leading the way in delivering innovative new road management systems. These are delivered within the Surface Intelligent Transport Systems (SITS) programme and will enable a multi-modal approach to managing the road network. The programme continues to deliver the two core replacement systems, which are the Real Time Optimiser (RTO) to manage

traffic lights more effectively and Common Operating View Incident Management System (COV IMS) to enable more effective management of incidents. These systems will reduce delay and improve journey times. Both projects are prioritised as operationally critical renewals.

COV IMS successfully delivered its fifth release in May 2022, including a new map-based element of the new system and incident management templates, to make it easier and faster for control centre teams to record and manage incidents. This has enabled elements of the old incident management system to be decommissioned. Positive feedback from users on these new elements increases confidence that the old system is on track to be fully decommissioned early next year.

There are two further elements of the SITS programme currently paused. These are Predictive, which aims to forecast the impact of an incident to improve response times and reduced delays and Video Analytics, which would provide real-time data to all road users. Progression of these work streams is being explored as part of the business planning process.

Public transport technology

We are maintaining and developing technology to operate our public transport networks and improve customer experience. This includes upgrading the critical technology systems that underpin the bus network, such as the iBus system which provides real-time information on bus locations. The tender process to select suppliers for the iBus2 software replacement project is progressing well.

We have now evaluated the proposals from bidders who were successful in the earlier selection questionnaire phase. In July, the shortlisted bidders progressed through to the competitive dialogue phase, which ran until late October. This phase will enable the project team to clarify bidders' technical and commercial proposals with them to ensure that any final proposal submitted at final tender represents the best value for money. Following dialogue, the project team will update the contract schedules where required and submit the invitation to submit final tender, to which bidders will then respond in the new year.

Procurement is also progressing for a replacement booking and scheduling system for Dial-a-Ride, which will give passengers the option to book online and enable us to deliver more trips with the same number of vehicles. Shortlisted bidders were invited to submit final tender in April 2022. Following this, we have selected a preferred bidder and are finalising the contract. We expect to sign the contract in late November, to begin delivery in late 2023/early 2024.

E-scooter rental trial

The London e-scooter rental trial has been operating for more than a year, with 10 participating boroughs making up a continuous trial area. Since the launch of the trial in June 2021, almost two million journeys have been made, with 4,425 e-scooter vehicles now available for hire.

London's trial is one of 32 around the UK authorised by the DfT to gather data that will inform changes to the legal status of e-scooters.

In November 2022 we confirmed that we – and London Councils – are extending the capital's trial of rental e-scooters in response to recently updated DfT guidance that enables local authority trials to continue until 31 May 2024.

This extension follows the recent government announcement of its plans to create a new vehicle category in legislation, in which e-scooters would be included. Continuing the trial of rental services will ensure that London can continue to learn about e-scooters and the role they can play in London's transport offer.

A competitive procurement for operators to run the next phase of London's rental e-scooter trial was launched on 25 October, and operators will be chosen on their ability to meet strict safety requirements and high operating standards.

The contracts let under the new procurement may run for longer than the DfT national trial term (which ends on 31 May 2024) in anticipation of new legislation being passed. To ensure there is a continuation of service in London, the current trial contracts operated by Dott, Lime and TIER, which expire this year, will be extended temporarily until the procurement is complete.

Santander Cycles

Our Santander Cycles scheme continues to go from strength to strength and has had twelve months of record usage. Each month between September 2021 and August 2022 saw more hires than any equivalent month. Over the last 12 months, 12.6m hires have taken place. On 20 August, the day of industrial action on the London Underground and across National Rail services, there were 66,903 hires, the fourth busiest day in the scheme ever.

The NHS promotional code that was introduced to support healthcare workers during the pandemic came to an end on 9 September 2022. The code was redeemed more than 160,000 times. This offer has been replaced by a permanent 50 per cent reduction on annual membership.

A new, modern back-office system was launched on 12 September 2022, which enabled the launch of 500 e-bikes on 6 October 2022. The new e-bikes will help to break down the barriers that stop some people from cycling, including fitness, age and journey length, and a new tariff makes charges for access more flexible and easier to understand for everyone. The new tariff was introduced as part of the back-office system upgrade to offer more flexibility to customers and support future financial sustainability.

Seven new docking stations opened between August and September in the London Borough of Southwark, extending the reach of the cycle scheme to more potential customers.



Santander Cycles has expanded to include 500 e-bikes

Professional services

This comprises Technology and data, media and the TfL Growth Fund



Technology and data

Reporting period	Gross cost to date (£m)	Gross cost to go (£m)	Forecast cost (£m)	Programme and project authority (£m)	Variance: Forecast vs authority (£m)
2019/20 to 2022/23	224	73	297	327	30
Change since last Investment programme report					
No change	4	(35)	(21)	7	

Financial commentary

The programme and project authority and EFC shown are for financial years 2020/21 to 2023/24 and include additional authority approved by the Programmes and Investment Committee on 2 March 2022.

The values are for technology and data-funded projects only and exclude the emergency services network, the public cellular network, telecoms commercialisation projects and Project Oval.

The forecast to authority variance is predominantly due to the outcome of capital prioritisation and reflects savings and deferrals out of the time period.

Performance over time commentary

Since the last report we have reset our reporting period due to the additional authority approved by the Programmes and Investment Committee on 2 March 2022, therefore no performance over time graph is included this quarter.

Progress update

Payments

On 4 September we implemented two changes to our fares system to support our longer-term financial sustainability:

- We revised the times at which peak fares are applied for journeys to and from Heathrow Airport to better reflect the peak times for travel demand at the airport
- The Oyster card fee was increased to £7 and the conditions were revised to remove the provision to refund this as a pay as you go credit after 12 months

Digital workplace

The upgrade of our Avaya telephony system was delayed for Operation London Bridge and the resulting Protection of Service. As such, the upgrade is being rescheduled for later in the calendar year at a time that aligns with the operational areas. The upgrade ensures that the Avaya telephony system remains supportable and compliant. All the preparatory work for the Avaya upgrade, including the migration away from legacy telephone lines to modern digital telephone lines, has been completed.

Technology improvements have been agreed for smart meeting rooms, including both operational areas and hub buildings. These improvements address issues with the audio, video and user experience, further supporting our hybrid ways of working. All the hardware has been purchased, the resourcing and planning finalised, and the work will begin in Period 7.

We are in the final stages of negotiation with Microsoft for a Microsoft Enterprise Agreement to be implemented across the business, which is due to begin in December 2022. This is critical as the vast majority of our IT services are based on Microsoft technology, which are underpinned by the licensing, services and support provided by this contract. The contract value is approximately £16m per year, with a number of current and emerging efficiencies and controls to ensure optimal value.

Progress continues on the desktop experience project, the primary objective of which is to deliver a suite of modernised desktop offerings across the organisation, optimised for hybrid working, enabling migration away from Windows 10 which becomes end of life in late 2025. Indicative capacity planning completed for tactical improvements which enables procurement activities to begin for additional infrastructure this financial year, and in turn ensuring service continuity while the strategic desktop is designed/tested for deployment in 2025/26.

Commercial activities have also progressed in relation to retention and compliance, with a number of potential third parties identified to assist us. The primary objective of this initiative is to ensure that the management of our file data (for example documents residing in Office365, network drives, My Documents etc) and emails adheres to Information Governance and Cyber Security policies, which will be achieved through a combination of tooling and process.

A London Underground-funded initiative has been agreed to improve the digital experience for train operators, to be driven from our digital workplace. This will focus on the right device and access to data for the role, but also on targeted training, guidance and support for the train operators. The project is due to start in Period 8/9, with stakeholder groups across Technology and data, London Underground and the Safety, Health and Environment team involved.

Hosting

Our programme to refresh end-of-life infrastructure to ensure the ongoing availability and security of our systems continues to progress well. We have re-hosted 91 per cent of servers hosting business application services to a modern hardware platform. More than 80 per cent of our data (about 12,000,000 gigabytes) stored on end-of-life and legacy storage platforms has been migrated to new and more efficient platforms. This activity is forecast to complete by March 2023.

A total of 78 out of 375 (20 per cent) mission- and business-critical application services that were operating on legacy end-of-life operating systems and database platforms have been re-platformed on to a modern supportable platform. A total of 788 servers and 1,742 database platforms (forming 73 application services) have also been decommissioned, leading to a cost avoidance of about £1m. This activity is forecast to complete by March 2023.

Automated the process to synchronise between the identity management systems and HR (SAP) systems to create single source of truth for organisational data.

Networks

The service on the transferred Jubilee line public cellular network has operated without interruption and beyond the levels specified in the contract. It continues to operate with all four UK mobile network operators providing service to all UK mobiles. The service continues to enable all mobile network customers to continue to check the latest travel information, keep on top of their emails, catch up on social media and live-stream videos wherever they are on this section of the Jubilee line.

On the wider network roll out, all four mobile network operators have signed up to the network-wide service (Three, EE, Vodafone and O2).

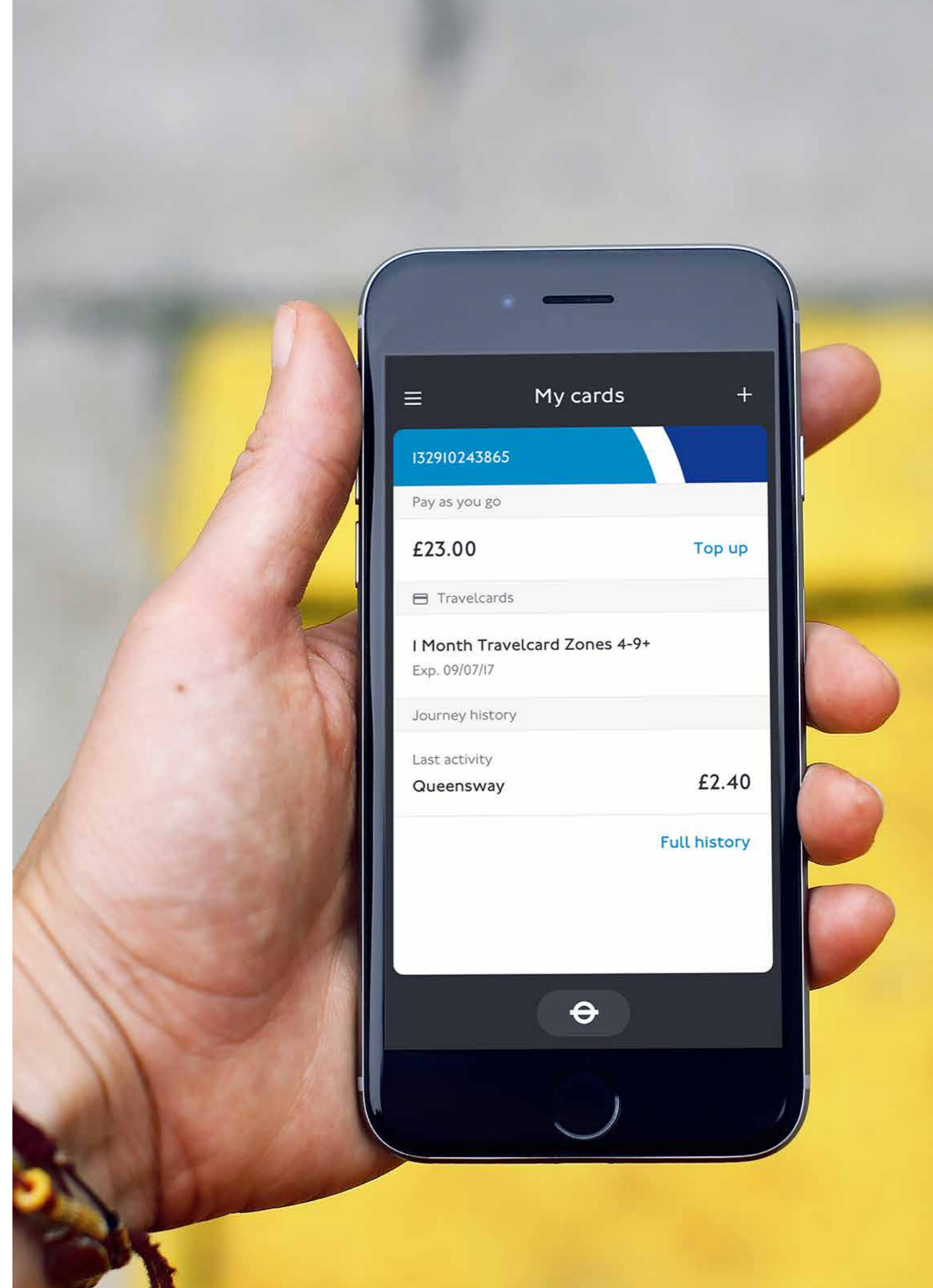
Looking ahead to the delivery of mobile services elsewhere on the Underground, Technology and data continue to work collaboratively with BAI and our other internal functions such as engineering, Safety, Health and Environment and Major Projects in the roll out of station and tunnel infrastructure.

A broad programme of installation is being delivered with more than 300 engineers on-site each night. The project has passed a key milestone with the Change Assurance Plan being approved, this sets out the approach to testing and go-live. The detailed testing and trial proposal has been submitted for approval in readiness for the first stations and tunnel sections to move through the assurance process.

Delivery of the initial stations will be followed closely by the roll out to adjacent tunnels and stations supported by mobile network operators.

We continue to work closely with the Home Office in the delivery of the emergency services network, and we are ahead of their schedule to deliver service.

The Connect programme continues to replace London Underground's operational radio base stations. This two-year project has now replaced more than 180 of 293 (61 per cent) base stations, including major stations such as Bank and London Bridge.



Juilee line mobile service continues to perform well

Our project to replace the end-of-life data network services that underpin virtually all surface services continues to progress according to plan. To date, we have migrated 2,753 of 4,496 (61 per cent) sites on to the new network delivered by Capita. The current plan is for all the Sky Broadband sites to be migrated by the end of December 2022. There will be a small amount of GTT sites that will fall into the new year.

Technology service operations

We have several key projects to help maintain and protect our business-critical services. They include assessing the suitability of on-premise and Cloud infrastructure for the services they support, and where necessary to improve the network or hosting solution. These projects are on schedule for completion within this financial year.

Other initiatives relate to software licence and service management. The project to optimise Java licence usage is in the process of being closed, now that all technical changes are complete and processes are in place to ensure this continues as a business-as-usual activity. For the set-up of a software asset management provider service, planning is progressing on how we will secure the service we need. Another project has now started to ensure our IT service management system remains supported by the supplier in line with their upgrade roadmap.

The GLA IT Shared Service project is an important strategic initiative that will see us assume responsibility for agreed GLA, MOPAC and OPDC IT services. There is a lot of focus in the project to resolve several scope-related issues. Meanwhile progress is being made with migrations of IT infrastructure and software applications, and planning the business change for the GLA.

Enterprise resource planning

Our new procurement and commercial system (SAP Ariba) went live for more than 300 users in early September with the sourcing and contract management functions. Uptake has been very positive with more than 30 sourcing events run through the system. The new purchasing function of SAP Ariba will go live for several vanguard business areas across Operations at the end of November followed by the rest of the company in January and February 2023. Communications, training and change management activities for our 3,000 users are in full flow to achieve this.

We are replacing our legacy HR SAP solution (for which support ends in 2027) by implementing further modules of SAP SuccessFactors which we call myJourney. Phase two of myJourney is now under way. The scope of the project is in two tranches. First, we will replace our core HR system of record and payroll solution, followed by a second tranche that will cover recruitment and onboarding. The project team are

completing the procurement of an SAP SuccessFactors implementation partner through market tender. The supplier will be contracted at the end of November. The milestone plan is to have the new HR and payroll system in by Quarter 4 2023/24.

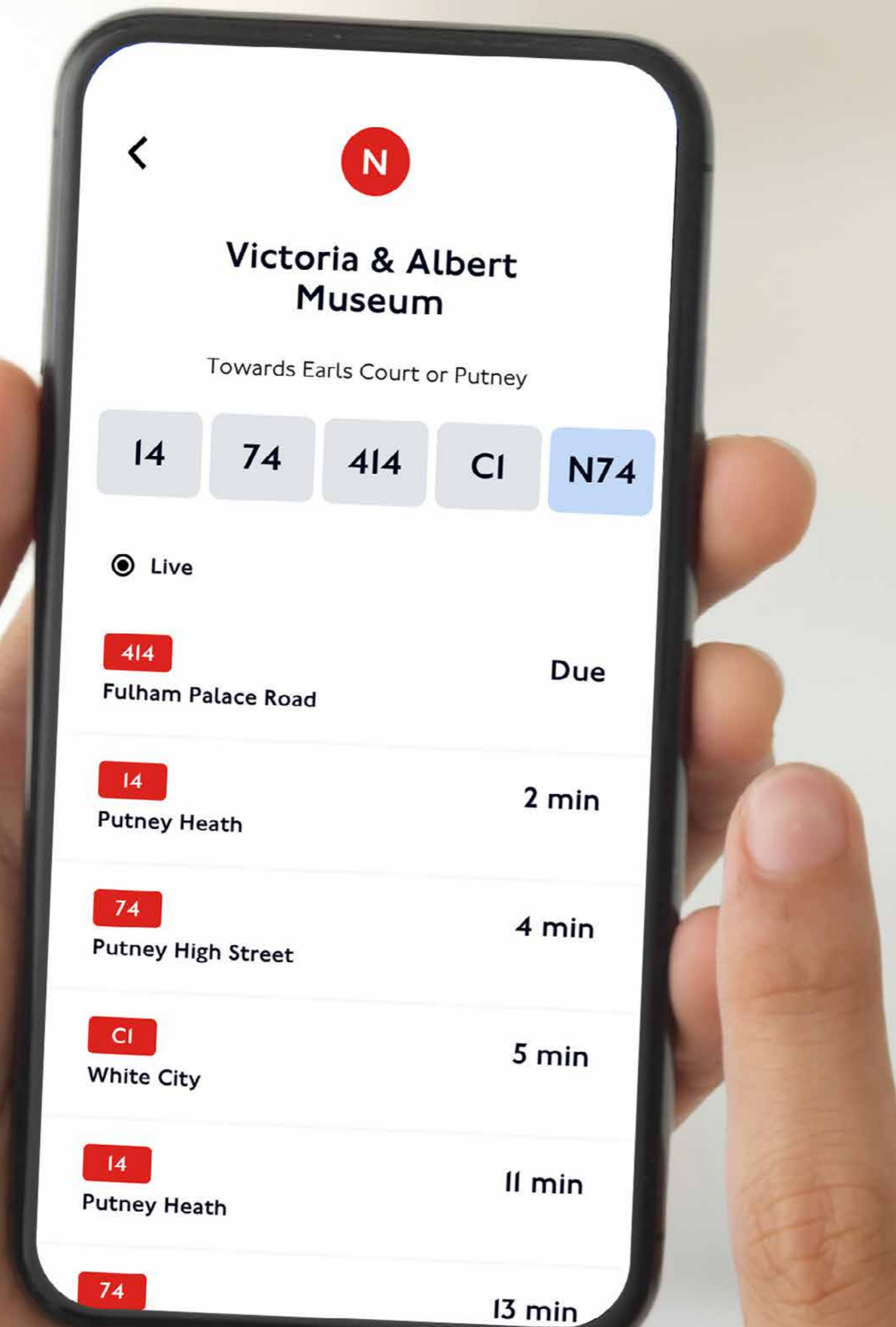
The next key stage of the transformation programme is the upgrade of our core SAP system to the latest version SAP S/4 HANA. Early programme planning has started for this with two initial projects kicked off to enable some technical prerequisites and investigate an area of significant historic customisation (The Borough Spend Portal). The programme team are concluding the procurement and selection of a client-side partner to help us scope out the project, understand the key process, system and data differences with the new technology, and help us prepare our market tender for an S/4 HANA implementation partner. This work will take until Quarter 2 2023/24 to complete.

Lastly, in June the enterprise resource planning and business services accounts payable team has successfully upgraded our Bank payments solution (Bottomline PTX), which enables all supplier and employee payroll payments. Go-live was seamless without any interruption to this critical service and there have been no issues post go-live. It was a resounding success.

Contact centre operations

Following the historic delivery of a successful outsourcing roadmap, reducing our cost to serve by more than £3m per annum, we are now replacing the outsourcing framework that facilitated this saving. The existing framework expired this year. A replacement is required to continue to leverage the per annum saving, to provide service continuity to the outsourced contracts currently live and to provide a commercial vehicle to outsource any additional work. Following market engagement last year and approval through internal governance this year, we have now also completed the Standard Selection Questionnaire processes and are nearing evaluation of bids at an Invitation to Tender stage.

In addition to providing this critical continuity of service to customers, we are also replacing legacy technology in our Lost Property Office. We are replacing Sherlock, the primary system that catalogues items of lost property. This tool has been out of support for more than a decade, and functionality limitations prevent modernisation of processes. Following last year's successful tender of the new tool, we have since worked closely with the supplier, Not Lost, to ensure the product is suitably rolled out to all the operational areas. We have now successfully gone live in the office and have also rolled out to a group of early adopters among our bus garages.



The TfL Go app was instrumental for Operation London Bridge

Data analytics

Mobilisation for the upcoming CLEO to the Cloud project is well under way, taking our data warehouse with all our customer journey and ticketing data and moving it to a new environment in the Cloud. Our development team are making good progress for phase one. This phase paves the way for our first migration from the outdated and unsupported on-premises hardware underpinning our CLEO Data Warehouse. Progress being made is as planned, with no issues reported.

Work has now completed on the migration of a GDPR-uncompliant system to our new reporting solution. The final reports have gone live, allowing all old uncompliant reports within Business Objects 5.1.7 to be turned off, removing the GDPR risk of this platform.

Following the launch of Crossrail, we have updated our WiFi product to ensure that WiFi connections are being collected from new stations, which also helps to inform route choice and station busyness elements of the product.

Digital

More than 2.3 million customers have downloaded the TfL Go app since it was launched in 2020. We recently supported Operation London Bridge by introducing real-time journey planning to the end of 'The Queue' and additional travel information around the state funeral and mourning period. Much of this was driven by our new content management system that went live in August.

We continue to test account, journey history and payment card functionality with a first phase beta release scheduled for Quarter 3 (we must now integrate the new account solution before we can go live to customers).

Challenges

Global semi-conductor supply issues are resulting in long lead times. This is impacting our ability to procure and implement new IT infrastructure (delaying project milestones) and increasing project costs as infrastructure demand outstrips supply. However, we have put mitigations in place for our known pipeline and live projects in the networks transformation space. However, we are still exposed to risk on ad hoc or emergency works.

Professional services Growth Fund

Reporting period	Forecast £m
2020/21 to 2029/30	2
Change since last IPR report at P3 22/23	
No change	No change

Programme update

The current budget classifies all future Growth Fund schemes as fully meeting the Mayoral objectives but contingent on additional funding. This means that, although all projects have already secured a strong commitment and a significant degree of third-party funding, a further commitment by Government or other third-party sources is needed to complete the funding packages. The Tolworth scheme remains in the budget as a commitment.

We are supporting business planning work which will establish the future Growth Fund programme in the budget.

Challenges

The main challenges continue to centre around ongoing funding uncertainty for third-party funded projects, which are necessary to deliver the Mayor's Transport Strategy outcomes in areas of development and high need in London. Several projects with previously complete funding packages are currently at risk due to the programme being reliant on additional funding.

As a result, a number of projects have been delayed or paused in anticipation of funding certainty, while there have been attempts over the last couple of months to secure alternative funding contributions for some critically urgent projects.



Third-party projects are at risk due to funding challenges

About us

Part of the Greater London Authority family led by Mayor of London Sadiq Khan, we are the integrated transport authority responsible for delivering the Mayor's aims for transport. We have a key role in shaping what life is like in London, helping to realise the Mayor's vision for a 'City for All Londoners' and helping to create a safer, fairer, greener, healthier and more prosperous city. The Mayor's Transport Strategy sets a target for 80 per cent of all journeys to be made by walking, cycling or using public transport by 2041. To make this a reality, we prioritise sustainability, health and the quality of people's experience in everything we do.

We run most of London's public transport services, including the London Underground, London Buses, the DLR, London Overground, Elizabeth line, London Trams, London River Services, London Dial-a-Ride, Victoria Coach Station, Santander Cycles and the IFS Cloud Cable Car. The experience, reliability and accessibility of these services is fundamental to Londoners' quality of life.

We manage the city's red route strategic roads and, through collaboration with the London boroughs, we are helping to shape the character of all London's streets. These are the places where Londoners travel, work, shop and socialise. Making them places for people to walk, cycle and spend time will reduce car dependency, improve air quality, revitalise town centres, boost businesses and connect communities. As part of this, our expanded Ultra Low Emission Zone and fleets of increasingly environmentally friendly and zero-emission buses are helping to tackle London's toxic air.

During the pandemic, we took a huge range of measures to ensure people were safe while travelling. This included extensive cleaning regimes across the public transport network and working with London's boroughs to introduce the Streetspace for London programme, which provided wider pavements and cycle lanes for people to walk and cycle safely and maintain social distancing. London's recovery is vital to the UK's recovery as life returns to normal. We want to ensure London avoids a car-led recovery and we continue to reassure people the capital and our transport network is safe and ready for them.

We have constructed many of London's most significant infrastructure projects in recent years, using transport to unlock much needed economic growth. This includes major projects like the extension of the Northern line to Battersea Power Station and Nine Elms in south London, as well as our work at Barking Riverside and the Bank station upgrade.

Working with the Government, we opened the Elizabeth line in time for Queen Elizabeth II's Jubilee. This transformational new railway adds 10 per cent to central London's rail capacity and supports the delivery of high-density, mixed-use developments, which are planned around active and sustainable travel to ensure London's growth is good growth. We also use our own land to provide thousands of new affordable homes and our own supply chain creates tens of thousands of jobs and apprenticeships across the country.

We are committed to being an employer that is fully representative of the community we serve, where everyone can realise their potential. Our aim is to be a fully inclusive employer, valuing and celebrating the diversity of our workforce to improve services for all Londoners.

We are constantly working to improve the city for everyone. This means using information, data and technology to make services intuitive and easy to use and doing all we can to make streets and transport services accessible to all. We reinvest every penny of our income to continually improve transport networks for the people who use them every day. None of this would be possible without the support of boroughs, communities and other partners who we work with to improve our services. By working together, we can create a better city as London's recovery from the pandemic continues.

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