

## Agenda

### Meeting: Programmes and Investment Committee

**Date:** Wednesday 15 December 2021

**Time:** 10:00am

**Place:** Conference Rooms 1 and 2,  
Ground Floor, Palestra, 197  
Blackfriars Road, London, SE1  
8NJ

#### Members

Prof Greg Clark CBE (Chair)

Dr Nelson Ogunshakin OBE (Vice-Chair)

Heidi Alexander

Mark Phillips

Dr Nina Skorupska CBE

Dr Lynn Sloman MBE

Ben Story

Copies of the papers and any attachments are available on [tfl.gov.uk How We Are Governed](https://tfl.gov.uk/How-We-Are-Governed).

This meeting will be open to the public and webcast live on [TfL YouTube channel](#), except for where exempt information is being discussed as noted on the agenda.

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#### Further Information

If you have questions, would like further information about the meeting or require special facilities please contact:

Jamie Mordue, Senior Committee Officer; Email: [v.JamieMordue@TfL.gov.uk](mailto:v.JamieMordue@TfL.gov.uk)

For media enquiries please contact the TfL Press Office; telephone: 0343 222 4141; email: [PressOffice@tfl.gov.uk](mailto:PressOffice@tfl.gov.uk)

Howard Carter, General Counsel  
Tuesday 7 December 2021

**Agenda  
Programmes and Investment Committee  
Wednesday 15 December 2021**

**1 Apologies for Absence and Chair's Announcements**

**2 Declarations of Interests**

General Counsel

**Members are reminded that any interests in a matter under discussion must be declared at the start of the meeting, or at the commencement of the item of business.**

**Members must not take part in any discussion or decision on such a matter and, depending on the nature of the interest, may be asked to leave the room during the discussion.**

**3 Minutes of the Meeting of the Committee held on 13 October 2021**

(Pages 1 - 14)

General Counsel

**The Committee is asked to approve the minutes of the meeting of the Committee held on 13 October 2021 and authorise the Chair to sign them.**

**4 Matters Arising and Actions List**

(Pages 15 - 20)

General Counsel

**The Committee is asked to note the updated actions list.**

**5 Use of Delegated Authority**

(Pages 21 - 24)

General Counsel

**The Committee is asked to note the paper.**

**6 Investment Programme Report - Quarter 3 2021/22**

(Pages 25 - 100)

Director Major Projects and Managing Directors Surface Transport, and London Underground and TfL Engineering

**The Committee is asked to note the paper and exempt supplemental information in Part 2 of the agenda.**

**7 Independent Investment Programme Advisory Group Quarterly Report**

(Pages 101 - 106)

General Counsel

**The Committee is asked to note the Independent Investment Programme Advisory Group's Quarterly Report, the Management Responses and exempt supplemental information in Part 2 of the agenda.**

**8 TfL Project Assurance Update**

(Pages 107 - 112)

General Counsel

**The Committee is asked to note the paper and exempt supplemental information in Part 2 of the agenda.**

**9 Barking Riverside Extension**

(Pages 113 - 120)

Director Major Projects

**The Committee is asked to note the paper and exempt supplemental information in Part 2 of the agenda and approve additional Authorities.**

**10 London Underground Fleet Heavy Overhaul, Fleet and Engineering Vehicles Programmes**

(Pages 121 - 152)

Managing Director London Underground and TfL Engineering

**The Committee is asked to note the paper and approve additional Authorities.**

**11 London Underground Railway System Enhancements Programme**  
(Pages 153 - 170)

Director Major Projects

**The Committee is asked to note the paper and approve a reduction in Authority.**

**12 London Underground Lifts and Escalators Programme**  
(Pages 171 - 182)

Managing Director London Underground and TfL Engineering

**The Committee is asked to note the paper and exempt supplemental information in Part 2 of the agenda and approve additional Authorities.**

**13 Members' Suggestions for Future Discussion Items**  
(Pages 183 - 186)

General Counsel

**The Committee is asked to note the forward plan and is invited to raise any suggestions for future discussion items for the forward plan and for informal briefings.**

**14 Any Other Business the Chair Considers Urgent**

**The Chair will state the reason for urgency of any item taken.**

**15 Date of Next Meeting**

Wednesday 2 March 2022 at 10am

**16 Exclusion of the Press and Public**

**The Committee is recommended to agree to exclude the press and public from the meeting, in accordance with paragraph 3 of Schedule 12A to the Local Government Act 1972 (as amended), in order to consider the following items of business.**

## **Agenda Part 2**

### **17 Investment Programme Report - Quarter 3 2021/22**

(Pages 187 - 200)

**Exempt supplemental information relating to the item on Part 1 of the agenda.**

### **18 Independent Investment Programme Advisory Group Quarterly Report**

(Pages 201 - 208)

**Exempt supplemental information relating to the item on Part 1 of the agenda.**

### **19 TfL Project Assurance**

(Pages 209 - 210)

**Exempt supplemental information relating to the item on Part 1 of the agenda.**

### **20 Barking Riverside Extension**

(Pages 211 - 216)

**Exempt supplemental information relating to the item on Part 1 of the agenda.**

### **21 London Underground Lifts and Escalators Programme**

(Pages 217 - 226)

**Exempt supplemental information relating to the item on Part 1 of the agenda.**

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## Transport for London

### Minutes of the Programmes and Investment Committee

**Teams Virtual Meeting**  
**10.00am, Wednesday 13 October 2021**  
**Chair's Action 22 October 2021**

#### **Members of the Committee**

Dr Nelson Ogunshakin OBE (Vice-Chair) (in the Chair)  
Heidi Alexander  
Mark Phillips  
Dr Nina Skorupska CBE  
Dr Lynn Sloman MBE  
Ben Story

#### **Government Special Representative**

Becky Wood

#### **Executive Committee**

Andy Byford	Commissioner
Howard Carter	General Counsel
Andy Lord	Managing Director London Underground and TfL Engineering

#### **Staff**

Bruno Carr	Head of Investment Delivery Planning – London Underground and Elizabeth Line
Andrea Clarke	Director of Legal
Helen Cansick	Head of Investment Delivery Planning – Healthy Streets, Local Schemes
Daniel Champion	Head of Investment Delivery Planning - Air Quality, Tech and Environment (for Minute 62/10/21)
Patrick Doig	Finance Director, Surface Transport and Major Projects and Statutory Chief Finance Officer
Mike Hardaker	Delivery Director, Major Projects
David Ho	Head of Finance, London Underground Assets and Engineering
Lorraine Humphrey	Interim Director of Risk and Assurance
Shamus Kenny	Head of Secretariat
Jamie Mordue	Secretariat Officer
Kumaran Nagiah	Chief of Staff, Major Projects
Robert Niven	Head of Investment Delivery Planning, Major Projects (for Minute 61/10/21)
James Norris	Interim Head of Project Assurance
Jonathan Patrick	Chief Procurement Officer
Edward Preedy	Chief of Staff, Director of Investment Delivery Planning (for Minute 57/10/21)
David Rowe	Head of IDP, Major Projects
Caroline Sheridan	Director of TfL Engineering Delivery

#### **Independent Investment Programme Advisory Group (IIPAG)**

Alison Munro	Chair, IIPAG
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## **49/10/21 Apologies for Absence and Chair's Announcements**

Apologies for absence had been received from Professor Greg Clark CBE. In his absence, Dr Nelson Ogunshakin OBE would chair the meeting. Simon Kilonback, Chief Finance Officer, Stuart Harvey, Director of Major Projects, Gareth Powell, Managing Director Surface Transport, and Alexandra Batey, Director of Investment Delivery Planning, were also unable to attend the meeting. The Commissioner and Heidi Alexander advised that they had to leave the meeting early but would return when possible.

The flexibility of meetings regulations, which applied to TfL from August 2020 and enabled it to take decisions via videoconference, expired on 6 May 2021. As the Committee was unable to meet in person, any decisions required would be taken by Chair's Action, following the discussion of the item with Members. The Chair of the Committee reviewed the notes of the meeting and on 22 October 2021 exercised Chair's Action to approve the items that required decisions.

The Chair reminded those present that safety was paramount at TfL and encouraged Members to raise any safety issues during discussions on a relevant item or with TfL staff after the meeting. No matters were raised.

An item on the Elephant and Castle Station Capacity Upgrade had been marked to follow. Discussions on the proposed Developer Agreement relating to the design and construction of a new subterranean station box and associated interfaces at Elephant and Castle were ongoing. As such, approvals would be sought once they were concluded. The withdrawal of this paper did not impact the request for Programme and Project Authority for this station within the item on London Underground Major Projects Stations Programme.

## **50/10/21 Declarations of Interests**

Members confirmed that their declarations of interests, as published on [tfl.gov.uk](http://tfl.gov.uk), were up to date and there were no interests to declare that related specifically to items on the agenda.

Dr Lynn Sloman MBE had declared a new interest as Chair of the Welsh Government's Roads Review Panel. Her interests had been updated and published on the TfL website.

## **51/10/21 Minutes of the Meeting of the Committee held on 21 July 2021**

**On Friday 22 October 2021, the Chair, following consultation with the Committee, approved the minutes of the meeting held on 21 July 2021 as a correct record. The minutes would be provided to the Chair for signature at a future date.**



## **52/10/21 Matters Arising and Actions List**

Howard Carter introduced the paper, which set out progress against actions agreed at previous meetings of the Committee.

**The Committee noted the actions list.**

## **53/10/21 Use of Delegated Authority**

Howard Carter introduced the paper, which provided an update on the use of delegated authority by the Committee, through the use of Chair's Action or of Procurement Authority and Programme and Project Authority, in respect of matters within the Committee's remit, granted by the Commissioner and the Chief Finance Officer.

Since the meeting on 21 July 2021, there had been no use of Chair's Action.

The Commissioner had approved five Procurement Authority requests relating to the Fleet Operator Recognition Scheme Concessionaire Contract Award, Supply of Signalling Equipment, Sponsorship of London Cycle Hire Scheme, Cable Car Operation and Maintenance, and a variation recommendation for Four Lines Modernisation Programme Support.

The Chief Finance Officer had also approved 10 Procurement Authority requests relating to Standalone Construction Projects, New Datacentre Co-location, Train Wheel Lathe Renewal and Enhancement at Northumberland Park and Upminster Depots and several material/component requests for the 73TS, 92TS, 96TS, S Stock Line Overhaul Programme and Southall Sidings Road Rail Access.

There were no Mayoral Directions to TfL within the Committee's remit.

**The Committee noted the paper.**

## **54/10/21 Investment Programme Report – Quarter 2 2021/22**

Mike Hardaker introduced the paper and the supplementary information on Part 2 of the agenda, which set out the progress and performance in Quarter 2 2021/22 of a range of projects that would deliver world-class transport services to London. The report also contained updates on notable progress made after the end of the quarter.

The format of the report had been updated to enable better tracking of changes in projects over time and to ensure consistency with other TfL quarterly reports.

On safety, site visits continued to be restricted to essential visits only, to protect critical activities and keep confirmed Covid-19 cases as low as possible. Virtual site visits and remote testing were being used as alternatives. There were four accidents reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations, which was an increase of one from the previous quarter. Managers were talking to supply chain partners to determine whether any patterns were

emerging since staff returned to work. Overall, there was a downward trend on injuries from the previous quarter, with the most common cases being slips, trips and falls. Briefings and informal conversations had increased.

Ninety-five percent of strategic milestones had been delivered early or were due to be delivered on time. The exception to this was the Rotherhithe Tunnel. Additional work would be undertaken to ascertain whether the refurbishment of the Rotherhithe Tunnel could be deferred until after the opening of the Silvertown Tunnel.

The Northern Line Extension (NLE) had opened slightly ahead of schedule on 20 September 2021 and for £160m less than first estimated. The delivery of the project had not always been easy but the outcome was a good demonstration of what could be achieved through collaborative working and when TfL had sustainable funding. Since opening, there had been 10,000 tap ins per day at Nine Elms station and 5,000 tap ins per day at Battersea Power Station station.

On Four Lines Modernisation, there had been a 10 percent improvement in run time on the north side of the Circle line. There had been a good weekend of testing on Signalling Migration Area (SMA) 8, however several software challenges had occurred on SMA5.

Train cars one to three in the Docklands Light Railway Rolling Stock Programme were ready for static testing. Work on the northern sidings at Beckton had started.

On the Piccadilly line upgrade, the manufacture of new trains began in August 2021 and work had progressed to construct the track formations at South Harrow Sidings. The High Voltage Power (Design and Build) framework Invitation to Tender had been issued in April 2021 and award recommendation was targeted for January 2022. The Piccadilly line upgrade was also being used as an incubator for environmental initiatives. The Estimated Final Cost (EFC) had been reduced by over £600m as a result of value engineering.

On the Silvertown Tunnel, piling for the launch chamber had been completed. The tunnel boring machine (TBM) was due on site in early 2022, with TBM launch expected from May 2022. Community liaison panels had been established on both sides of the river, chaired by councillors from Greenwich and Newham, and an interactive website had been launched for residents to learn more about the scheme. An independent expert would be sought to provide assurance. A separate item on the Silvertown Tunnel appeared elsewhere on the agenda (see Minute 58/10/21)

It was noted that the costs of settlement for the Silvertown Tunnel were outside of the project costs. As they did not directly lead to the construction of the asset, they were required to be written off. In addition to this, the negotiation was commercially sensitive and could not have been reported.

The viaduct structure at Barking Riverside Extension had been completed. The track slab had been finalised and most of the track installed. Stage 14 signalling commissioning was completed in July 2021 and the penultimate stage, Stage 15, connecting the viaduct to the existing network, was completed during an extended possession over the August 2021 bank holiday weekend.

On the Bank station capacity upgrade, work was ongoing to prepare for the blockade in January 2022. There were similarities between the work at Bank and the Kennington step plate junction and so, to share knowledge across projects, staff would move from NLE to Bank.

London Underground (LU) work continued at Paddington station on the redevelopment of the Bakerloo line ticket hall. Work to fit out the new Hooper's Court and Brompton Road entrance of Knightsbridge station was ongoing and due to be opened in early 2022. Both of which would deliver step-free access (SFA). Tottenham Hale station was on track to open at the end of 2021.

Osterley station became the 89<sup>th</sup> SFA, with two further stations expected to be delivered by the end of the year. Subject to discussions with the supply chain, the intention was to restart on the paused SFA improvements at Burnt Oak, Hanger Lane and Northolt stations.

The Acton train modification unit had been completed in July 2021 and would support ongoing LU fleet renewals. A strategic review of facilities at Acton warehouse and Lillie Bridge depot was being undertaken.

Good progress had been made on track renewals. Nearly all renewals had been completed at Ealing Common depot and significant renewals had been completed on the south side of the Circle and District line. There was one significant injury during the period. TfL and Balfour Beatty were working to understand what had happened and take forward lessons learnt.

On Rolling Stock, good progress continued to be made on the Central Line Improvement Programme. TfL had taken the opportunity to accelerate accessibility works on the Waterloo & City line fleets, whilst there was a reduced service on the line. Engineering fleets, delivered in the 1960s, performed well but required a lot of maintenance. Working with the supply chain, TfL had begun to detail options available to renew the fleet to improve flexibility and value for money. The equipment was made bespoke to the Deep Tube network.

On Healthy Streets and Active Travel, TfL continued to meet with the Department for Transport's (DfT's) Active Travel Oversight Group. There had been 7.3km of cycle lanes delivered since the June 2021 funding settlement, including links to the new NLE stations. A further 20.8km were in construction.

In August 2021, a cyclist was sadly killed in Holborn at the junction of Southampton Row and Theobalds Road. The London Borough of Camden implemented interim safety improvements and further changes were expected in 2022. TfL anticipated a full transformation scheme for the Holborn area to come forward, which would need to be considered in relation to any new funding deal with the DfT.

It had been agreed with the Mayor to accelerate the lowering speed limits programme and introduce 20mph limits on 140km of the Transport for London Road Network by March 2023. This included works to create a pedestrianised crossing on the north side of Battersea Bridge, widening the footways and making Chelsea Embankment 20mph.

On air quality, the Ultra Low Emission Zone would be launched on 25 October 2021. Final preparations would take place over the following days, updates to the TfL website and mobile app were ready to go live and new boundary signs had been installed on the North and South Circular Roads.

On Surface Transport renewals, work hard started to replace the largest Roller Shutter Joint in London, which was life expired, on the A40 Westway. Two lanes of traffic were kept open in the week, although more extensive possession would be required on weekends.

The third phase of embedded track renewals for the trams at Reeves Corner was completed in August 2021. Highway resurfacing work in the centre of Croydon and further repair works to the Addiscombe Road Bridge were also completed during the possession.

The Committee welcomed the updated format of the report. Members asked that, if appropriate, EFC performance note if the scope had changed.

Members commended the work done to have 95 per cent of strategic milestones forecast to be delivered on time or early. Achieving the milestones was taken seriously and a series of sub-milestones acted as early warning systems. Openness and collaboration across TfL and with the supply chain helped to achieve milestones.

**The Committee noted the paper and exempt supplementary information on Part 2 of the agenda.**

## **55/10/21 TfL Project Assurance Update**

Lorraine Humphrey introduced the paper and the supplementary information on Part 2 of the agenda, which provided an update on Project Assurance work undertaken between 27 June and 18 September 2021.

During the period, four programme reviews were undertaken, with the Independent Investment Programme Advisory Group (IIPAG) involved in all four. Fourteen project assurance reviews were undertaken, with IIPAG involved in three reviews. The reviews resulted in a total of 69 recommendations, of which six were considered critical.

The number of overdue IIPAG recommendations had reduced from 21 to 11 and the number of overdue Project Assurance recommendations had reduced from 52 to 44. Four of the overdue recommendations were critical recommendations; two related to the General Data Protection Regulation Project, one to the Barking Riverside Extension project team being under resourced and one to the need to ensure that the business case for the Central line Signalling and Control Project demonstrated value for money.

The paper raised three critical issues, following a review of the Rotherhithe Tunnel. A further review had been undertaken, which would determine the correct scope, what was needed to ensure value for money and to deliver a more robust estimated final cost.

**The Committee noted the report and the exempt supplementary information on Part 2 of the agenda.**

## **56/10/21 Independent Investment Programme Advisory Group Quarterly Report**

Lorraine Humphrey and Alison Munro introduced the paper and the supplementary information on Part 2 of the agenda. The paper provided an update on the work undertaken by the Independent Investment Programme Advisory Group (IIPAG) since the last meeting of the Committee.

Three areas of cross cutting work had been completed during the period. These related to the annual review of first and second line of defence, asset information and a review of programmes made on reporting value for money.

Members welcomed the progress made in establishing a common understanding of the state of good repair (SOGR) of assets. Members supported the need for consistent metrics that could be applied across all assets, give an insight into consequences of not replacing or renewing an asset and show how things had changed over time. Given the increasing importance of the quality of data, TfL should consider it as an asset in itself.

TfL had a good understanding of where data was held and the quality of the data. There was a focus on areas where this was lacking, for example on civil infrastructure and drainage in London Underground (LU). In some areas, such as for LU track, there was a near complete data set, which included a heat map that showed the status of the track. Having a good knowledge of the SOGR was particularly important in relation to funding discussions. Members asked for a briefing on how TfL captured and used asset data. **[Action: Andy Lord]**

**The Committee noted the paper and the exempt supplementary information on Part 2 of the agenda.**

## **57/10/21 Review of Progress on Value for Money**

Edward Preedy introduced the paper and the supplementary information on Part 2 of the agenda, which set out progress to date in developing a comprehensive Value for Money (VfM) programme to improve TfL's capital delivery.

The work on VfM was structured around four outcomes: cultivating a VfM culture within TfL; ensuring that the Five Case model of decision-making was the key driver of investment decisions; ensuring that VfM was considered at every stage of the decision-making process or lifecycle; and monitoring and regularly reporting TfL's VfM initiatives alongside the achievements of objectives.

To ensure that there was a genuine organisational shift and a building of understanding of what VfM meant, a director led review group was established. This looked across all capital delivery, promoted consistency, avoided duplication and provided a forum for improvement initiatives.

Following the submission of the Capital Efficiencies Plan to the Department for Transport in July 2021, a new pan-TfL Capital Improvement Group was established to centralise governance of capital improvement activity.

On business case development, the approach and decision-making processes had been enhanced, for example through producing more succinct summaries and drawing out VfM considerations at each stage.

A series of systems and check points throughout project lifecycles had been created, to enable more consistent and timely decisions. For example, a central projects list and business case repository captured all project activity from an early stage and the key business case metrics. VfM checklists had also been introduced at stage gates.

Future work would continue the drive for efficiencies, as outlined in the Capital Efficiencies Plan, particularly in areas such as equity.

Members recognised that any project could only represent VfM if it achieved its objectives. When setting strategic outcomes, it would be more helpful to consider three or four primary objectives, such as modal share shifts or net emissions. This would provide a better insight into how projects were contributing to the Mayor's Transport Strategy (MTS). Historically there had been more focus on enhancements, as they more naturally contributed to the MTS. TfL sought to develop 10-15 objectives that would capture enhancement and renewal schemes simultaneously. From this, the highest priority objectives would be established and connected to an MTS tracker.

The Independent Investment Programme Advisory Group (IIPAG) commended the work that had been undertaken, which went wider than the original IIPAG report on VfM. Good progress had been made, particularly in relation to efficiencies and culture, but there was still some work to be done on business cases. Enhanced scrutiny and governance on VfM in business cases would help to progress further. Project Assurance reviewed business cases to ensure that key points and objectives were identified, strengthen the cases, and make them work effectively.

**The Committee noted the paper and the supplementary information on Part 2 of the agenda.**

## **58/10/21 Silvertown Tunnel**

Mike Hardaker introduced the paper and the supplementary information on Part 2 of the agenda, which provided an update on the Silvertown Tunnel project, including progress with design and construction, since the Committee last considered a specific paper on the scheme in July 2019.

The piling for the launch chamber was complete and work to excavate had begun. The delivery of the tunnel boring machine was slightly ahead of schedule and factory acceptance testing was expected to be completed by December 2021.

On site progress was good. Hybrid vehicles were used where possible, which resulted in a reduction of traditional fuel use by 80 per cent on site. Most of the spoil

had been transported off site via the Thames, which had allowed 3,500 heavy goods vehicle loads to be taken off the road.

Work on the user charging system, which would be used on the Silvertown Tunnel and Blackwall Tunnel, was ongoing.

TfL was undertaking a range of monitoring, modelling and assessment work to ensure the project's benefits, impacts and any changes in transport patterns due to the coronavirus pandemic were understood. Communications and engagement sessions continued and were planned to extend beyond the project lifecycle.

The paper requested a transfer of existing Authority, for the user charging element of the project, from the Major Projects Directorate to Projects and Programme Delivery (PPD). This reflected delivery expertise in PPD and the need to be consistent in TfL's approach to user charging.

Members shared that there was growing recognition from climate scientists that reduced traffic volumes were necessary to achieve net-zero. User charging could reduce the number of cars crossing the river from current level, while more public transport use could increase the volume of people crossing the river.

TfL retained the responsibility for the setting and operating the user charge as to ensure it could effectively manage traffic. It had been forecast that the use of a user charge would result in no additional traffic along the corridor to Silvertown Tunnel and Blackwall Tunnel. Modelling showed an increase in the proportion of trips made by public transport from 10 per cent to 30 per cent. TfL was legally committed through the Development Consent Order process to achieve the environmental objectives set out.

Traffic remodelling would be re-run in 2022. The results from which would indicate how different sets of charges achieved different outcomes, in terms of both overall traffic level and what proportion of the traffic was made up of different vehicles.

**[Action: David Rowe]**

The affordability of the charges would be important due to potential displacement of traffic to other crossings. Members stated that TfL should continue to work closely with local boroughs and the Silvertown Tunnel Implementation Group on the user charging levels.

**On Friday 22 October 2021, the Chair, having reviewed notes of the meeting, noted the paper and the related paper on Part 2 of the agenda and approved the transfer of Programme and Project Authority to the Air Quality and Environment Programme in respect of the user charging element of the Silvertown Tunnel scheme, at the sum set out in the paper on Part 2 of the agenda.**

## **59/10/21 London Underground Track Renewals Programme**

Andy Lord introduced the paper, which provided an update on the London Underground Track Renewals Programme, which delivered prioritised, critical asset renewals to maintain current levels of safety and reliability and, where possible, supported upgrade requirements.

Bruno Carr told the Committee that the Programme team had been working on the state of good repair (SOGR) with the Independent Investment Programme Advisory Group and TfL Project Assurance. There had been a change in metrics, which caused some issues in tracking historical data but TfL was now able to implement a standard SOGR metric; every asset would be given a red, amber, green or black rating.

Work on track was critical to the safety of the railway, as it did not fail safe. The paper set out how TfL would recover from coronavirus pandemic related stoppages and deliver 14-15km of work across the main ballasted track and Deep Tube over the coming years. The work would ensure safety and reliability, before seeking opportunities to improve track, in line with capacity. It was envisaged that all of the Deep Tube would have flat bottomed rail by 2030.

Additional works would be delivered on 3km of drainage assets, on which a low SOGR was known. A wider asset project was underway to collect asset condition data on the more difficult to survey and access drainage.

Several significant flooding events had occurred on the network over the summer period, which led to a stranded train and closed stations. A review of certain flooded locations was being undertaken to determine what more TfL could do to prevent it in the future.

Track renewals and replacements was intrusive and difficult to do in short windows. The most efficient, cost effective and least disruptive over the longer-term approach was to have larger blockades. There was a need to balance this with providing a good service and TfL helping London's economic recovery.

TfL Project Assurance had raised a critical issue in relation to potential impacts on the 2023 work bank, as a result of the lack of design work for the Programme. The procurement of external resource was an option to ensure designs were done in good time and did not disrupt delivery. Processes had been changed to make funds available for design work, with the intention of achieving a greater work bank than planned works. There was a national shortage of engineering resource and TfL was reaching out to other sectors.

Members stated the importance of ensuring that language used to describe asset condition was clear, as an asset rated as being in 'poor condition' did not mean that the safety of customers was compromised. It was noted that the charts were generally more engineering focussed and did not provide the whole context of mitigations being in place to ensure safety. An example of TfL operating 'life expired' assets safely was in the Bakerloo line fleet, which was 'life expired' but well maintained and continued to perform well.



Ideally there would be no track designated as 'life expired' however this would require a large financial commitment and have a big impact on service. A lot of the life expired track related to bull head rail, which was deemed life expired as a result of manufacturers not likely to provide replacements in the future. Track was regularly physically and electronically inspected and TfL would never operate a service unless it was safe to do so.

The Board would be kept apprised of changes in asset condition, so it could understand what the backlog was over the coming years.

**The Committee noted the paper.**

## **60/10/21 London Underground Signalling and Controls Programme**

Andy Lord introduced the paper, which provided an update on the London Underground Signalling and Controls Programme and requested additional Programme and Project Authority in line with the do minimum scenario in the Long-Term Capital Plan.

The Programme was split into renewals and incremental upgrades. On renewals, the Programme would extend the life of existing systems and replace critical obsolescence, primarily on the Central and Bakerloo lines. An incremental upgrade approach, replacing larger one-off replacement approach, would minimise operational disruption and funding requirements.

Computerised systems generally did not last as long as mechanical systems; in computerised systems, components required regular updates in a specific order. TfL delivery teams had worked closely with the original equipment manufacturers to determine the order in which the components should be updated.

This marked a critical change in strategy and was needed because of specific component failures on the more modern systems, for which replacements were scarce. Maintenance teams worked across TfL to ensure spares were used efficiently. The approach would allow TfL to support fleet expansion in the future and reduce the likelihood of needing to do major single point upgrades.

There were huge financial and operational advantages to having standardised signalling systems.

TfL Project Assurance thought the change in approach was sensible. Work was needed on how TfL would best achieve value for money where there was only one supplier that could do the work.

**On Friday 22 October 2021, the Chair, having reviewed notes of the meeting, noted the paper and:**

- 1 approved additional Programme and Project Authority of £94.4m for the London Underground Signalling and Controls Programme, giving a total Programme and Project Authority of £306.7m (figures in outturn including risk); and**
- 2 noted that the matters for which Authorities are sought above include commitments that extend beyond the period of the Business Plan and “Revised Budget” approved by TfL Board on 28 July 2021. Appropriate provision will, therefore, need to be made for those commitments in future Business Plans.**

## **61/10/21 London Underground Major Projects Stations Programme**

Mike Hardaker introduced the paper and the supplementary information on Part 2 of the agenda, which provided an update on the progress of the London Underground Major Projects Stations Programme. The paper sought adjustments to the Programme and Project Authorities (including reductions) and requested additional Authority to progress the Elephant & Castle station capacity upgrade.

Due to the current funding constraints, the Programme was focussed on projects that were in progress and coming to completion, and those that had a third-party funding element.

At Bank station, work was focussed on the blockade in January 2022. There was a need to ensure that appropriate information and contingencies were available. A new Programme Manager was in place to look at the interfaces between the Central and Northern lines. Production and quality issues with cladding had arisen but were expected to be resolved.

At Elephant & Castle station, the scheme would combine the separate Bakerloo and Northern line tickets halls into a single facility and include provision of safeguarding for the Bakerloo line upgrade. The developer, Delancey, would deliver the station box and TfL would deliver the fit out and completion of the tunnel connections.

The Camden Town Station Capacity Upgrade and Holborn Station Capacity Upgrade projects were on hold, subject to future funding.

**On Friday 22 October 2021, the Chair, having reviewed notes of the meeting, noted the paper and the supplementary paper on Part 2 of the agenda and approved additional Programme and Project Authority of £54.7m for the London Underground Major Projects Stations Programme.**

## **62/10/21 Surface Technology Programme**

Daniel Champion introduced the paper and the supplementary information on Part 2 of the agenda, which provided an update on the Surface Technology Programme.

Seventy-five per cent of the Surface Technology Programme was renewals of critical operational technologies, such as the enforcement and compliance operating system and iBus2. The remaining 25 per cent of the Programme was made up of enhancements for key TfL priorities, such as the Deployable Enforcement Cameras on roads and body-worn cameras for staff. In addition to this, 500 e-bikes would be rolled out by summer 2022.

While the paper had been scheduled to be presented to the Committee in March 2022, increased delivery confidence and positive performance meant it was brought earlier. This reduced the risk of contract extensions for older operationally critical technology.

**On Friday 22 October 2021, the Chair, having reviewed notes of the meeting, noted the paper and exempt supplemental information in the paper on Part 2 of the agenda and:**

- 1 approved an additional £30.1m budgeted Programme and Project Authority for the Surface Technology Programme, taking the total Programme and Project Authority to £140.0m;**
- 2 noted that the matters for which Authorities are sought above include commitments that extend beyond the period of the Business Plan and Budget. Appropriate provision will, therefore, need to be made for those commitments in future Business Plans and Budgets; and**
- 3 noted that Procurement Authority for the various initiatives will be sought at officer level in accordance with Standing Orders.**

## **63/10/21 Members' Suggestions for Future Discussion Items**

Howard Carter introduced the current forward plan for the Committee.

In addition to a briefing on asset data (as at Minute 56/10/21), Members requested a visit to Tottenham Hale station to see the progress made. **[Action: Andy Lord]**

**The Committee noted the paper.**

## **64/10/21 Any Other Business the Chair Considers Urgent**

There was no urgent business.

## **65/10/21 Date of Next Meeting**

The next scheduled meeting was due to be held on Wednesday 15 December 2021 at 10.00am.

## **66/10/21 Exclusion of the Press and Public**

**The Chair, following consultation with the Committee, agreed to exclude the press and public from the meeting, in accordance with paragraph 3 of Schedule 12A to the Local Government Act 1972 (as amended), when it considered the exempt information in relation to the items on: Investment Programme Report – Quarter 2 2021/22; TfL Project Assurance Update; Independent Investment Programme Advisory Group Quarterly Report; Review of Progress on Value for Money; Silvertown Tunnel; London Underground Major Projects Stations Programme; and Surface Technology.**

The meeting closed at 1.10pm.

Chair: \_\_\_\_\_

Date: \_\_\_\_\_

## Programmes and Investment Committee



**Date:** 15 December 2021

**Item:** Matters Arising and Actions List

---

### **This paper will be considered in public**

#### **1 Summary**

1.1 This paper informs the Committee of progress against actions agreed at previous meetings.

#### **2 Recommendation**

2.1 **The Committee is asked to note the Actions List.**

#### **List of appendices to this report:**

Appendix 1: Actions List

#### **List of Background Papers:**

Minutes of previous meetings of the Programmes and Investment Committee.

Contact Officer: Howard Carter, General Counsel  
Email: [HowardCarter@tfl.gov.uk](mailto:HowardCarter@tfl.gov.uk)

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## Programmes and Investment Committee Action List (reported to the meeting on 15 December 2021)

Actions from the meeting of the Programmes and Investment Committee held on 13 October 2021

Minute No.	Description	Action By	Target Date	Status note
56/10/21	<p><b>Independent Investment Programme Advisory Group Quarterly Report: Asset data</b> Having a good knowledge of the SOGR was particularly important in relation to funding discussions. Members asked for a briefing on how TfL captured and used asset data.</p>	Andy Lord	2022	Members will be consulted on available dates in early 2022.
58/10/21	<p><b>Silvertown Tunnel: Traffic modelling</b> Traffic remodelling would be re-run in 2022. The results from which would indicate how different sets of charges achieved different outcomes, in terms of both overall traffic level and what proportion of the traffic was made up of different vehicles.</p>	David Rowe	2022	A briefing will be arranged once modelling work has been completed.
63/10/21	<p><b>Members' Suggestions for Future Discussion Items: Tottenham Hale station visit</b> Members requested a visit to Tottenham Hale station to see the progress made.</p>	Andy Lord	December 2021	Complete. Members will take part in a visit following the meeting.

## Actions from previous meetings of the Committee

Minute No.	Description	Action By	Target Date	Status note
37/07/21	<p><b>Investment Programme Report – Quarter 1 2021/22: Risk and contingencies</b></p> <p>Members requested that future reports provide further information on contingencies in place to cover risks, and if and how they had been used. This would also include a risk and opportunities gaze, how projects were managed for value, more visibility of how inflationary risks were mitigated and how opportunities were delivered.</p>	Director Major Projects	Ongoing	The format of the report was recently amended and continues to be refined.
23/05/21 (2)	<p><b>Investment Programme Report – Quarter 4 2020/21: Santander Cycle Hire expansion</b></p> <p>Members requested further information on how and where TfL would concentrate its expansion of the Santander Cycle Hire scheme.</p>	Director Investment Delivery Planning	December 2021	The 8 December 2021 Finance Report to the Board sets out that further expansion will require third-party funding.
64/12/20	<p><b>IIPAG Quarterly Report: gateway and performance review functions</b></p> <p>Members requested information on how the gateway and performance review functions worked and best practice and the principles that guided this, including the work done to embed value for money within TfL.</p>	Director Major Projects / Director Investment Delivery Planning	2021/22	A paper will be provided to coincide with IIPAG's updated report to a future meeting of the Committee.



72/12/20	<p><b>Healthy Streets Programme, H2 2020/21: monitoring</b></p> <p>Further monitoring results were expected to be available in the next 12-18 months. Members asked that longer term assessment of the impacts of the Programme be conducted, with the results shared with the Committee, when available.</p>	Director Investment Delivery Planning	Ongoing 2022	<p>Updates on monitoring were provided in the Chair's Action paper to the Committee on 19 April 2021 and the paper on the agenda for this meeting. The long-term assessment will be included in the annual Health Streets updates.</p>
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## Programmes and Investment Committee



**Date:** 15 December 2021

**Title:** Use of Delegated Authority

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### **This paper will be considered in public**

#### **1 Summary**

- 1.1 This is a standing item on the agenda to inform the Committee of any use of delegated authority by the Committee, through Chair's Action or of Procurement Authority and Programme and Project Authority (in respect of matters within the Committee's remit) granted by the Commissioner and the Chief Finance Officer in accordance with delegated authorities under TfL's Standing Orders since the last meeting of the Committee. The paper also provides information on Mayoral Directions to TfL within the Committee's remit.
- 1.2 Since the last meeting of the Committee, on 13 October 2021, there have been:
- (a) no uses of specific authority delegated by the Board;
  - (b) two uses of Chair's Action in relation to approval of authority requests at the meeting of the Committee on 13 October 2021 and the Congestion Charge Changes Review;
  - (c) no Mayoral Directions within the Committee's remit;
  - (d) one approval of Programme and Project Authority by the Chief Finance Officer relating to the Digital Safety, Health and Environmental Management Systems;
  - (e) one approval of Procurement Authority by the Commissioner, relating to the Central Line Signalling Life Extension – Signalling Call-Off 003 Detail Design and Installation; and
  - (f) five approvals of Procurement Authority by the Chief Finance Officer, relating to 1973 Piccadilly Line Life Extension Supply of Rubber to Metal Components; Immigration Enforcement's Checking and Advice Service; Extension of District line Wimbledon Branch Track Access Agreement; Fire Maintenance Contract Extension Variation Recommendation; and Thales Establishment Works - Bank Station Capacity Upgrade Signalling Variation.
- 1.3 A similar report is submitted to the Finance Committee in respect of the use of Chair's Action and of Procurement Authority and Land Authority granted by the Commissioner and the Chief Finance Officer in respect of matters within the Finance Committee's remit, together with relevant Mayoral Directions.

## **2 Recommendation**

**2.1 The Committee is asked to note the paper.**

## **3 Use of authority delegated by the Board**

3.1 There have been no uses of authority delegated by the Board since the last meeting of the Committee.

## **4 Use of Chair's Action**

4.1 Under Standing Order 113, in situations of urgency, the Board delegates to each of the Chair and the Chairs of any Committee or Panel the exercise of any functions of TfL on its behalf, including the appointment of Members to Committees and Panels. Any use of Chair's Action is reported to the next ordinary meeting.

4.2 There have been two uses of Chair's Action since the last meeting of the Committee on 13 October 2021.

### **Approval of Authority requests at the Meeting of the Committee on 13 October 2021**

4.3 Owing to the limited availability of Members, the meeting was held entirely on Microsoft Teams. The Chair was subsequently provided with a summary of the issues discussed and the recommendations.

4.4 On Friday 22 October 2021, having reviewed the issues discussed, the Chair exercised Chair's Action to approve the recommendations in the papers, as published on the [TfL website](#). The minutes of the meeting are elsewhere on the agenda.

### **Congestion Charge Changes Review**

4.5 On 22 October 2021, the Committee was sent a paper which provided an update on the Congestion Charge Changes Review project, which sits within the Air Quality and Environment Programme. The paper also sought a Chair's Action decision to approve additional Procurement Authority of £3.5m to extend the contracts with Capita Business Services Ltd to develop the potential Congestion Charge changes.

4.6 On 24 October 2021, the Chair of the Committee, following consultation with Members, approved additional Procurement Authority to extend the contracts with Capita Business Services Ltd to develop the potential Congestion Charge changes. The paper has been published on the [TfL website](#) but the appendix remains exempt from publication.

4.7 The use of Chair's Action was considered appropriate as additional Procurement Authority was needed to enable ongoing delivery of the proposed Congestion Charge changes outside of the planned meeting cycle; it was not practicable to submit a paper until the consultation was launched and an understanding of the proposed accelerated delivery timelines were confirmed.

## **5 Programme and Project Authority Approvals**

- 5.1 To enable an appropriate level of governance, processes are in place for the authorisation, control and reporting of projects.
- 5.2 Programme and Project Authority will normally be granted by the Committee for all programmes and projects as part of the defined Programmes within the overall Investment Programme. Where individual programmes or projects have a value in excess of £50m and have not already received full approval as part of a Programme, requests will be submitted to the Committee for consideration. Those programmes and projects with an estimated final cost of £50m or below, which have been approved by the Commissioner or the Chief Finance Officer, will be reported to subsequent meetings of the Committee.
- 5.3 Where the main contract has not yet been awarded, the Financial Authority and Estimated Final Cost may not be stated because they are commercially confidential.

### **Approvals by the Commissioner**

- 5.4 Since the meeting of the Committee, the Commissioner has not approved any Programme and Project Authority requests within the Committee's remit.

### **Approvals by the Chief Finance Officer**

- 5.5 Since the meeting of the Committee, the Chief Finance Officer has approved one Programme and Project Authority request within the Committee's remit relating to the Digital Safety Health & Environmental Management Systems.

## **6 Procurement Approvals**

### **Approvals by the Commissioner**

- 6.1 Since the meeting of the Committee, the Commissioner has approved one Procurement Authority request in respect of matters within the Committee's remit, relating to the Central Line Signalling Life Extension - Signalling Call-Off 003 Detail Design and Installation.

### **Approvals by the Chief Finance Officer**

- 6.2 Since the meeting of the Committee, the Chief Finance Officer has approved five Procurement Authority requests in respect of matters within the Committee's remit, relating to 1973 Piccadilly Line Life Extension Supply of Rubber to Metal Components; Immigration Enforcement's Checking and Advice Service; Extension of District line Wimbledon Branch Track Access Agreement; Fire Maintenance Contract Extension Variation Recommendation; and Thales Establishment Works - Bank Station Capacity Upgrade Signalling Variation.

## **7 Mayoral Directions to TfL**

- 7.1 The Greater London Authority Act 1999 (as amended), permits the Mayor to issue to TfL general directions as to the manner in which TfL is to exercise its functions or specific directions as to the exercise of its functions (or not to exercise a power

specified in the direction). Directions are also often made in relation to the implementation of matters in respect of which the Mayor delegates statutory powers to TfL.

- 7.2 The Mayor makes Mayoral Directions through Mayoral Decisions. Papers for Mayoral Directions set out the financial and other implications. If those implications change over time, that will be reported to the Greater London Authority (GLA).
- 7.3 All Mayoral Decisions are issued in writing, with the information that is not exempt from publication included on the [GLA's Decisions Database](#).
- 7.4 Mayoral Directions fall into three broad categories: those addressing technical issues relating to statutory powers; those related to commercial development activities; and those related to projects and programmes. Mayoral Directions relating to TfL are reported to the Board's Committees for discussion as soon as possible after they are received by TfL or published. Regular reports will list the relevant Directions for as long as they are applicable.
- 7.5 Annually the Audit and Assurance Committee considers the list as part of its consideration of the annual audit plan to ensure that appropriate audit resource is applied to assurance on TfL's work in implementing Mayoral Directions. This will also be kept under review at each quarterly meeting of that Committee.
- 7.6 A summary of current Mayoral Directions to TfL is maintained on the [How we are governed](#) page on our website, with links to the relevant Mayoral Decisions. That page will be updated as and when further Directions are made.
- 7.7 Mayoral Directions to TfL related to projects and programmes are reported to this Committee. No Mayoral Directions to TfL within the Committee's remit have been published since the last meeting.

**List of appendices to this report:**

None

**List of Background Papers:**

None

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## Programmes and Investment Committee



**Date:** 15 December 2021

**Item:** Investment Programme Report – Quarter 3, 2021/22

---

### **This paper will be considered in public**

#### **1 Summary**

- 1.1 The Investment Programme Report describes the progress and performance in Quarter 3, 2021/22 of a range of projects that will deliver world-class transport services to London.
- 1.2 A paper is included on Part 2 of the agenda which contains exempt supplementary information. The information is exempt by virtue of paragraph 3 of Schedule 12A of the Local Government Act 1972 in that it contains information relating to the business affairs of TfL. Any discussion of that exempt information must take place after the press and public have been excluded from this meeting.

#### **2 Recommendation**

- 2.1 **The Committee is asked to note the report and the exempt supplementary information on Part 2 of the agenda.**

#### **List of appendices to this report:**

Appendix 1: Investment Programme Report Quarter 3, 2021/22

Exempt supplemental information is contained in a paper on Part 2 of the agenda

#### **List of Background Papers:**

None

Contact Officers: Gareth Powell, Managing Director Surface Transport  
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Contact Officers: Andy Lord, Director London Underground and TfL Engineering  
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Contact Officers: Stuart Harvey, Director of Major Projects  
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# Investment programme report

22 August – 16 October 2021

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# Introduction

We assess the progress of some of our biggest and most important projects



# Purpose and scope

## Purpose

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.

Our investment programme is the suite of projects comprising renewals and enhancements to maintain the reliability of our network and support growth in London. Renewing and replacing our assets is our baseline to maintain current performance levels 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 supports London's growing population and economy, enhances the quality of life for Londoners and creates jobs and improves skills across the UK.

We continue to adapt to the evolving situation as London emerges from the restrictions imposed by the coronavirus pandemic.

## Scope

This report provides an update on a range of projects that will further enhance our world-class transport services. It covers Periods 6 and 7, which runs from 22 August to 16 October 2021.

For each key project or programme, the financial and milestone data represent the position at the end of Period 7 and includes commentary on key achievements, progress, and challenges. The report also contains updates on notable progress since the last report.

Financial records of spend to date, authority and estimated final cost (EFC) represent the duration of each separate project, programme or portfolio, except where stated. Where authority is significantly lower than EFC, it has been given for the current stage of works and further funding authority will be sought when appropriate.

Some financial information is commercially sensitive and is redacted.



Our projects cover all areas of London's transport network



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# Investment programme structure

Our investment programme is delivered by certain areas of our organisation, which 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 stations, accessibility, track renewals, power, cooling and energy, rolling stock, and signalling and control.

## 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 the TfL Growth Fund.

# Our performance

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



# Safety performance

During Quarter 2, we continued to keep our customers and workforce safe during the pandemic. Our priority was to provide reassurance that our services were safe. At the same time, we continue to make progress towards our longer-term safety, health and environmental objectives.

## Capital delivery

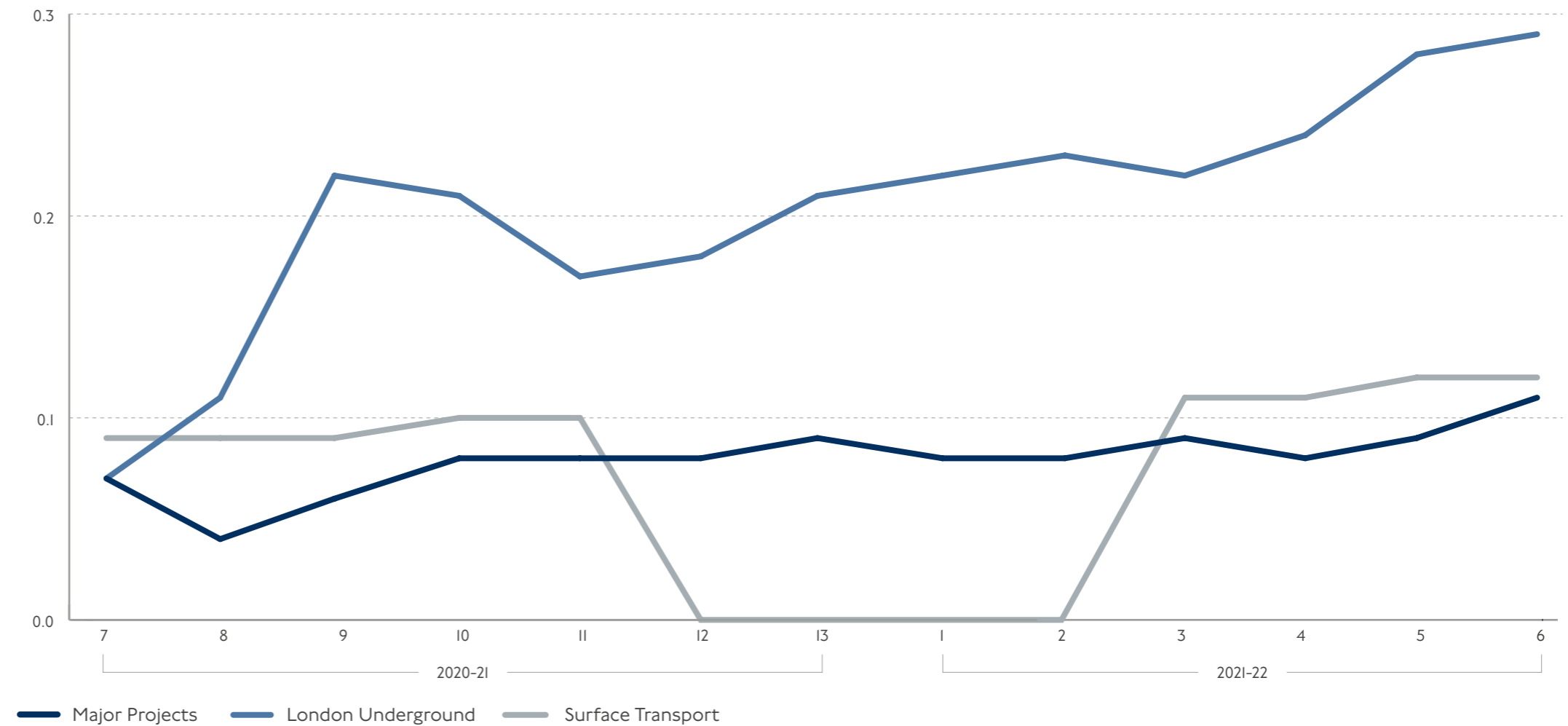
Data reported in this section comes from our Major projects directorate, the Surface transport project and programme delivery, and the London Underground renewals and enhancements. Data from other areas where construction and maintenance work is done is reported separately in our public transport workforce data.

## Quarterly performance

To enable data to be accurately analysed, 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.

In Quarter 2, there were seven accidents reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) in our Capital Delivery teams. Three of these were in London Underground, three in Major Projects and one in Surface Transport. The increase in RIDDOR reportable accidents resulted in the accident frequency rising within London Underground and Major Projects against their respective thresholds of 0.15 and 0.10. Within Surface Transport, the accident frequency rate remained below the threshold of 0.15.

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

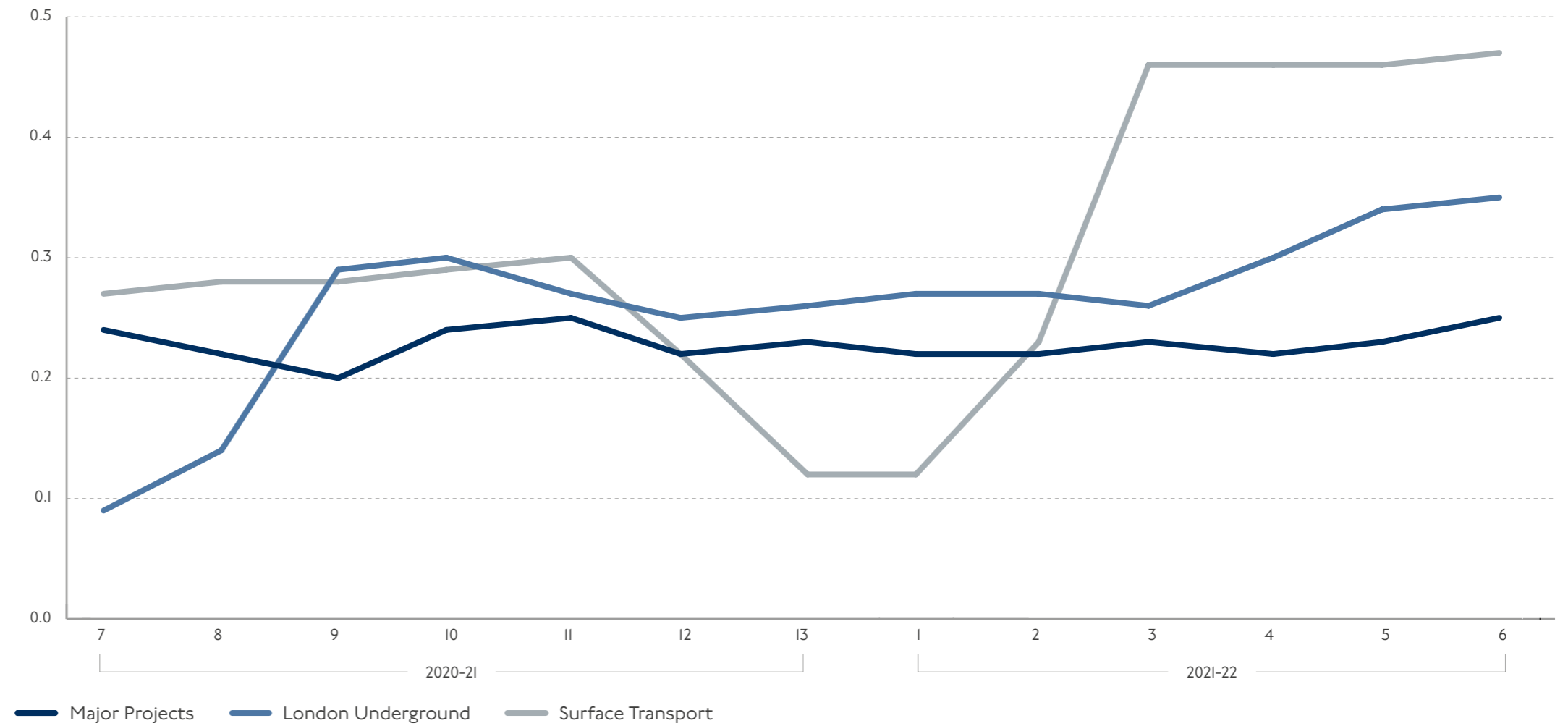


We are working to address the root causes and concerns arising from incidents during the quarter to prevent recurrence. A track operative injured their ankle while working at Embankment station. As a result, the team is working closely with the contractor to review the factors that affect workforce performance, including culture, chain of command and communications. After two RIDDOR reportable accidents at Barking Riverside, our Major Projects team has worked with the contractor to run a full site stand down, focused on safety behaviours, two-way communication and reinforcing the importance of conducting workplace risk assessments. As always, learning from incidents will be shared across capital teams to both prevent harm and drive performance improvements.

Lost time injuries are those that cause an employee to be absent for one or more shifts. There were nine lost time injuries in our Capital Delivery teams during Quarter 2, a slight increase on the previous quarter. As a result, there has been a rise in the lost time injury frequency rate in London Underground and Major Projects against a threshold of 0.20. No lost time injuries were recorded in Surface Transport during the quarter, but the rate remains high due to the number of injuries that occurred in the previous quarter.

Most of the lost time injuries were classified as minor, such as cuts and muscle strains. Where injuries were classified as RIDDOR reportable accidents, they have been reported to the Health & Safety Executive or Office of Rail and Road. All injuries have been investigated to understand root causes and put any possible mitigations in place to prevent them from happening again.

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



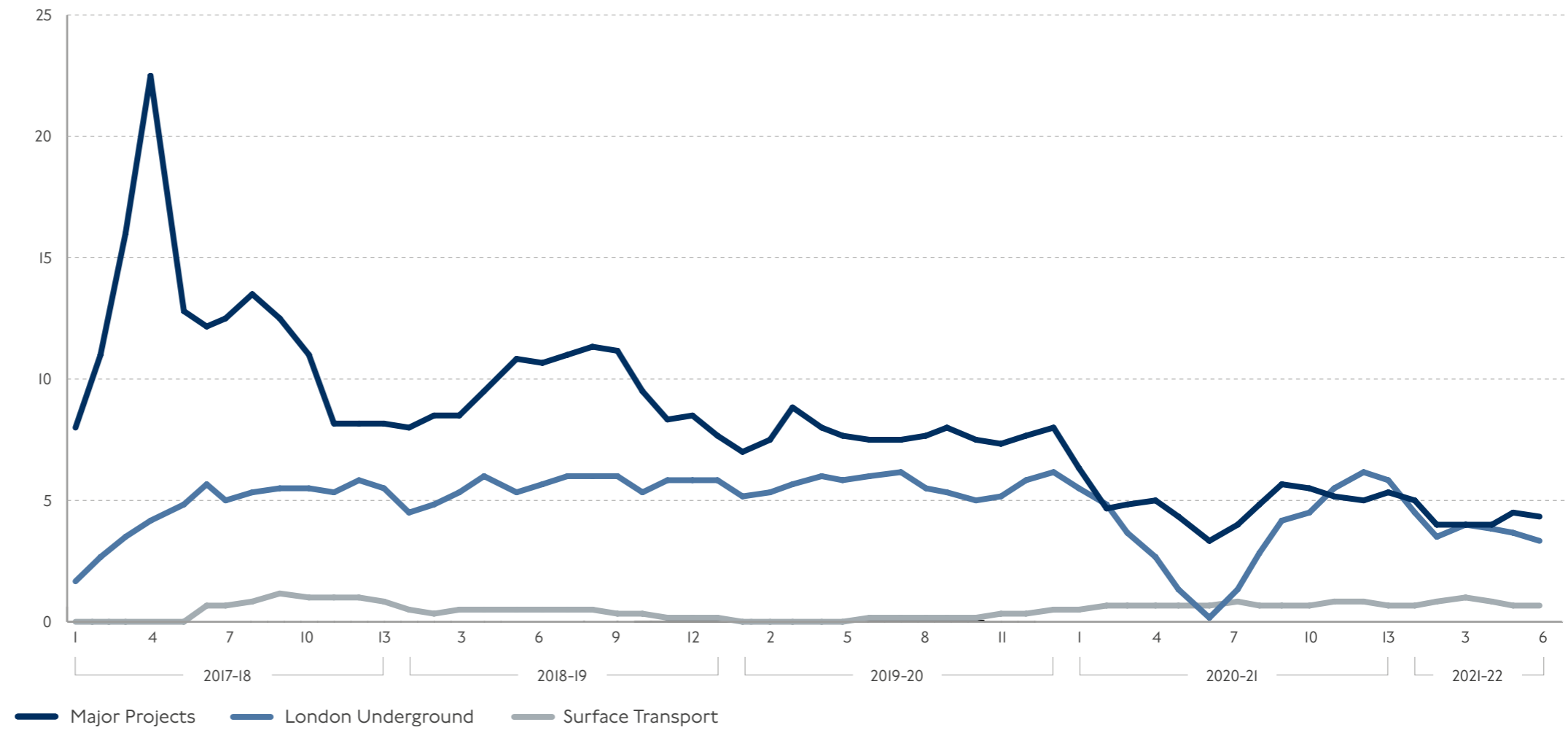


There were 26 injuries across our Capital Delivery teams during Quarter 2. While this is a small increase on the previous quarter, injuries across our Capital Delivery activities remain below pre-pandemic levels and continue the overall trend of long-term decline since 2017-18. This remains the case when hours worked are taken into context, which have seen a smaller decline over the same period.

The steady decline in injuries is positive and reflects the hard work that has gone in to improving safety, health and environment performance across our Capital Delivery programmes. However, data indicates that the number of injuries is beginning to stabilise. As such, it is more important than ever that we continue to investigate all incidents to understand their root causes and identify any improvements.

We are launching a data improvement programme across our Capital Delivery areas that aims to support better decision making and enable interventions. During the next quarter, our Major Projects team will use detailed analysis to inform future improvements and how our use of data aligns with our role as a construction client.

**Total capital delivery physical workforce injuries**  
(Six-monthly average)





# Schedule performance

We have achieved a number of significant milestones throughout the year

## Northern Line Extension

On 20 September, two new stations on the Northern Line Extension at Nine Elms and Battersea Power Station welcomed their first customers. The two step-free Zone 1 stations are set to dramatically improve the connectivity of these vibrant south London neighbourhoods and contribute to London's recovery from the pandemic.

## Piccadilly line upgrade

We have begun assembly of the new passenger trains.

## DLR rolling stock replacement programme

The first train in the new fleet has been assembled in advance of testing.

## Barking Riverside Extension

We have completed viaduct construction, including the works to enable rail systems to be installed.

## Four Lines Modernisation

The passenger carrying revenue service has been implemented between Monument and Sloane Square.

## London Underground

We have developed a decarbonisation strategy.

## London Underground asset performance

The Victoria Line train overhaul programme has been completed.

## London Underground asset renewals

We have completed our one-person operation camera work at 75 per cent of the planned platforms.

## Surface technology

We have completed the Intelligent Transport System Release 2.0.

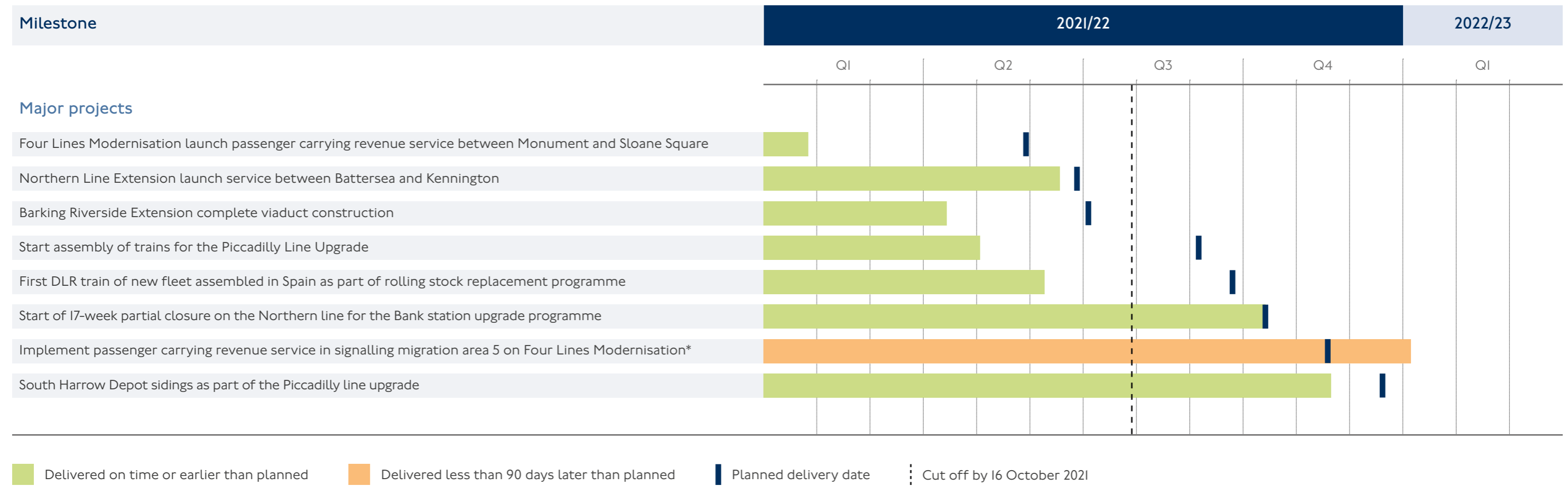
## Surface assets

Construction work on the A40 Westway began on site.

# Strategic milestone performance

We are forecast to deliver 86 per cent of our strategic milestones on time or early for the full year

The graphic shows our 2021/22 strategic milestones. The blue line shows when the milestone was due to be met, while the coloured block shows when it was achieved or is forecast to be achieved.



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\* Between Sloane Square and Fulham Broadway, Barons Court, Kensington (Olympia) and Paddington

## Strategic milestone performance 2021/22 (continued)



■ Delivered on time or earlier than planned    
 ■ Delivered less than 90 days later than planned    
 ■ Planned delivery date    
  P7 cut off 16 October 2021

\* Signed off by TfL Commissioner

**Strategic milestones that are forecast later than planned**

**Rotherhithe Tunnel**

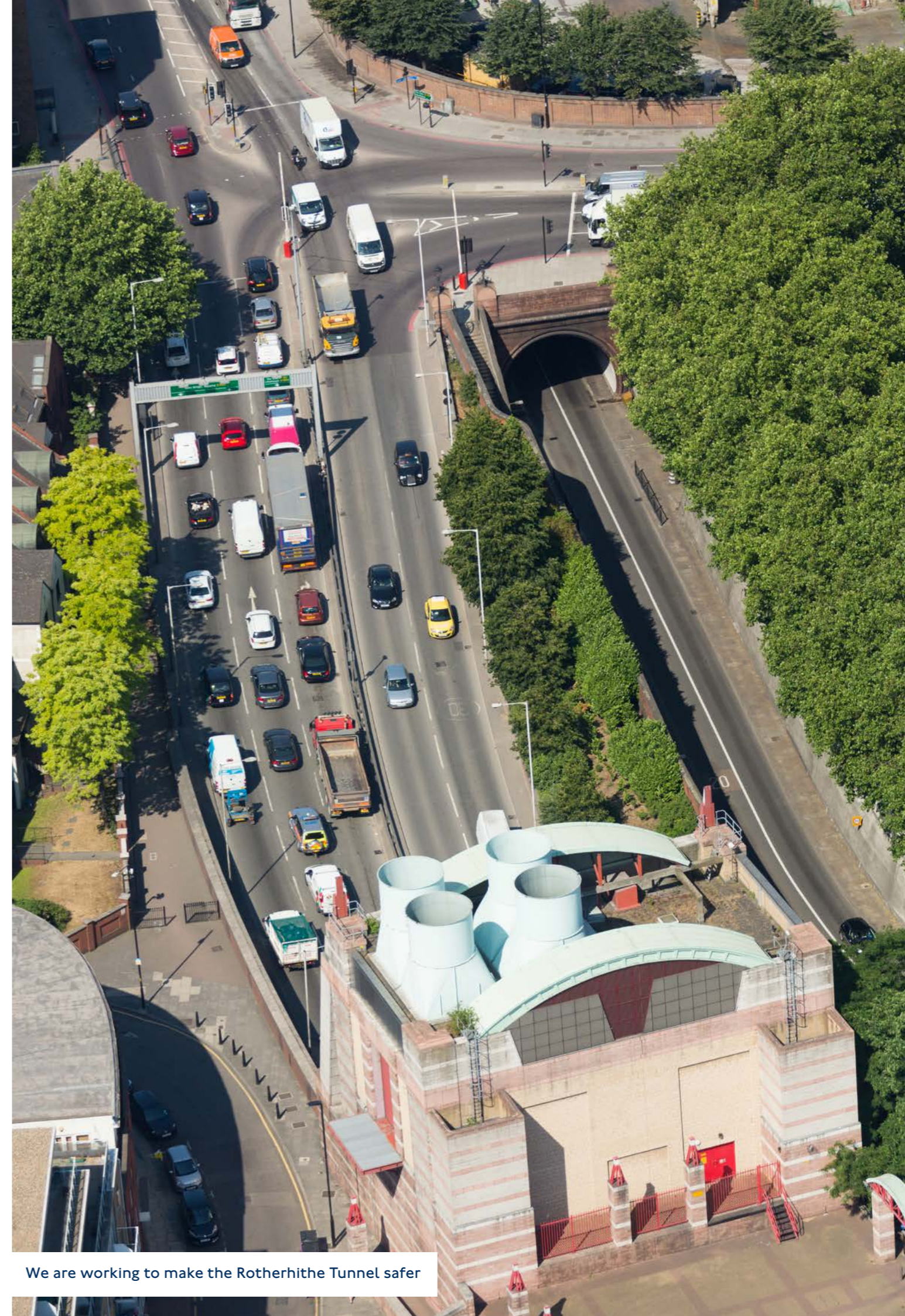
The milestone to make a recommendation for the award of the Design and Build Contract for the Rotherhithe Tunnel is running 153 days late. It was agreed in June with Surface directors that additional work should be undertaken to determine whether the refurbishment of Rotherhithe Tunnel could be deferred until after the Silvertown Tunnel opens. The outcomes are being reviewed with the options being presented in autumn.

**Four Lines Modernisation signal migration area 5**

This milestone is forecast to be 48 days later than planned, owing to ongoing software issues that are under review and to incorporate all functionality for the safety and reliability of the migration area.

**London Underground Central Line Improvement Programme**

The first train was expected to go into service in March 2022, but the current forecast shows a later delivery by 32 days. The programme has been delayed by a lack of resource and inability to recruit. The team is reviewing the plan to identify delivery dates based on the current available resources and validate the impact to delivery. Though there is a plan to try to recover some of this time, the current forecast shows the first train will be later than planned.



We are working to make the Rotherhithe Tunnel safer

# Major projects

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



Elizabeth line

# On-network stations improvement programme

Forecast completion	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority deficit £m
2022	92	1	94	94	0
Change since last Investment programme report					
No change	-	-	No change	No change	

The on-network station improvement programme involves upgrading surface stations on what will form the Elizabeth line route.

The programme comprises step-free access work at seven stations and refurbishment work across all 22 TfL-operated surface stations.

We have completed the Great Western step-free access schemes. Further to this, the completion certificate has now been issued to the contractor and the 12-month defect liability period has begun.

On the completed eastern step-free access works at Maryland, Manor Park and Seven Kings, some progress has been made on the review and closeout of documentation to achieve handover, with only telecoms paperwork left to review. There have been significant delays in handover on both the east and west step-free access schemes as a result of the pandemic.

The station refurbishment half of the programme, delivered in partnership with our operator MTR Elizabeth Line, continues. Alongside a number of smaller interventions, the team is currently focused on two major projects – completing the new station building at Burnham, which is due to be brought into use in late December, and the installation of new platform canopies at Ealing Broadway and Hayes & Harlington, due to be completed during the Christmas period.

\* All numbers are shown as net of income and third-party contributions. Figures are rounded to the nearest £m.



We are providing accessible stations across the Elizabeth line

# Elizabeth line

## Rolling stock

Forecast completion	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority surplus £m
2025	991	15	1,006	1,149	143
Change since last Investment programme report					
No change	1	(1)	No change	No change	

**Programme update**

**Class 345 trains**

Passenger services between Reading, Heathrow and Paddington continue to be operated by nine-car Class 345 trains.

There have been six nine-car Class 345 trains in passenger service between Shenfield and Liverpool Street since July 2021, supplementing seven-car Class 345 and eight-car 'legacy' Class 315 trains.

The transition of the Shenfield to Liverpool Street service to a full nine-car Class 345 operation, with up to 22 trains, began on 1 November 2021.

Up to 18 Class 345 trains, 12 trains per hour, have been operating timetabled trial running in the Elizabeth line central section since 13 July 2021 under the control of the new signalling system.

The upgrade of the train and signalling software for trial operations started on 15 October and was completed on 25 October.

**Challenges**

The current train control and signalling software has not delivered the predicted nine-car Class 345 reliability growth. Signalling system supplier Siemens completed the enhanced software update on schedule on 25 October, in time for the start of trial operations, which started on 20 November. Train manufacturer ALSTOM is on schedule to deliver the first of two reliability-focused train control software releases later in December, ready for installation on the fleet.



We are rolling out new trains ahead of Elizabeth line services



# Crossrail

Forecast completion	Spend to date £m	Cost to go £m	EFC £m	Programme and project authority (£b)
2023	*	*	*	18.4

**Programme update**

Crossrail is the biggest railway infrastructure project in Europe and one of the largest single investments undertaken in the UK. It will deliver 42km of new rail tunnels under London, 50km of new, permanent track and 10 new stations.

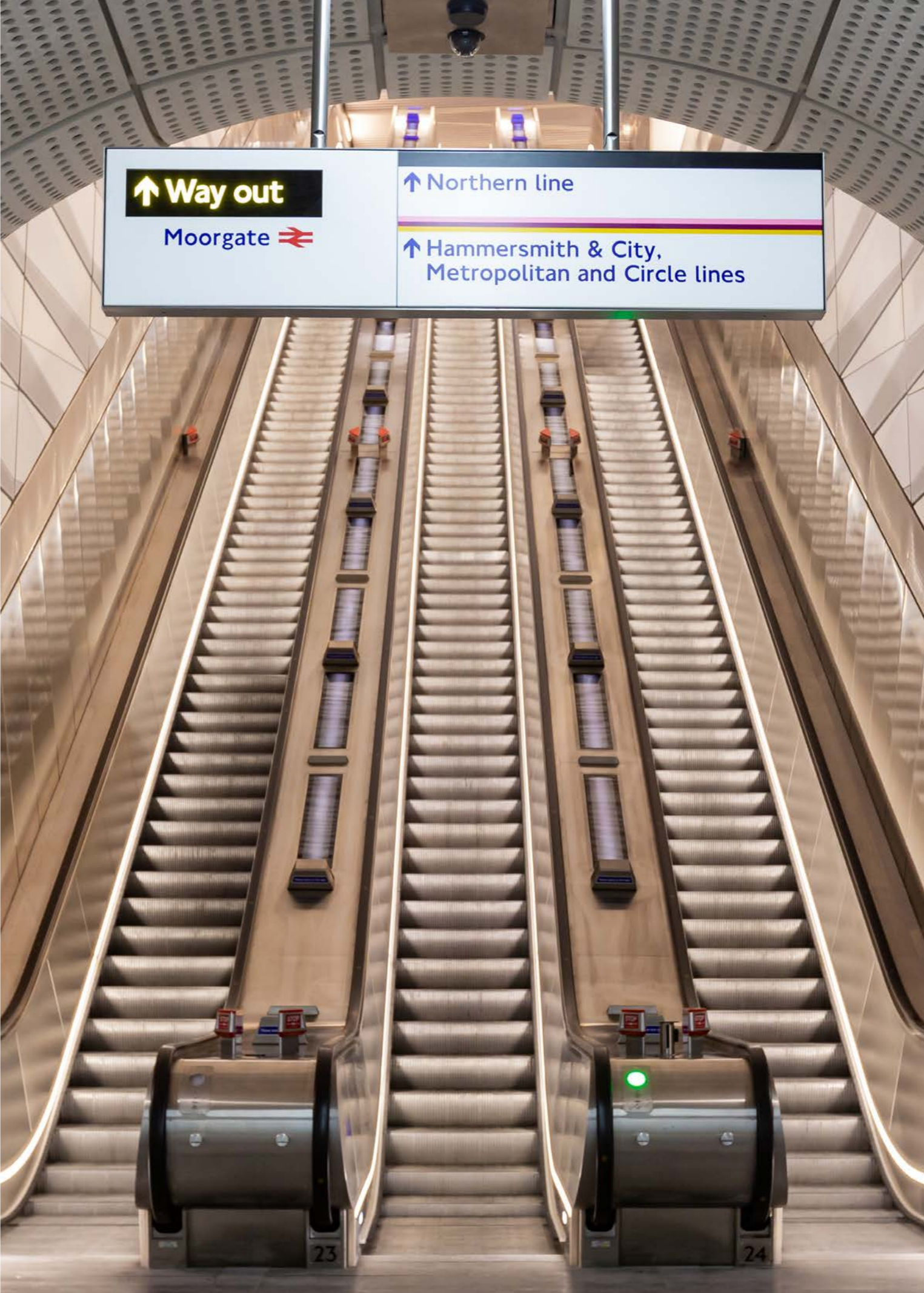
The project completed an 18-day blockade in July 2021 where trial running was suspended to enable work to proceed uninterrupted. The objective of the blockade was to reduce the number of intrusive activities in the tunnels and stations. A further closure took place in October 2021 to complete outstanding works in the tunnels and update the software configuration to ELRI00.

The final railway integration tests to the tunnel ventilation system, trains, software, signalling and power systems will be completed during the remaining trial running period. These can only be done at this stage now that the whole system railway is available. This testing has identified the final modifications needed to complete the railway and ensure reliability ahead of the Elizabeth line opening.

The next station to be handed over later in the year is Canary Wharf, where final safety system modifications are being carried out. Bond Street has met its requirements to support trial operations and Crossrail is continuing to work to get it ready for passenger service.

We have a countdown process to monitor progress ahead of Elizabeth line passenger services starting. The aim is to ensure that the configuration of the railway and the entry criteria for trial operations are defined, approved and achieved. It will also capture the collective readiness of infrastructure managers and operators.

\* Data has been redacted due to commercial sensitivity



We are developing 10 new stations as part of the Crossrail project

# Four Lines Modernisation

Forecast completion	Cost to date (Gross) £m	Cost to go (Gross) £m	EFC (Gross) £m	Programme and project authority £m	Authority deficit £m
2025	5,081	376	5,457	5,447	(10)
Change since last Investment programme report					
No change	20	(8)	12	No change	

### Financial commentary

Following the revised authority, which was granted by the Programmes and Investment Committee in July 2021, we have continued to further review the risks and opportunities for the remainder of the Four Lines Modernisation programme. Given the complexity of this programme and the extent of the review, we expect this to take some time, during which the estimated final costs will remain dynamic. We will update the Committee in spring 2022 following the review.

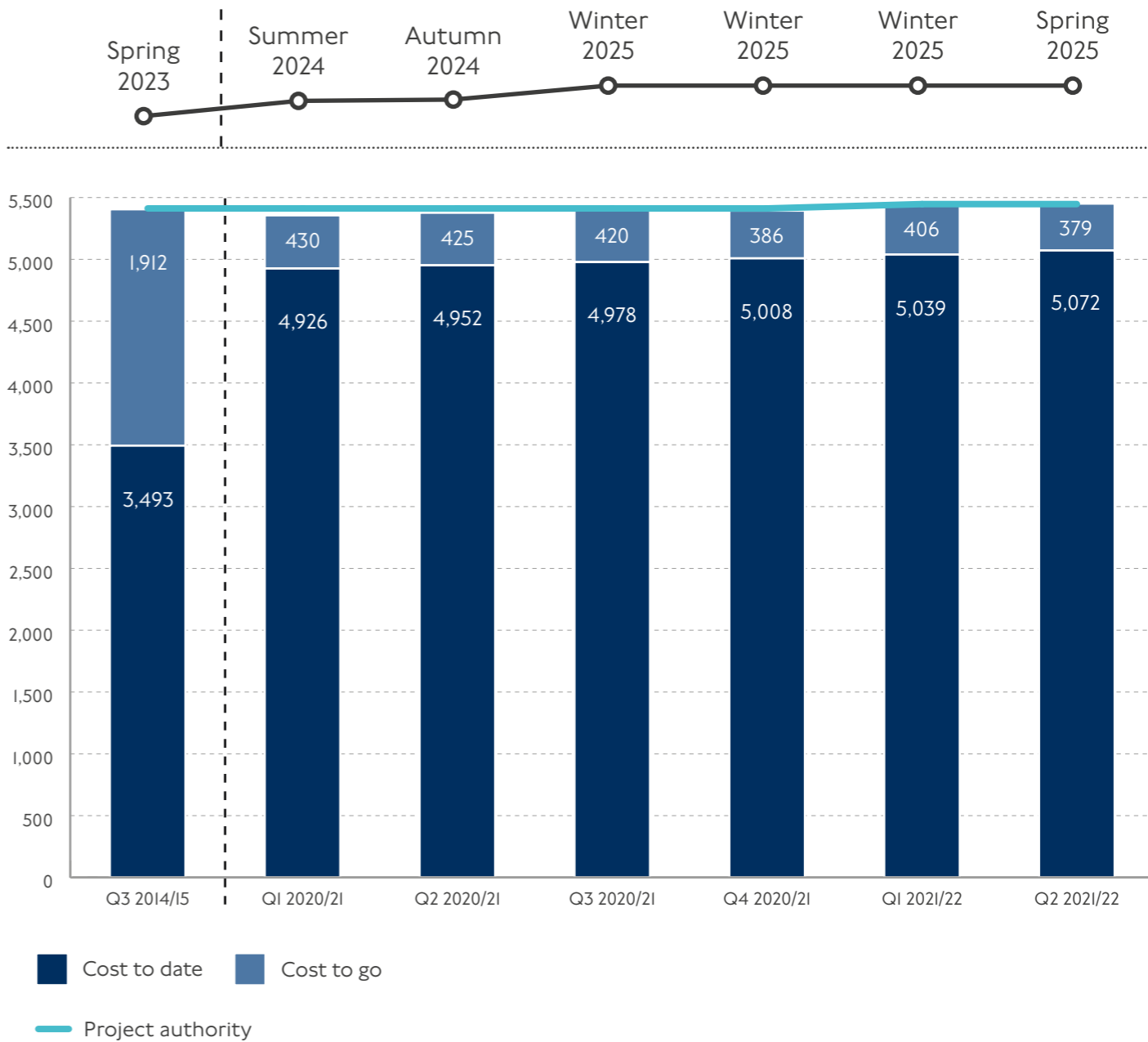
As part of the review, the software programme has been extensively analysed with our signalling contractor, Thales. This has focused on understanding of the risks and the granular metrics, which are essential to monitor the performance. This review has been fed into the latest programme to help ensure it is realistic and will be the catalyst to drive further collaboration and confidence in our plan.

### Performance over time

The programme is currently forecasting an EFC of £10m over the authority granted in July 2021. The EFC is a dynamic forecast based on the current understanding of the cost to go in relation to the remaining scope of work and the associated risks, which considers the entire programme and currently has signalling migration area I4 forecast for October 2024. The financial budget is a more robust near-term view of costs to go and will retain a higher degree of maturity, while not entirely without uncertainty in the estimates, owing to the volatility of software development. While a reduction in EFC cannot be guaranteed, we continue to review the programme cost forecasts, with a strong focus on identifying opportunities for savings and risk mitigations. We are still awaiting an acceptable schedule from the signalling supplier, Thales, which will support the assessment for producing a robust EFC.

Performance over time – estimated financial cost (£m)

Forecast end date





We are upgrading some of the oldest parts of the Tube network

### Programme update

We are transforming the Circle, District, Hammersmith & City and Metropolitan lines to reduce journey times and run a more frequent and reliable service. The next section of signalling, between Sloane Square, Paddington, Fulham Broadway and Barons Court, is due to go live in spring 2022. This phase, called signalling migration area 5, will involve upgrading the highly complex junction at Earl's Court and will mean the entire Circle line will have been upgraded to the new signalling system. This will be a significant milestone for the programme.

### New timetable

The programme achieved a major milestone on 12 September 2021 when the first timetable change enabled by the new signalling system was introduced. Journey times have been reduced by 10 per cent on the north side of the Circle line and added one extra train during the morning and evening peaks. The reliability of the timetable has since improved.

Further improvements were planned after the new signalling goes live, but the importance of keeping the network open during the Christmas period mean we have decided to go live in spring 2022. This decision was taken in order to incorporate all functionality for the safety and reliability of the migration area.

Further testing has been done on signalling migration area 6 and we have completed our first test weekend on signalling migration area 8 between 11 and 12 September, which is the most technically complex of the sites.

# DLR rolling stock and systems integration

Forecast completion	Cost to date (Gross) £m	Cost to go (Gross) £m	EFC (Gross) £m	Programme and Project Authority £m	Authority surplus £m
Spring 2026	127	461	588	603	15
<b>Change since last Investment programme report</b>					
No change	II	(II)	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

Our forecast end date and programme and project authority have remained consistent since December 2018. We have reduced our EFC to reflect procurement savings and taking a proactive stance with the remaining risk exposure as the rolling stock design approaches completion.

## Programme update

Our new DLR rolling stock programme will manufacture and supply 43 new trains – 33 to replace the expired B92 fleet and 10 to increase capacity. It will also include an expanded depot at Beckton to stable and service the new fleet, and signalling modifications to the Thales automatic train operation system to work with the new trains and functionality. There will also be a telecoms system modification to provide enhanced customer information and traction power capacity works.

## Rolling stock delivery

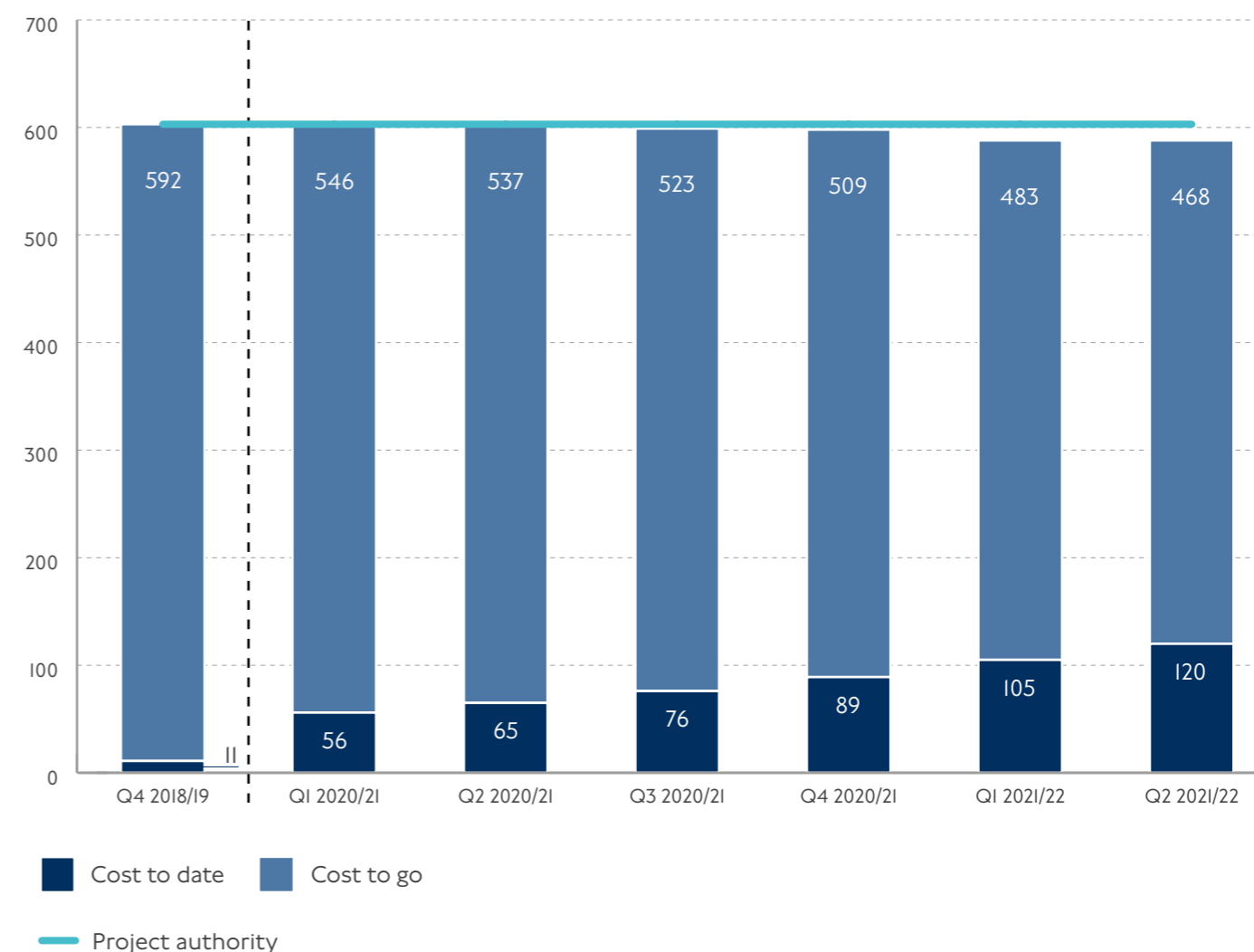
Manufacturing for our new rolling stock is under way, with the initial run of 20 car bodies for trains one to four now in production. The first train is now assembled and ready to begin static testing. This strategic milestone was achieved two months ahead of programme.

## Beckton Depot and network infrastructure

At Beckton, work on the northern sidings continues in preparation for the decommissioning of sidings in January 2022. The main site compound is now operational and work on the sub-station began in November 2021. Meanwhile, signalling software development for the new trains continues to progress on time with the first software releases due in March 2022.

Performance over time – estimated financial cost (£m)

Forecast end date





### Housing Infrastructure Funding

We have now finalised terms for the acquisition for the land at Beckton adjoining the current depot to accommodate a further 11 trains, in addition to the original order of 43 trains. This supports the development of 12,000 homes across 15 sites, comprising the Poplar site owned by us and 14 sites in third-party ownership, with the aim for all sites to provide a minimum of 35 per cent affordable housing.

# Piccadilly line upgrade

Forecast completion	Cost to date (Gross) £m	Cost to go (Gross) £m	EFC (Gross) £m	Programme and Project Authority £m	Authority surplus £m
Spring 2027	346	2,498	2,844	2,994	150
<b>Change since last Investment programme report</b>					
No change	24	(22)	1	No change	

## Financial commentary

Our EFC has increased by £1m since the last report. Risks and opportunities are actively managed each period, which results in dynamic changes to the EFC. The main driver for the increased risk this quarter comes from a review of legacy signalling works as scope has matured. Although the EFC has increased slightly this quarter, the overall EFC has reduced by £450m since initial programme and project authority was granted in 2018.

## Performance over time

The 2020/21 emergency budget decision was to defer the start of third party spend where possible by six months. Due to this, and the delay to start infrastructure enabling works, the new trains are now expected to begin entering revenue service from spring 2025, as mentioned in the public announcement in March 2021.

We have reduced our overall EFC due to active risk management and an ongoing focus on value and efficiency generating an authority surplus. To reflect the progressive reductions in EFC for the stage one programme since authority in May 2018, a decision was endorsed by the Programmes and Investment Committee to reduce the programme's authority by £300m.

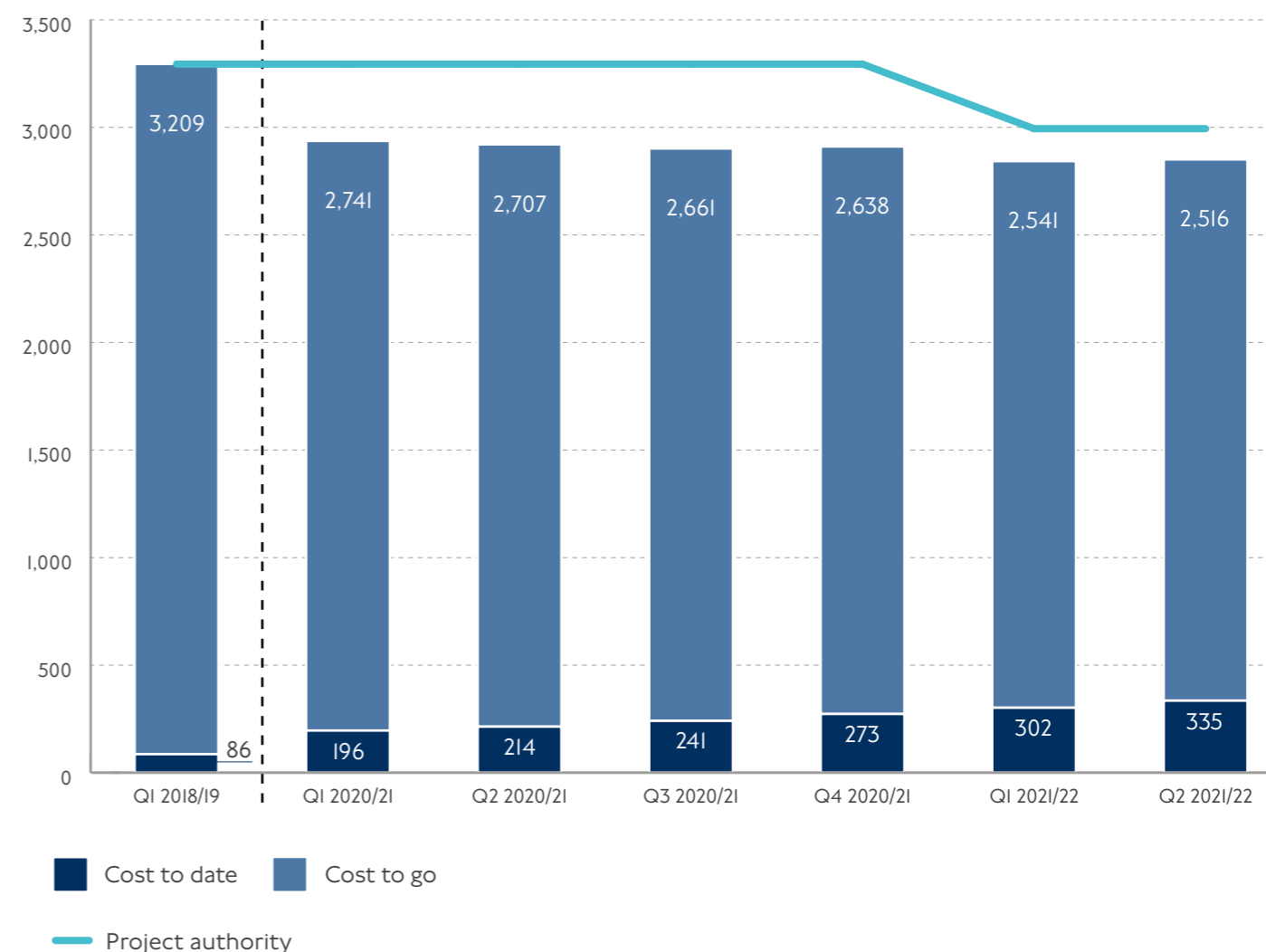
## Programme update

Phase one of our upgrade of the Piccadilly line will introduce 94 new generation, high-capacity, walk-through, air-conditioned trains and supporting infrastructure.

These will replace some of the oldest trains on our transport network and enable a peak frequency increase from 24 to 27 trains per hour.

## Performance over time – estimated financial cost (£m)

### Forecast end date



### Power and signalling

The supplier for the HV Power Immunisation Design and Build contract has been selected and the contract award is expected this quarter. Some existing elements of signalling equipment are not compatible with the new trains. This contract will deliver the power infrastructure to support the frequency conversion of this equipment, which will ensure it is compatible.

The HV Power Design and Build Tender returns, which will deliver the sub-station upgrades, were received and are being evaluated. We remain on target to achieve the key milestone of issuing the tender recommendation report in Quarter 4.

We completed the installation and commissioning of new signals at Earl's Court. Due to the trains being longer and having different sightlines to the existing stock, we need to install new signalling assets at all Piccadilly line sites.

At the end of Quarter 3, the depots and sidings team will award a contract for the Northfields Depot Works Stage One, which will include underground utility mapping, surveys and ground investigation works.



The Piccadilly line has some of the oldest trains on the network

# Northern Line Extension

Forecast completion	Cost to date (Gross) £m	Cost to go (Gross) £m	EFC (Gross) £m	Programme and Project Authority £m	Authority surplus £m
Autumn 2021	1,088	19	1,107	1,260	153
<b>Change since last Investment programme report</b>					
No change	8	(7)	No change	No change	

## Financial commentary

The EFC has remained stable since last quarter and the variance on spend to date and cost to go reflects the costs spent since last quarter.

The revenue service on the Northern Line Extension launched on 20 September 2021, with the two new stations at Nine Elms and Battersea Power Station welcoming their first customers.

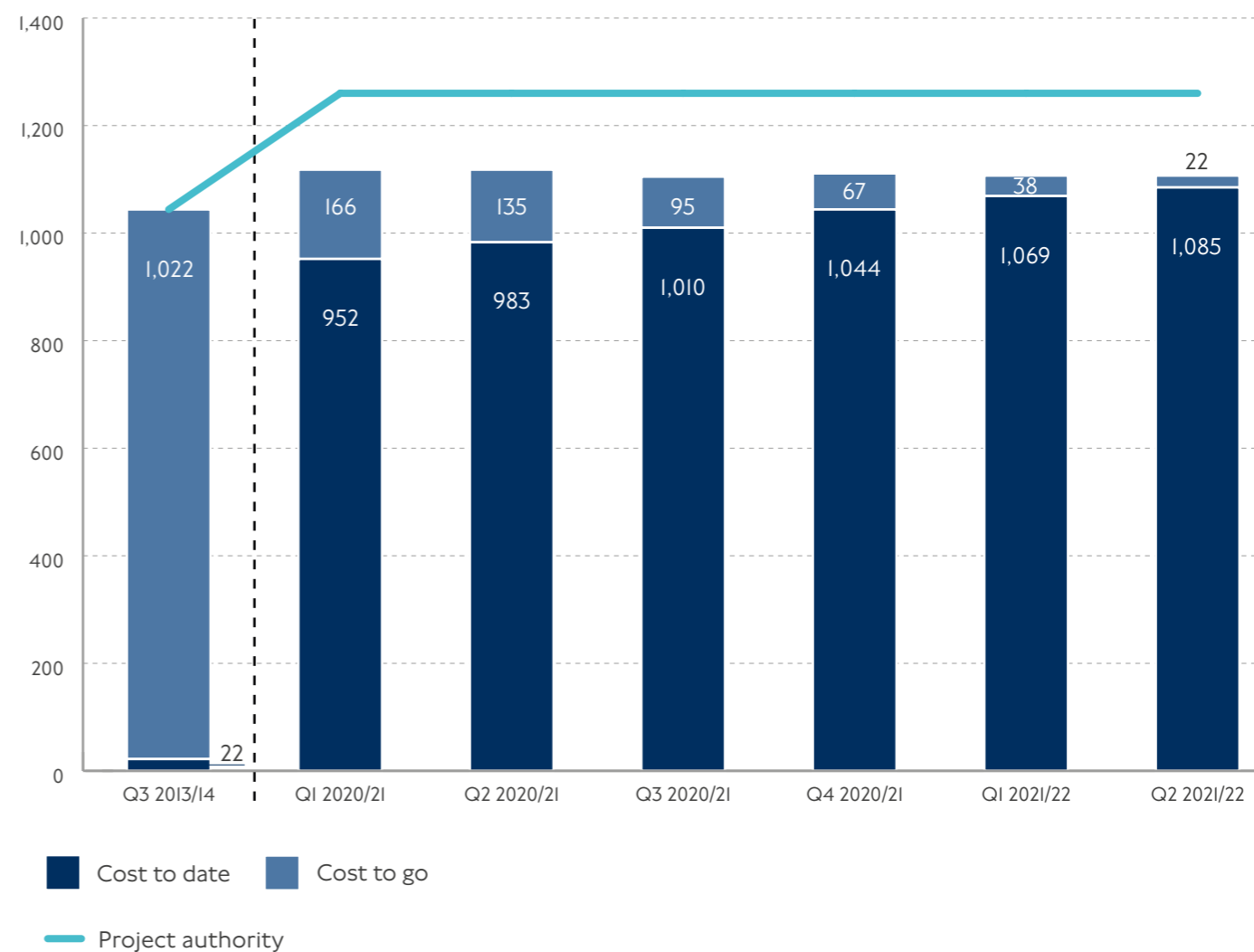
## Performance over time

The project came in £160m under budget, bringing its estimated final total cost to £1.1bn, despite the cost pressures brought about by the pandemic.

The Northern Line Extension team is now focused on closing out snagging items, completing assurance documentation, achieving commercial closure and working towards project closure in 2022.

## Performance over time – estimated financial cost (£m)

### Forecast end date





# Silvertown Tunnel

Forecast completion	Cost to date (Net) £m	Cost to go (Net) £m	EFC (Net) £m	Programme and project authority £m	Authority deficit £m
Winter 2025	62	113	175	173	(2)
<b>Change since last Investment programme report</b>					
No change	2	(1)	1	No change	

## Financial commentary

The EFC is currently £2m over the delegated Programme and Project Authority of £173m. The project team is continuing to look for opportunities to bring this back in line with authority.

## Performance over time

Our forecast end date has been stable since the Programme and Project Authority was approved in May 2019. Our Programme and Project Authority was granted net of third-party contributions. EFC increased over the last 18 months due to an increase in costs for implementation of road user charging infrastructure. It was then reduced in Quarter I 2021/22 after the road user charging infrastructure scope and budget was transferred to Surface Project and Programme Delivery to achieve synergies with our other Road User Charging schemes. Sponsorship will remain with the Major Projects Directorate to ensure project objectives are met.

## Programme update

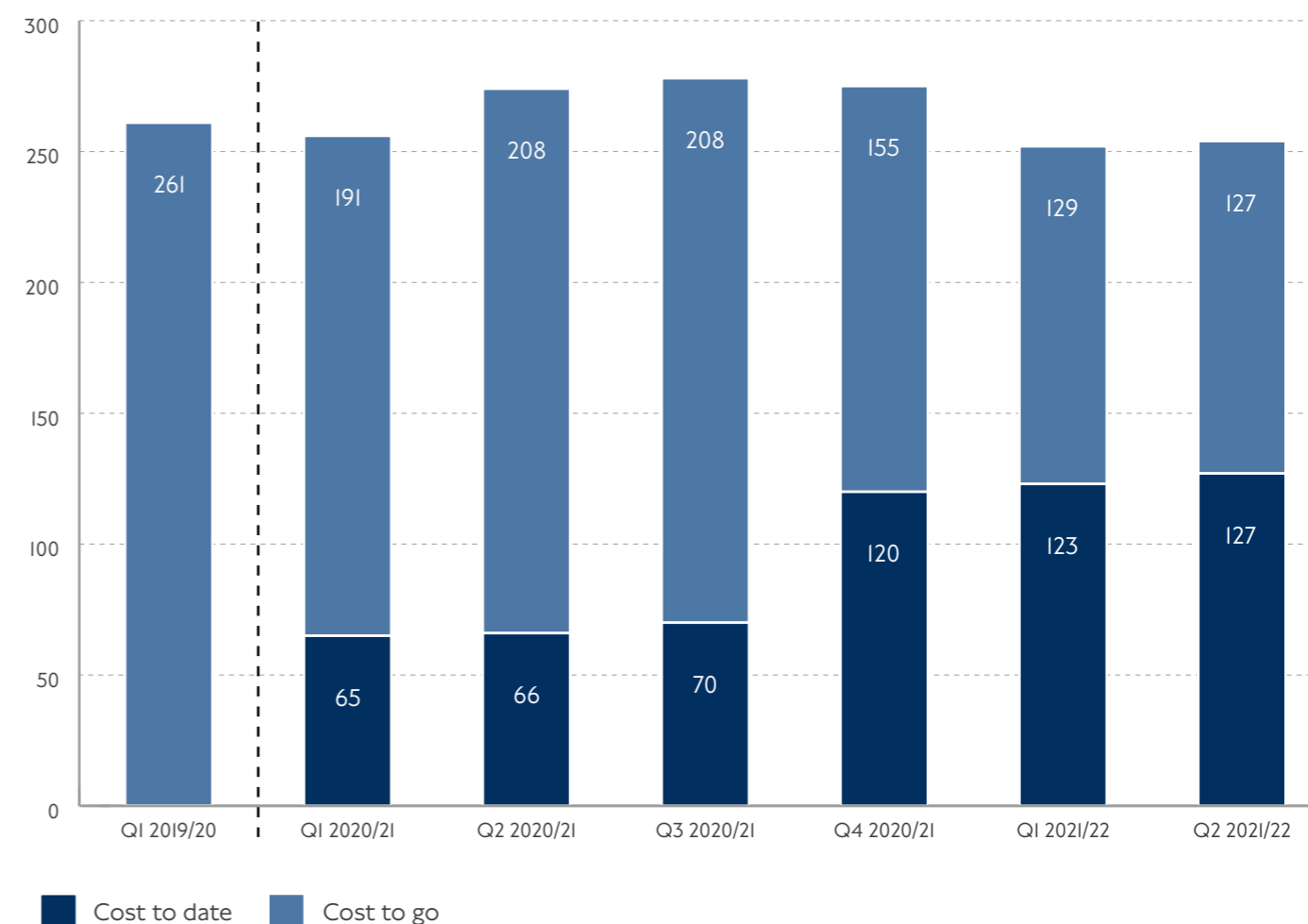
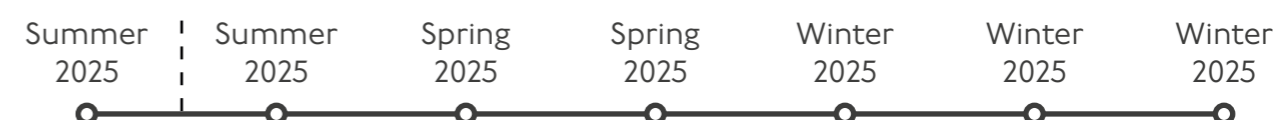
Site works continue at both Greenwich and Silvertown, including where the tunnel boring machine launch chamber will be constructed. Demolition of existing buildings and site clearance are under way.

The piling for the tunnel boring machine launch chamber is now complete, and excavation works in the first shaft have begun. Works continue on the river wall and on cabling and diversions to enable the power supply for the tunnel boring machine. The contract for the design and manufacture of the tunnel boring machine is progressing to plan, with delivery expected in spring 2022.

We have taken temporary possession of the required land from existing tenants to facilitate handover of 47 out of 63 sites to date to our contractor Riverlinx.

## Performance over time – estimated financial cost (£m)

### Forecast end date



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



Contracts are now in place for transport and traffic, socio-economic and environmental monitoring, which are part of our Development Consent Order obligations.

Environmental monitoring continues, with other monitoring planned to start later this year. This will support our wider air quality monitoring and is in addition to that required under the Development Consent Order obligations.

A Supplementary Agreement incorporating Riverlinx revised car park design on the Greenwich Peninsula has now been executed. This has been raised in previous papers as approval was delayed due to ongoing requests from developer Knight Dragon. Resolution of this issue involved changes to a London Underground Framework Agreement, which allows Knight Dragon to call down on GLA and TfL land for development, the changes put in place by Commercial Development extend the deadline by which Knight Dragon need to take up this option.

#### **Virtual exhibition**

A virtual public exhibition on the Silvertown Tunnel is being hosted on the Riverlinx website and includes new CGI images showing what the fully accessible walking and cycling bridge across the A102 Blackwall Tunnel approach will look like.

# Barking Riverside Extension

Forecast completion	Cost to date (Gross) £m	Cost to go (Gross) £m	EFC (Gross) £m	Programme and project authority £m	Authority deficit £m
Autumn 2022	300	31	331	329	(2)
<b>Change since last Investment programme report</b>					
No change	II	(II)	No change	No change	

## Financial commentary

The EFC is unchanged from last forecast and still exceeds Programme and Project Authority granted by the Programmes and Investment Committee in December 2020 by £2m. The current authority was based on the minimum EFC of a range at that time and all risks and opportunities to delivering within this are being fully explored before seeking any further uplift.

## Performance over time

Our forecast end date has been delayed since Programme and Project Authority was increased in December 2018, following the discovery of uncharted utilities and the Safe Stop as a result of the pandemic causing a replanning of rail systems works and requirement to secure revised Network Rail possessions.

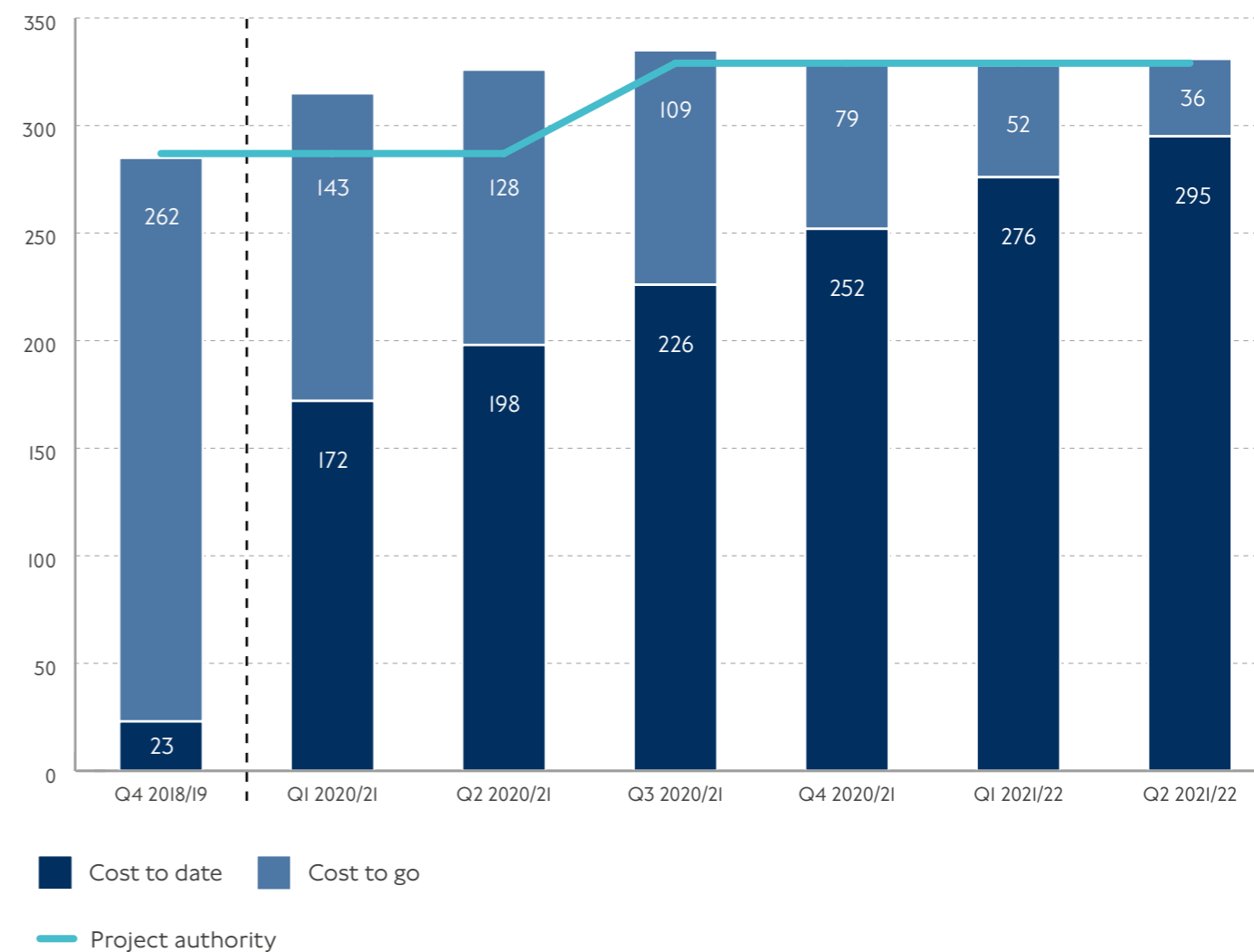
## Programme update

Delivery of the physical works is well advanced with the installation of track on the viaduct completed as planned in October 2021. The focus is now on installing the remaining rail systems on the viaduct ahead of the final signalling stage commissioning planned for April 2022. At the station, the installation, testing and commissioning of systems continues ahead of completing the quality assurance activities that ramp up towards the end of this year.

Our most likely date to enter into service remains autumn 2022.

## Performance over time – estimated financial cost (£m)

### Forecast end date





### Viaduct rail systems

In October, we completed the installation of the track running along the viaduct from the existing Network Rail lines to the new Barking Riverside station. The rail systems team's attention now turns to the installation of telecoms, signalling and overhead line equipment and preparations for the final signalling stage commissioning that is planned for a series of weekends in March and April 2022.

### Station installation

The installation, testing and commissioning of mechanical and electrical equipment at the station has continued and there is an increasing focus on producing and reviewing assurance documentation. Plans for delivering the public realm areas around the station that interface with the Barking Riverside development are being finalised to ensure they are ready for when the station opens.

# Bank station capacity upgrade

Forecast completion	Cost to date (Gross) £m	Cost to go (Gross) £m	EFC (Gross) £m	Programme and project authority £m	Authority deficit £m
Autumn 2022	601	101	702	701	(1)
Change since last Investment programme report					
No change	9	(8)	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

Our forecast end date has remained consistent since January 2016. The EFC has increased since authority award in Quarter 4 2015/16 due to site works being disrupted by the impact of the terrorist attack at London Bridge, additional scope following the discovery of asbestos and the impact of the pandemic. Costs have remained relatively static over the last 18 months, with minor increases driven by the impact of the pandemic and the Safe Stop of all construction works, as well as the discovery of asbestos and the resultant programme delays.

## Programme update

The works and preparation activities leading to the start of the 17-week closure of the Bank branch of the Northern line from Kennington to Moorgate are progressing to

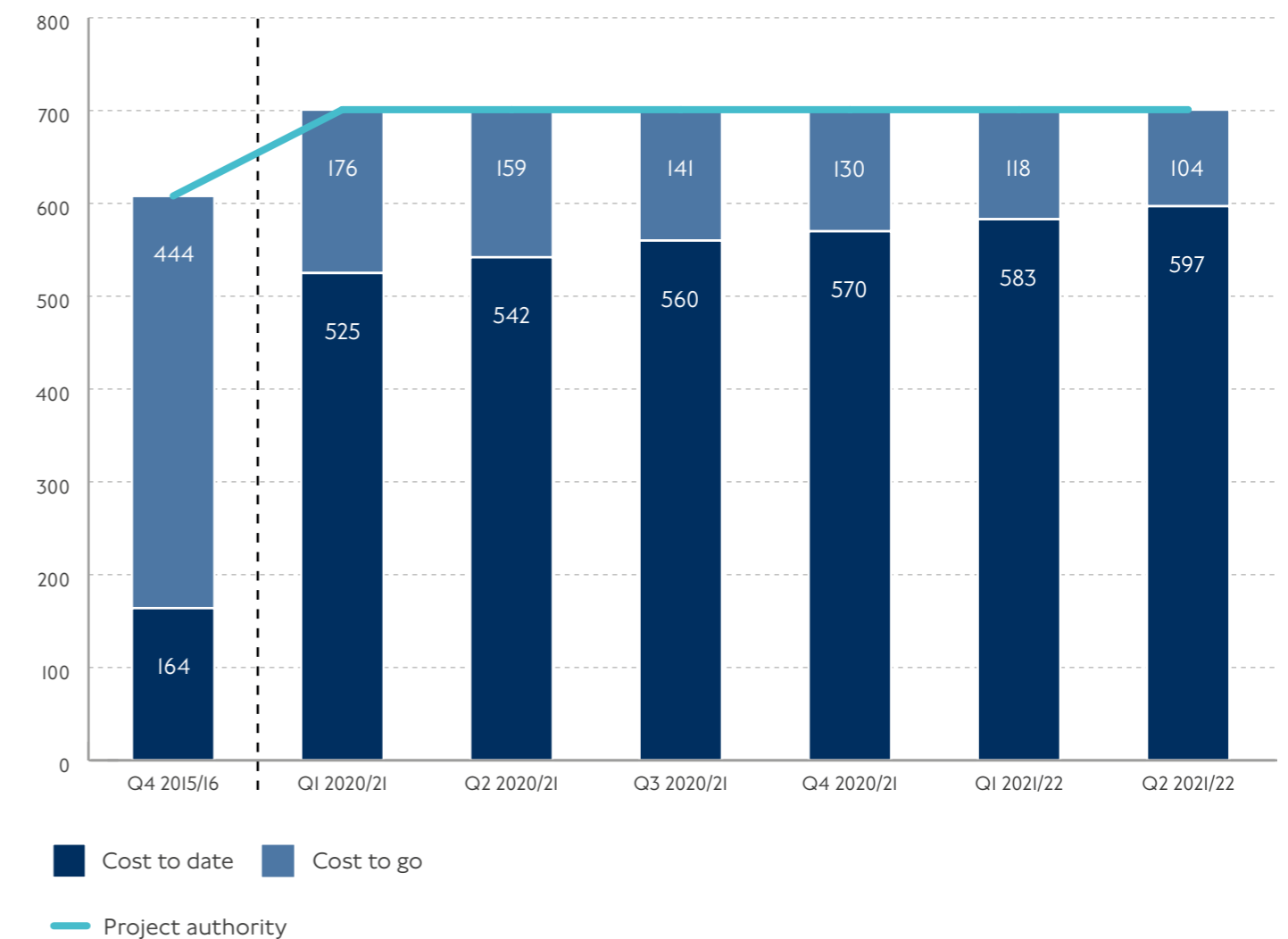
plan. The construction works have moved into the finishing phase in all public facing areas of the station. Installation of the 12 new escalators, moving walkways, lifts and preparation for integration testing of all the new electrical and mechanical systems asset are under way.

During the closure, due to start on 15 January, we will enhance services on the Charing Cross branch and deploy a new bus route between Oval and the city. Additional staff will be deployed to help customers, working with Network Rail and other train operators on alternative travel options. We have also launched a communications campaign to give customers journey planning tools and advice.

The closure will enable our contractors and us to complete the works needed to connect the new tunnel to the existing railway, fit out the station, install new track sections, complete the new tunnel work and the integrate the new systems installed in readiness for operations in 2022.

## Performance over time – estimated financial cost (£m)

### Forecast end date



# Elephant & Castle

Forecast completion	Cost to date (Gross) £m	Cost to go (Gross) £m	EFC (Gross) £m	Programme and project authority £m	Authority deficit £m
Spring 2030	*	*	*	*	*
Change since last Investment programme report					
No change	0	0	No change	No change	

## Financial commentary

The EFC has remained stable since the last report and spend is in line with current forecasts. Authority for tunnelling works and station box construction will be requested at this Programmes and Investment Committee meeting.

## Developer negotiations

Our negotiations with the developer continue, with a few issues outstanding. The latest target date for concluding the fundamental components of the Development Agreement is late autumn 2021. Programmes and Investment Committee approval will be sought by Chair's Action for authority to enter into the Development Agreement.

## Funding

Funding discussions with third parties, including the GLA and London Borough of Southwark, were successful, which means we have secured the funding for the first stage of works, including the station box, connecting tunnels and early works. A successful submission was made to the October Programme and Investment Committee to request full authority for the first stage of the works.

The contract in respect of the early works has been let. Station fit-out remains unfunded but we will seek to secure funding at a later date.

Current technical activity includes preparing the early works during the Bank closures, plus more detailed analysis of the requirements for the fit-out.

\* Data has been redacted due to commercial sensitivity



We are preparing for the next stage of works at Elephant & Castle

# High Speed 2

Forecast completion	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority deficit £m
2028	18	44	62	28	(34)
Change since last Investment programme report					
No change	-	-	No change	6	

**Financial commentary**

Programme and Project Authority is £34m lower than EFC as it is granted on an annual basis for the following year’s spend. The £6m increase in authority is an adjustment in the quarter and was approved at both the Surface Investment Programmes Director Review and the Financial Commitment Oversight Group on 27 and 30 September respectively.

**Programme update**

**Construction progress**

HS2 Ltd’s early construction activity continues across London. We have been working together to mitigate the impacts of construction traffic on our roads, including on Hampstead Road, where changes have been made to the site entrance after concerns by residents. We are working closely with HS2 Ltd as it constructs the new Euston London Underground facilities, including a new substation, ventilation building and tunnels connecting the station. Early enabling work has also started for the relocated taxi rank.

At Old Oak Common, we continue to ensure that the Elizabeth line depot is protected during the large-scale piling and excavation works, which are under way for the new high-speed station box.

**Station designs**

We are supporting HS2 Ltd on its designs for Euston and Old Oak Common stations. A high-level design for Euston was shared at the end of September and we have carried out a comprehensive review. We are actively and collaboratively working with HS2 Ltd, Network Rail, London Borough of Camden and Lendlease, under the umbrella of The Euston Partnership, to ensure it meets our requirements and any undertakings and agreements accommodate our requirements.



Early construction work for High Speed 2 continues across London

# Railway systems enhancements

Forecast completion	Cost to date (Gross) £m	Cost to go (Gross) £m	EFC (Gross) £m	Programme and project authority £m	Authority surplus £m
2027	141	53	194	245	51
Change since last Investment programme report					
No change	1	1	2	No change	

## Financial commentary

The EFC increased by £2m since the last report. This is because of increases in scope following delays to the Northern line speed uplift, Kennington works and Jubilee line rolling stock upgrades. EFC is £51m lower than the Programme and Project Authority, due to additional historical Jubilee and Northern line trains being taken out of scope, and scope transfer for high voltage works at Stockwell station to another project.

## Programme update

### Kennington works

The Kennington speed uplift works have been completed. These have improved the track condition in advance of the start of the Northern Line Extension revenue service.

### Northern line power upgrade

The Northern line power supply enhancement work continues and is planned for completion in early 2022. This will provide system capacity for reliable services during planned or unplanned outages.

## Rolling stock

Work continues on modifications to Jubilee line rolling stock to enable an increase in entry and exit speeds at Neasden Depot, with dynamic train testing completed as planned. This ensures compatibility with adjacent Metropolitan line services following the introduction of new signalling on the Circle, District, Hammersmith & City and Metropolitan lines, which will support the future timetable uplift.

## Challenges

The planning for the delivery of the Northern line speed uplift and Northern Line Extension signalling defect software continues and we are targeting commissioning on the railway in mid-2022.

The Jubilee line enhanced signalling and fleet improvements, to enable a peak service of 32 trains per hour, remain paused until 2023/24 because of our ongoing funding discussions with the Department for Transport (DfT) and reduced passenger demand on the Jubilee line due to the coronavirus pandemic.



We need suitable infrastructure to support our rail systems



# London Underground

Our programmes ensure safety and reliability, while also increasing the capacity of the network. This portfolio is made up of stations, accessibility, track renewals, power, cooling and energy, rolling stock, and signalling and control

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# Enhancements

## Station developments

Forecast completion	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority deficit £m
2023	406	132	538	532	(6)
Change since last Investment programme report					
No change	6	(6)	No change	No change	

### Programme update

The enhancements programme covers a range of improvement projects, mainly on stations and depots. We improve stations primarily through enhancing accessibility, relieving congestion and carrying out large scale capacity upgrades.

### Paddington

We continue to work with Great Western Developments on a co-funded scheme to improve customer access to the Bakerloo line. This includes an enlarged ticket hall and step-free access to the platforms. Civil and structural works continue. Tunnelling works to create a new cross-passage are due to start later in the year and continue into early 2022. The project is due for completion in late summer 2022.

### Knightsbridge

Fit-out works within the new station entrance are ongoing. The fitout of the lower passageway connecting the lift shafts has also begun. Work has started to install three lifts, which will make the station step-free in 2022. Structural defects were found in work delivered by the developer,

Carraig Investments, which have delayed opening the Brompton Road entrance. The developer and its technical teams are exploring solutions and mitigation measures to ensure the entrance is opened as early as possible.

### Waterloo

As part of a wider redevelopment that will see Elizabeth House demolished, we are evaluating a project to provide step-free access to the Northern line platforms. Discussions with the developer are ongoing and are expected to conclude later in 2022. Step-free access would be subject to affordability.

### Tottenham Hale

We are creating an interchange with Network Rail, as well increasing capacity and creating a new ticket hall. The final works are progressing well and focused on completing the remaining station fitout scope and starting final testing and commissioning of the integrated systems. The newly constructed assets will be brought into use in late 2021.



Our stations are a gateway to London for our customers



We must ensure people can travel safely through our stations

#### King's Cross St Pancras

We are engaged in detailed negotiations over a developer-funded scheme to upgrade the station entrances on the south side of Euston Road as part of a wider redevelopment of the area. This project would improve the urban realm and provide additional step-free access. Negotiations are expected to conclude early in 2022 with project delivery timescales still to be confirmed.

#### South Kensington

With our joint venture partner Native Land, we are disappointed that the Royal Borough of Kensington and Chelsea did not grant permission for our plans to restore and enhance the station and surrounding streets. We will now review our options.

#### Colindale

Working with our key stakeholder, the London Borough of Barnet, we aim to relocate the ticket hall, increase capacity and provide step-free access. The detailed design phase was completed in July. We are finalising an optimised delivery schedule, making best use of working in engineering and traffic hours, weekend track possessions and a station closure. The decision on starting construction is expected by the end of 2021.

#### Stratford

A new south-western station entrance is forecast to open in 2023. It is a collaborative venture with London Legacy Development Corporation and the London Borough of Newham who are funding the capital works. Concept design is under way and scheduled to be completed by March 2022.

#### West Ham

We are working with developer Berkeley Homes on a new ticket hall from the Twelve Trees Park housing development. The developer's enabling works are ongoing, with piling activity set to begin later in 2021. We aim to start on the new station entrance in 2022.

#### Leyton

We continue to work closely with our key stakeholder, the London Borough of Waltham Forest, to create a new ticket hall, increase capacity and provide step-free access. This is at early development stage and will be subject to a commercial agreement with the borough in early 2022.

#### Walthamstow

The Walthamstow Central project will address existing capacity limits and supports the London Borough of Waltham Forest in its wider regeneration plans. The project plans to deliver step-free access and improved customer facilities. Current activity is focused on developing funding options and safeguarding the planned scheme.

#### Ladbroke Grove

We continue to work closely with our key stakeholder, the Royal Borough of Kensington & Chelsea to evaluate the merits of a scheme to provide increased capacity and step-free access at Ladbroke Grove. A feasibility study, funded by the borough, started this summer and has identified various options, which are being appraised. Dialogue continues on funding opportunities from the borough and exploration of other third-party contributions.

## Enhancements

# Depot construction

### Programme update

#### Acton train modification unit

This project supports the ongoing London Underground fleet renewals programme, including the heavy overhauls and modernisation on the Central line trains. The delivery of the new train modification unit at Acton was completed in July 2021, with the first train moving into the facility in August. Two track roads are now available for full project use, with the remaining three expected to be available in late 2021.

### Acton warehouse

Funding for the first phase of works for a new warehouse has been approved and contract award is expected in November. A detailed design phase will follow in tandem for the replacement storage facility. The future decision around transition into the construction of a new storage facility is expected in early 2022. This project will also complement the strategy for the future use of the Acton Depot and the relocation of business activity from Lillie Bridge Depot and Ruislip redevelopments.



Our depots are essential for maintaining our Tube assets

## Enhancements

# Energy and cooling

### Programme update

#### Substation ventilation

As part of the enabling works for the Four Lines Modernisation programme, we are upgrading the cooling capacity within key substations. Critical improvements to the final seven substations are currently ongoing. Earl's Court and Shepherd's Bush have achieved practicable completion of the main installation and final commissioning is imminent. Onsite works are progressing at Acton and design is nearing completion for Embankment.

In the next quarter, Acton will be commissioned and handed over, with works starting at Embankment and recommencing at Victoria. Notting Hill Gate should also be nearing practical completion.

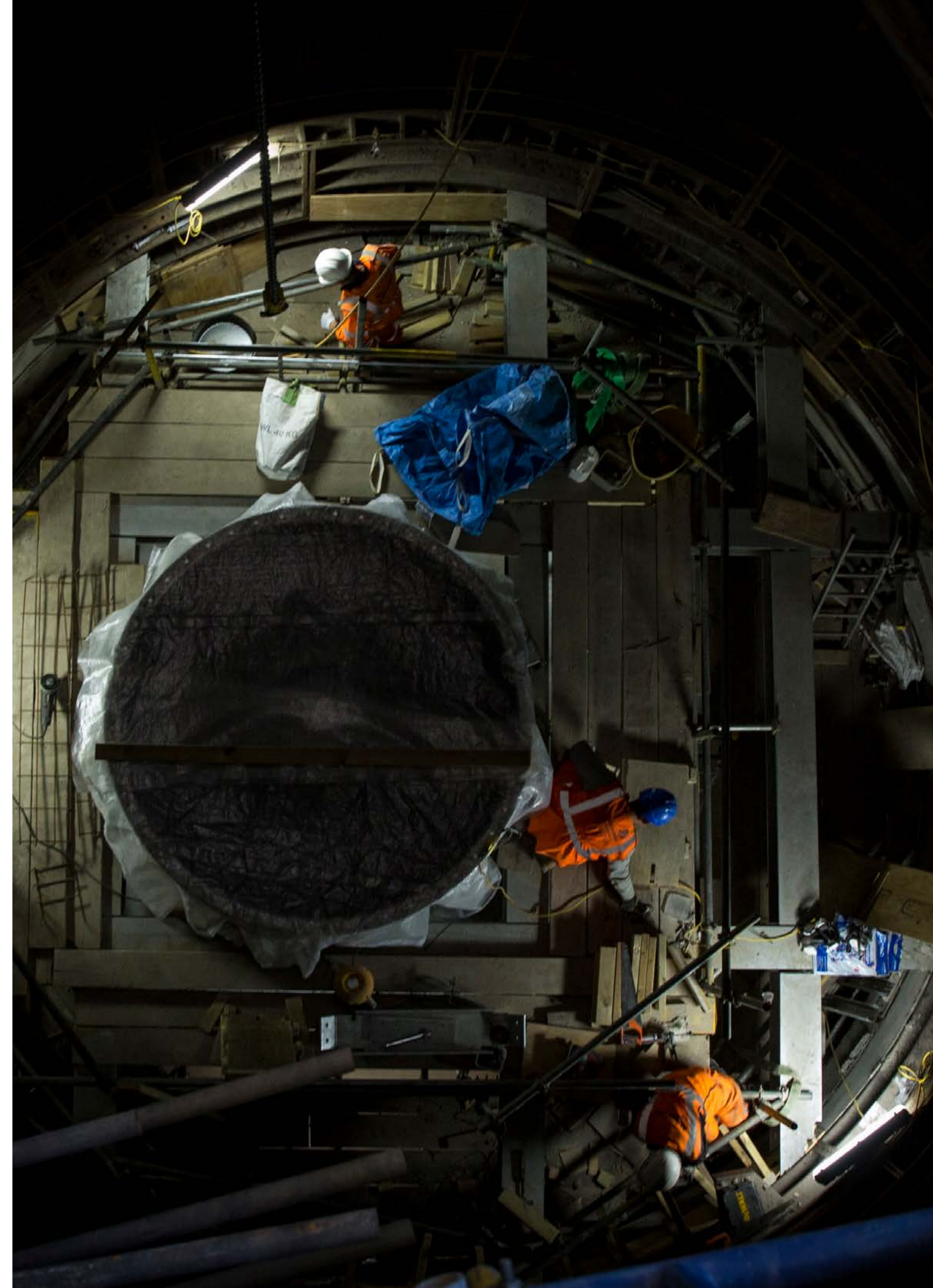
#### Waste heat and solar private wire

These are environmental projects that form part of our wider energy and carbon strategy. These are early-stage projects.

The waste heat project builds on our success with the London Borough of Islington in the Bunhill development. It aims to offer the market an opportunity to use currently uncaptured thermal energy from ventilated air on the Tube networks to power heating and hot water in buildings, with potential to serve more than 15,000 households.

Solar private wire will enable us to directly receive zero-carbon electricity from local solar assets, reducing our carbon emissions. The project is focused on direct connection to new-build solar photovoltaic generation. Based on a typical solar generation profile, the opportunity represents up to 64 megawatts of renewable generation, equivalent to five per cent of our annual energy load.

Works are progressing on both projects to establish the route to market and develop the contract strategy, specification documents and the production of a financial and carbon model.



Our energy projects will support environmental improvements

# Accessibility

## Step-free access

Forecast completion	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority surplus £m
2023	103	17	120	120	0
Change since last Investment programme report					
No change	1	(1)	No change	No change	

### Programme update

We are committed to improving accessibility across the Tube network and, as well as third-party funded work, we have 15 stations in our accessibility programme.

Since 2018, we have provided step-free access at Newbury Park, Buckhurst Hill, South Woodford, Mill Hill East, Cockfosters, Amersham, Debden, Ickenham, Wimbledon Park and, most recently, Osterley, which became the 89th step-free station on 6 October. Main works and lift installations continue at Harrow-on-the-Hill and Sudbury Hill, with both due to be made step-free by the end of 2021.

We are making steady progress across the accessibility programme, with Sudbury Hill due to be made step-free imminently. Work at Harrow-on-the Hill is now entering the final stages.

Discussions have restarted with our supply chain on the paused step-free

improvements at Burnt Oak, Hanger Lane and Northolt. We will have a two-stage approach to provide greater assurance on the deliverability of the projects. In collaboration with the supply chain, the first phase will focus on completing the detailed design and progressing value engineering opportunities, in addition to refining construction logistics, methodologies, planning and sequencing, ensuring a robust and deliverable schedule and cost estimate are in place. This initial phase will conclude in early 2022 ahead of the future decision on moving into full construction delivery.

On 2 November, we launched a public consultation on our future step-free access priorities and improvements. The consultation, which runs until 10 February 2022, will help us identify where we should prioritise future investment to bring the most far-reaching and beneficial impacts and help even more people use public transport independently.



Our accessibility work helps keep our services open to all

## Enhancements

# Lifts and escalators

Forecast completion	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority surplus £m
2023	466	125	591	885	294
Change since last Investment programme report					
No change	4	(4)	No change	No change	

### Programme update

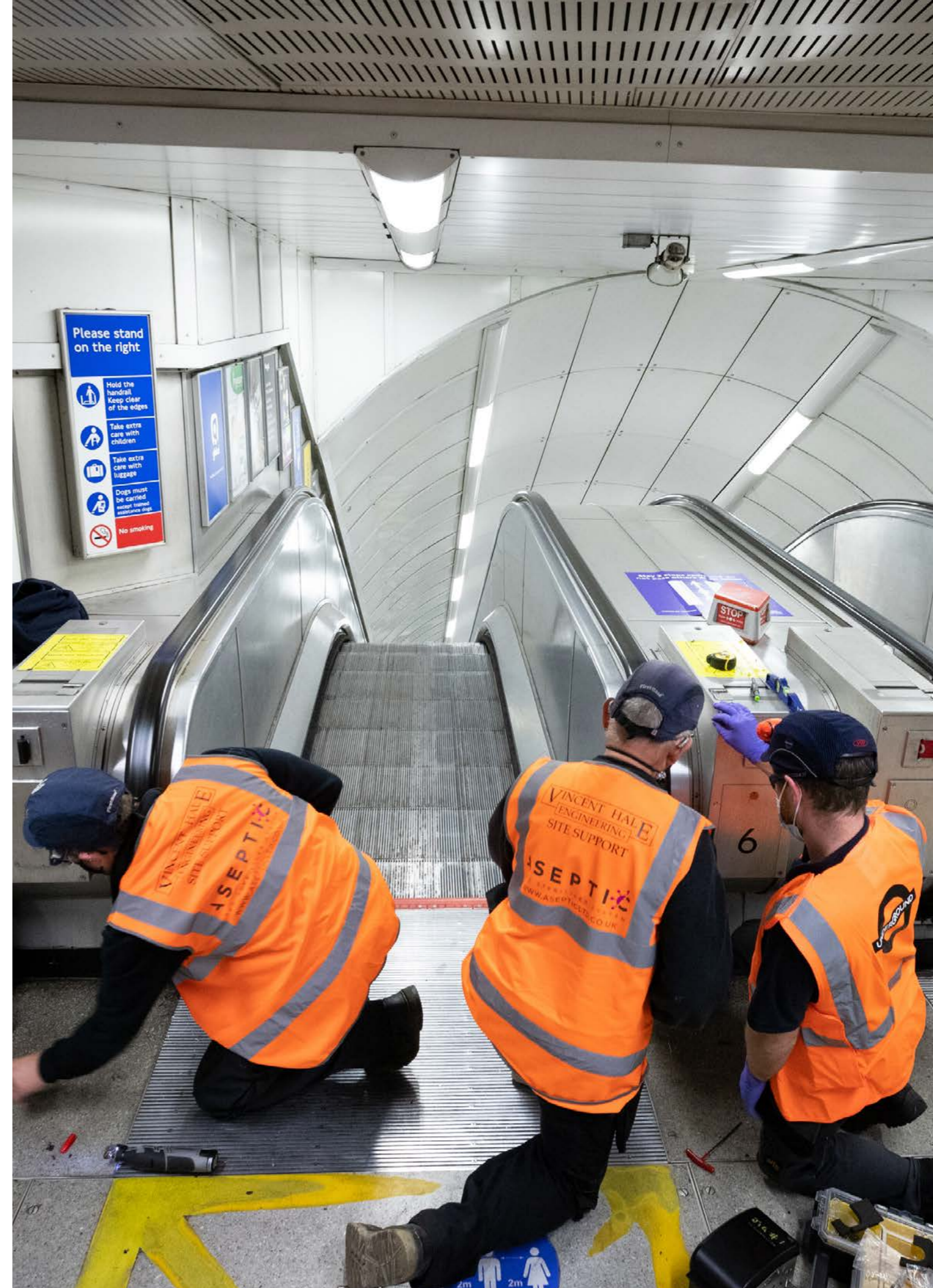
There are 447 escalators, 259 lifts and four passenger conveyors on the London Underground network, which are essential to ensuring customers have safe, reliable and quick access to our services. These numbers will grow by 25 per cent by 2026 as a result of major station projects, the accessibility programme and the Elizabeth line. 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. This rate will need to increase as the number of assets grows. The interventions carried out are informed by the condition and performance of each asset.

Replacing an escalator or lift is a complex process. It must be fully dismantled and worked on in a very constrained space, while daily operations in the station continue. When we replace assets, we also try to standardise them where possible to reduce ongoing maintenance costs.

### South Kensington

Works continue to replace five life-expired escalators at the station. This means Piccadilly line trains are not stopping at the station until spring 2022. However, the Circle and District line platforms remain open. The civils construction phase is now complete, with delivery and installation of the new escalators having begun on 7 November.



Our lifts and escalators need ongoing refurbishment and renewal



### Marylebone

We have completed the installation of a third escalator, which will boost capacity and resilience at the station. We have started to replace one of the remaining two life-expired existing escalators. All works are due to complete in 2023.

### Oxford Circus

Refurbishment work to improve the condition and reliability of the escalators began in May 2021 and the third escalator was completed and returned to service in October.

### Borough and Tottenham Hale

Works to replace the obsolete lift at Tottenham Hale station are progressing well and are expected to be complete in January 2022. Works to replace the poorly performing lifts at Borough station will continue into 2022. They will coincide with the temporary Bank branch Northern line closure to minimise disruption.



# Track renewals

Forecast completion	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority surplus £m
2023	124	278	402	402	-
Change since last Investment programme report					
No change	19	(19)	No change	No change	

## Programme update

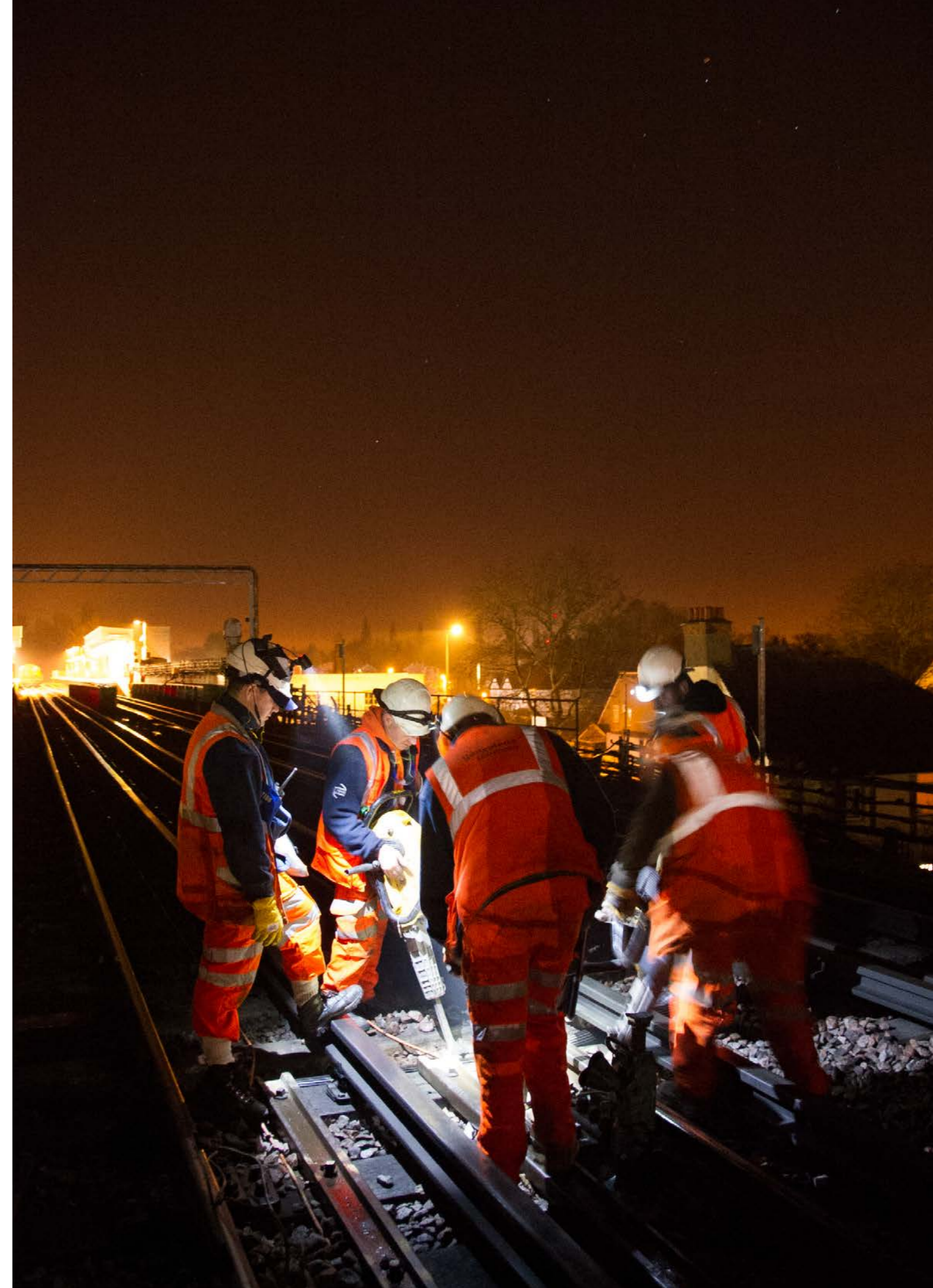
Our track assets are an essential component of a safe and reliable railway. Track is continually degrading and needs rolling maintenance and renewals to maintain it. Each section of track may have a residual life of between 40-60 years, meaning we must renew two to three per cent of our track every year,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

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

This quarter, we successfully delivered four planned weekend closures on the District, Central, Northern and Piccadilly lines, as well as extensive works during engineering hours. We delivered more than 1.1km of renewed track, which meant we achieved our mid-year target of 3.4km of new track installed in the financial year.

As usual, work was spread across the entire network, addressing the areas of track in greatest need of renewal to support safe operation. We renewed more than 600 metres of ballasted track, as well as 500 metres of concreted track in the deep Tube.

The programme remains on course to deliver the year-end target of installing 8km of new track across the network.



We must maintain our track to ensure safety and reliability

# Rolling stock

Forecast completion	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority deficit £m
2027	245	804	1,049	703	(346)
Change since last Investment programme report					
No change	4	(4)	No change	No change	

## Programme update

We have more than 600 Tube trains operating across 11 lines, with the oldest trains entering service in the 1970s. We must ensure all trains remain safe and operational, which requires certain interventions. Some of these are maintenance activities and others are needed due to changes in regulations, arising safety issues, poor reliability and performance, unacceptable costs or system obsolescence.

To better predict interventions, we have a 25-year fleet cost model, which feeds into our long-term capital plan. The model has various scenarios that map out when each fleet may get replaced and the likely interventions required to enable them to reach this date.

We are purchasing a new fleet for the Piccadilly line. There are no other confirmed fleet replacements.

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

## Accessibility

Our programme of works on the Bakerloo and Central line fleets is critical to improving accessibility. Both projects are progressing with detailed design validation through the installation and testing of prototype systems. A Bakerloo line train is currently at Acton maintenance shed, having the first wheelchair bays and new grab poles installed. We are progressing designs and prototype installation for the passenger information system.



We monitor the condition of our trains to ensure their safe running



For the Central Line Improvement Programme, a train is currently at Ruislip maintenance shed, with all electrical systems installed, as well as wheelchair bays and trial fitments of new door entry tread plates and vinyl floors. We expect to meet our target of a successful dynamic test of the Central line saloon design by end of the year. A Waterloo & City line train has also been fitted out with wheelchair bay components and returned to service, with documentation under way.

#### Reliability

We are including critical reliability improvements in our Central Line Improvement Programme works, by converting them from the now obsolete direct current (DC) power traction to the much more reliable alternating current (AC) traction equipment. The AC traction prototype installation on the first train is complete, and we have made a back-to-back comparison on the London Underground network and have completed extensive offsite eight-car high-speed testing at the Rail Innovation & Development Centre in Old Dalby. We expect to meet our target of a dynamic train test by the year end.

As part of the Jubilee line reliability improvement programme, the feasibility study on reducing the risk of structural fatigue cracking in the carriage underframe has completed, with capital investment authority to proceed into concept design and delivery expected in Quarter 3.

#### Safety

We are working to improve customer safety on the Central and Bakerloo line fleets. The first Bakerloo train, with new LED lighting, was returned to service in Quarter 1. Our target of 10 trains by the end of the financial year is at risk due to trade union discussions, which prevented the project from starting onsite during the summer. These discussions have been resolved and a limited team of four installers have been permitted on site to deliver the installation on to the trains at a reduced rate while additional facilities are procured to enable full production in January 2022.

On the Central line, we have completed the installation and unit testing for all electrical systems, which includes passenger information system, CCTV, data transmission system, saloon design and LED installed and undergone static train testing and maintenance activities. We expect to meet our target of a successful dynamic test of the Central line saloon design by the end of the year.

We have restarted a programme of works to improve the train operator's cab security. In Quarter 3, we will instruct a security and behavioural assessment and revise the installation plan prioritising the Waterloo & City line to complete works started pre-March 2020.

### Engineering vehicles

The mechanised renewal vehicle will change the way we replace track by mechanising concrete track renewal in the deep Tube. Made up of three wagons, the vehicle has been fitted with track renewal equipment, handrails and steps. It is ready for testing and familiarisation at Ruislip Depot. Once it is approved, we will trial the vehicle during engineering hours.

We are purchasing a new fleet of engineering wagons from the world's largest rolling stock manufacturer in China. The first four prototype wagons arrived in the UK in late 2020. With final engineering works now complete, dynamic testing is due to start. A fifth wagon is expected to arrive in January 2022. Once dynamic testing has passed, they will undergo infrastructure testing on the Underground network. The remaining 66 wagons will then enter production in China before being shipped to the UK in early 2023.

We purchased two rail-mounted cranes and eight tilting wagons from Kirow in Germany. The cranes have successfully completed dynamic brake testing on our test track. Consent to operate will first be granted in open sections and then in sub-surface tunnel environments. The cranes and tilting wagons enable us to transport wide track panels directly from the manufacturer's site to the track renewal location, giving time and quality benefits.

### Track recording vehicle

Tender evaluation of the track geometry measuring equipment is under way with contract award scheduled for mid/early 2022. This project will mount this equipment to two sets of host wagons, which will be hauled by battery locomotives across the Tube network, replacing the single, life-expired track recording vehicle currently in operation.

### Ruislip Depot

The first of three areas identified for track layout changes in Ruislip Depot to improve track condition is due to begin this quarter. Work on the remaining areas for increased stabling capacity will start next year.

### Battery locomotive fleet replacement

We are exploring options, supported by a completed early market engagement exercise, to replace the existing battery locomotive fleet. These locomotives haul most of our engineering vehicles around the Underground network, but the fleet is close to its extended service life. Part of this project will ensure the existing fleet remains operational while the replacement fleet is being progressed.



We maintain and service a wide range of vehicles

# Fleet heavy overhauls

Forecast completion	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority surplus £m
2027	85	156	241	398	157
Change since last Investment programme report					
No change	6	(6)	No change	No change	

**Programme update**

To ensure train fleets remain safe and reliable, we conduct a planned programme of essential heavy maintenance. This ensures all core systems meet the required standards. This programme delivers large scale heavy maintenance activities on our existing fleet of passenger rolling stock and rail adhesion trains.

The work requires each train to be removed from service for several days or weeks and includes overhauling suspension, wheelsets, motors and brake systems, overhauling auxiliary equipment.

**Victoria line**

We ran a prototype of the pressurised ventilation fans, which provide air in place of air-conditioning, work has started to roll out this system to the whole fleet. This upgraded system will reduce maintenance.

**Metropolitan line**

Work has continued with the third train forecast to go back in service in early November.

**Piccadilly line**

On the Piccadilly line life extension works, we have completed the replacement of the saloon seats and 75 per cent of the floors. The second lift cycle has begun for the additional 59 units to take the fleet to end of life.



We have a programme of planned maintenance work



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We must continually assess the status of our train fleets

### Jubilee line

Mobilisation continues to progress at Stratford Market Depot, with a new bogie press installed and commissioned.

Procurement activities progressed to enable the start of some work in February 2022 and the main programme lift in summer 2022. As planned, we are working on the concession document, which lists the mitigations necessary to keep the trains in operation until the heavy overhaul takes place. Work Instructions have been drafted and are being reviewed. Recruitment is under way.

In the past year, our engineering team has used the latest iteration of its framework for finding suppliers to support the programme. Availability of principal engineers is slowing down delivery and remains an issue.

### Adhesion train

We completed this year's work on one of our rail adhesion units. These are required to support operations on the Central line by applying a substance to the rails to manage adhesion levels during autumn when the leaves fall on the tracks.

# Renewals

Forecast completion	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority deficit £m
2025	134	207	341	285	(56)
Change since last Investment programme report					
No change	(0)	0	No change	No change	

## Programme update

This programme covers a range of assets across buildings and stations, civils, power, electricals and cooling to ensure safety compliance and continued reliability.

## Buildings and stations

We undertake rolling programmes of targeted interventions to building systems, communications, fire and mechanical assets, and the built environment in stations, buildings and other London Underground premises to improve asset condition.

We recently completed concept designs on the replacement of the ceiling at Pimlico station.

We have completed detailed design work to replace obsolete communications equipment at King's Cross St Pancras, including station management systems, local area networks, CCTV, the public address and alarm system, lift intercom system, visual information displays and ticket hall information displays, as well as passenger help points.

We have completed concept design work and detailed designs are now progressing to replace station information management systems, public address and voice alarm systems, as well as the passenger help point systems, at London Bridge, North Greenwich, Canary Wharf, Canada Water, Canning Town, West Ham, Southwark and Bermondsey.

In October, we completed works to renew the one-person operated CCTV cameras on the Bakerloo line platforms at Waterloo station, to improve passenger safety.

## Staff welfare facilities

We are carrying out targeted renewals of staff welfare facilities at prioritised locations. The renewals will improve the condition of the facilities and the environment. We are doing procurement activities to support works starting on site from January 2022.



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We have an extensive asset base that must be maintained

### Civils

These account for 30,000 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.

Works are progressing onsite to stabilise the cutting between Grange Hill and Chigwell stations on the Central line to ensure the continued safe running of the railway.

### 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 capability. Based on the state of good repair of the assets and the expected age, we deliver a rolling programme of renewals to maintain the integrity of power delivery to the railway.

Work is under way to replace 22 life-expired uninterruptable power supply units to ensure a continuous power supply to critical signalling assets on the railway. Detailed designs have been completed with site works planned for later this year.

Procurement has started for the replacement of 20 life-expired offline battery power inverter units supplying station emergency lighting systems. The project will include developing standardised modular equipment, which can be retrofitted into existing installations, and site trials to reduce the installation work and improve value for money.

The replacement of 16 traction isolation switches is in progress at Hainault Depot to address equipment non-compliances and remove operational restrictions. All units are now installed with five fully commissioned and the others planned for completion in 2021.

Civil works at Greenford substation are nearly complete in preparation for the replacement of the high-voltage switchboard. The impact of the pandemic on the overseas manufacture of the switchboard has been mitigated with completion of its factory acceptance test in October for delivery to site in late autumn this year.

We have started procurement for the replacement of the DC traction switchboard at Holborn station, starting in 2022/23.



### Power control

We have nearly completed the installation of the network-wide power control system replacement project. This comprises control centres linking to circuit breakers across the network, which enable train traction control. The site acceptance testing began in September and, with the relaxation of coronavirus travel restrictions, plans have been put in place to train operational staff and commissioning towards the end of 2021/22.

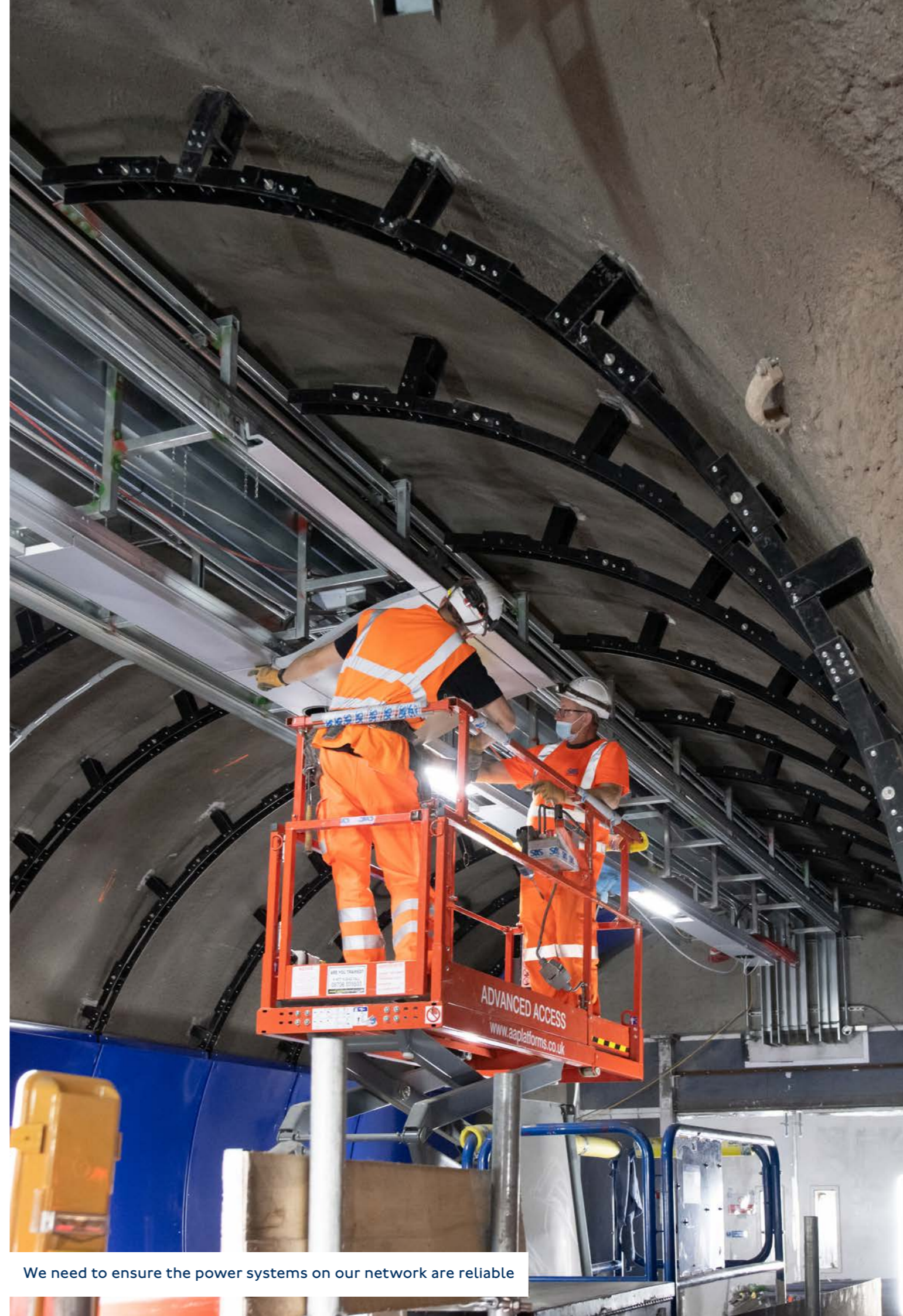
The first of the control system upgrades on the electricity generators at Greenwich Power Station was completed in October. The upgrades will continue in 2022/23 and remove obsolescence and improve the long-term reliability of the essential emergency generating plant.

### LED lighting

We have continued with the planned conversion of traditional fluorescent lights to low energy LED lighting, improving efficiency and reducing ongoing maintenance costs. A new delivery programme for a further 26 stations to be completed during 2022/23 is in progress, with additional conversions also started in September at prioritised train depot locations.

### Civils and accessibility

Meeting Rail Vehicle Accessibility Regulations (RVAR) requirements to provide level access between the train and platform for customers on the Bakerloo line will improve accessibility and safety. We have constructed platform humps at Oxford Circus and provided manual boarding ramps at Elephant & Castle in readiness for when the Bakerloo line trains are made RVAR-compliant. Final preparations are under way for construction of a hump and associated works at Paddington.



We need to ensure the power systems on our network are reliable

# Signalling and control

Forecast completion	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority deficit £m
2028	96	328	424	307	(117)
Change since last Investment programme report					
3 years	1	207	208	95	

## Financial commentary

The EFC has increased by £208m since Quarter 2 and the cost to go has also increased by £207m for the next stage of works. This is due to maturing of estimated costs for the next tranche of signalling and control system upgrades on the Bakerloo and Central lines, and critical obsolescence works on the Jubilee and Northern lines. The recent stretch to the forecast completion covers the scope in the next tranche of system upgrades under the Central line incremental upgrade, which is forecast to complete in 2028. This was authorised at the Programmes and Investment Committee in October 2021. Additionally, new projects have been added that will resolve safety and legislative compliance issues across the network.

## Programme update

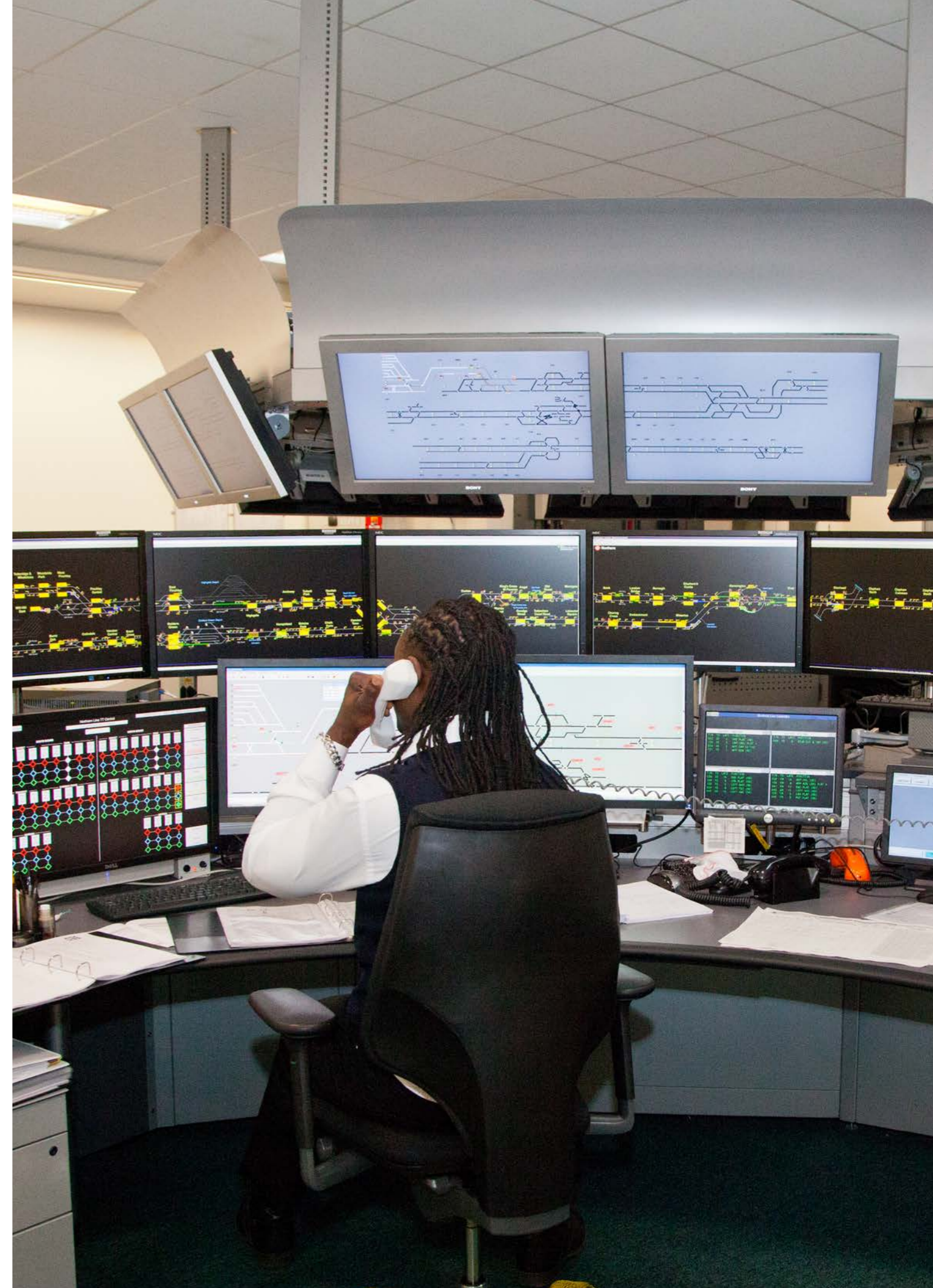
Signalling and control systems are essential for the safe and efficient operation of train services. Some date to the early 1960s and are now obsolete and increasingly hard to maintain. We continue to move towards more modern computer-based systems that provide greater service capacity. While these need less day-to-day

maintenance compared with traditional electro-mechanical signalling, they do need significant obsolescence-driven renewals during their life.

Large upgrades, such as the modernisation of the Circle, District, Hammersmith & City and Metropolitan lines, are replacing systems across the sub-surface lines. The Jubilee, Northern and Victoria lines have relatively modern, computer-based systems, however as computer technology is fast-paced, the availability of support and spares declines as systems age, and obsolescence risk increases.

On lines such as the Bakerloo, Central, Piccadilly and Waterloo & City, recent financial challenges have seen planned upgrades scaled back, and in response we have developed a targeted incremental approach to upgrading and life extension.

This programme has been established to extend the life of current systems and contain obsolescence risk.



Our signals and controls are essential for ensuring safe travel



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### Signalling and control

The Bakerloo line control system life extension project has successfully commissioned the replacement central computer servers into service. These are now controlling the Bakerloo line with the next phase of the project, which involves decommissioning and transferring the equipment to a museum, is under way.

We will start replacing the large file transfer system on the Jubilee line to enable data to be transferred automatically rather than doing it manually.

Assurance reviews and necessary governance steps have been completed to award the contract for life extension of the Central line signalling and control systems, which is expected in late autumn this year.

### Incremental signalling upgrade

The first five-year tranche of the incremental signalling upgrade programme is progressing well, with design starting on updating the Bakerloo line control system. We are procuring a contractor to address replacement of obsolete signalling sub-systems on the Jubilee and Northern lines. We are also planning the first part of the upgrade for the Central line signalling system, limited in scope to part of the line.

# Technology

Forecast completion	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority deficit £m
2025	89	116	205	95	(110)
Change since last Investment programme report					
No change	3	(3)	No change	No change	

## Programme update

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

## Networks and connectivity

We continue to upgrade key components of London Underground's operationally critical Connect radio system and are now focusing on rolling out new radio hardware base-stations across the network. This second phase will continue through 2021/22 and is expected to be complete in mid-2023. As a result of this work, the Connect system will be able to function into the 2030s. We have installed new hardware at 44 of the required 293 locations and installation is progressing well.

We are also issuing replacement mobile devices to many of our operational staff. This will be complete in early 2022 and entails rolling out around 7,700 devices.

More than 5,000 replacement devices have been issued so far. Old devices will either be recycled or donated.

## Asset management

To improve our approach to asset management and long-term investment planning, we are consolidating our asset management information systems into a single platform for London Underground and London Trams. We are now in the process of migrating London Underground assets onto this new single platform. This work will continue through 2021/22 and is anticipated to complete in early 2023. The project is part of an initiative to streamline our approach to asset management, which will involve migrating to the same single asset management platform over the coming years.

In addition, we are working to improve the quality of our asset condition data by running surveys across a wide range of assets on our network. This work will be complete by mid-2022 and help us improve the planning and co-ordination of essential maintenance works.



We are upgrading key connectivity elements on the network

# Surface transport

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



# Healthy Streets

Reporting period	Cost to date £m	Cost to go £m	EFC £m	Programme and project authority £m	Authority deficit £m
2020/21 to 2024/25	220	516	736	309	(427)
Change since last Investment programme report					
No change	24	(39)	(15)	No change	

## Financial commentary

Our Healthy Streets Investment Programme and Project Authority was increased at the July 2021 Programmes and Investment Committee. This includes all spend from 2020/21 to 2022/23.

The investment programme is currently reporting a £15m lower expenditure than the previous report. This mainly relates to slippage on committed spend, due to revised delivery plans on Old Street Roundabout, and the decision by the members of the Hammersmith Ferry Task Force to postpone the ferry service following the reopening of the bridge for people walking and cycling. The latest forecast also reflects lower borough expenditure based on current allocations and the run rate of spend to date.

## Programme update

In March 2021, we largely concluded the rapid delivery of new temporary schemes under the Streetspace for London programme, in response to the challenges

of the pandemic. Further Government funding of £100m was allocated to the programme as part of the funding package agreed between the DfT and us for the period from 29 May to 11 December 2021.

We have now remobilised our longer-term Healthy Streets investment programme, while continuing with some temporary and experimental schemes on borough roads via the Government's Active Travel Fund.

A lot has changed since the programme was paused and we are now in a markedly different context. Our approach to Healthy Streets planning and delivery has adapted to reflect this, with a review of some historic schemes to test the best next steps, a new integrated pipeline of future schemes, and learning lessons from the Streetspace for London programme. We have also reviewed our strategies and policies, which has led to the programme and its priorities being reshaped to align with these commitments, which will span the next three years to May 2024.



We are working to make London's streets healthier for all



The continuing Healthy Streets programme will help reduce road danger in line with our Vision Zero action plan, and make it easier to walk, cycle and travel by bus across London. It will accelerate progress towards mode shift, decarbonisation, economic recovery and tackling health inequalities. Healthy Streets will also be an indispensable complement to our other initiatives, such as Vision Zero, Crossrail, the electrification of the bus fleet, and the ULEZ expansion, and help power London's wider recovery.

#### Old Street Roundabout

This scheme will substantially improve safety for pedestrians and cyclists at this major junction. Completion is scheduled for autumn 2022.

The next traffic management phase was completed during the August bank holiday weekend. This enabled construction to continue on the highways and drainage elements on all four arms of the junction, including roof strengthening works above the existing station in the peninsula area.

Construction of the new main station entrance continues with the substructure works now completed. Works have started on the above-ground superstructure and the installation of the precast concrete central column and stairs began on 15 November. This will be followed by the roof and glazing installation as planned from February 2022. Work on the new goods lift shaft continues in readiness to install the new lift car from January 2022.

Refurbishment of the existing stairs at the northwest entrance was substantially completed on 3 September 2021, which enabled the entrance to be reopened to the public and the green line to Moorfields Eye Hospital reinstated. This has enabled the adjacent ramp at the northwest entrance to be permanently closed, enabling new passenger lift works to start.

Construction of the new station entrance at Cowper Street was substantially completed on 31 August 2021 and opened for public use. This has enabled the permanent closure of the northeast entrance, which will be infilled over the coming months. The southwest entrance will remain open for customers until July 2022.

Installation of the new mechanical, electrical and new fire safety systems works in the below surface shopping arcade area continues as planned.

#### Cycleway 4

Construction works along Evelyn Street are now 35 per cent complete. The southbound diversion for traffic that was put in place from 31 August to accommodate the works was removed on 7 November 2021 as planned. The construction works are due to complete in summer 2022. The works on the Creek Road Bridge section, which will be carried out by the borough, are planned to start in January 2022.

### Cycleway 9

Work to transform Hammersmith gyratory started on 29 November. This includes a protected two-way cycle track on the north side of Hammersmith gyratory and cyclist-specific signals at junctions to separate cyclists and motor vehicles. There will also be improvements for pedestrian safety at all junctions with side roads, including raised level crossings and more footway space, and new pedestrian crossing signals with 'countdowns' at King Street, Beadon Road, Shepherd's Bush Road, Queen Caroline Street, Hammersmith Road and Butterwick. There will also be a new parallel crossing at the Butterwick junction to enable westbound cyclists to join the two-way cycle track.

Work is set to be completed by spring 2022. We are advising people in the area to check their journeys before they travel, as the work will cause some travel disruption.

### Responding to the pandemic

Borough delivery continues at pace, with more than 20km of cycling routes under construction. Hackney started construction of a new bus gate on Church Street in Stoke Newington, which closes the road to general traffic for part of the day and widens pavements for pedestrians. The London Legacy Development Corporation started construction of a new cycle crossing in The Queen Elizabeth Olympic Park. Ealing has recently completed construction of a 4.3km route between East Acton and Chiswick. Various improvements along the route make cycling more comfortable, with the major improvement seeing Fishers Lane, a previously highly

congested road, closed to general traffic. Further construction is planned to start and be completed over the coming months.

Work is ongoing to review each temporary Streetspace for London scheme that was delivered over the past 18 months, to consider whether schemes should be retained, altered, or removed from site. These decisions are based on extensive monitoring of the temporary schemes, stakeholder feedback, equalities considerations and alignment to our strategic priorities.

We successfully appealed the judgment in the judicial review challenge brought by two taxi groups, the Union Trade Action Group (UTAG) and the Licensed Taxi Drivers Association Limited (London) (LTDA), to challenge the Streetspace for London Plan, a temporary traffic scheme in Bishopsgate (A10) and the issuing of our interim Streetspace for London guidance to the boroughs.

On 16 June, the Court of Appeal allowed our appeal and overturned the order to quash the A10 scheme order, the Streetspace for London Plan and the interim guidance. UTAG and LTDA have made an application to the Supreme Court for permission to appeal, which we have objected to. A decision from the Supreme Court about whether any further appeal should have permission to proceed is currently awaited.



More people are cycling in London following the pandemic





Our roads must be safe to encourage more active travel options

### Safer streets

We are working on more than 120 vital projects to address historical collision issues and reduce road danger on our roads. This contributes to the Mayor's Vision Zero ambition to eliminate deaths and serious injuries from London's roads by 2041. Measures include new and upgraded crossing points, improved pedestrian and cycle facilities, speed limit reductions and innovative pedestrian crossing technology. We are progressing these projects, but delivery will be subject to future funding.

Design work is progressing well on the latest projects to lower the speed limit to 20mph on more than 140km of our roads. We will introduce 20mph limits across 13km of our roads within Westminster, as well as 12.7km on the A13 in Tower Hamlets, the A23 London Road in Croydon, the A107 corridor in Hackney, the A10 to A503 corridors in Haringey and the A232 West Wickham and A205 Putney town centres. We will also introduce 2km of 30mph limits on the A10 Great Cambridge Road in Haringey, as well as A4180 Ruislip Road in Ealing.

Detailed design work is almost complete on five of these projects, which will be delivered by late January 2022. These are the A10 Great Cambridge Road, A13 Commercial Road, A23 London Road, A107 corridor and A10-A503 corridors. We engaged with local stakeholders on these projects during the summer. In addition, we met with key external stakeholders such as the Metropolitan Police Service, emergency services, 20s Plenty, London Cycling Campaign and boroughs in early September.

Detailed design work is also under way on proposals to introduce a new 20mph speed limit across our remaining roads in Westminster by March 2022. This follows successful public consultation, which concluded on 18 August.

We are working on a supplementary marketing campaign including posters and radio advertising. These are planned to take place in mid-December 2021 and March 2022, to coincide with the launch of the Lowering Speed Limits projects.

### Safer Junctions

Safety measures have been introduced at 43 Safer Junction locations so far. Common measures include new and improved crossings, pedestrian countdowns at traffic signals, separation of signal phases or early release for cyclists,, improved cycle facilities, wider footways, separation or prohibition of dangerous turning manoeuvres, resurfacing, and lining improvements to encourage better lane discipline.

Detailed design work is complete on the new signal crossing on the north side of Battersea Bridge, after a pedestrian was tragically killed. Phase one of the project, delivering a new crossing and introducing a 20mph speed limit, commenced construction in October.

# Air quality

Reporting period	Cost to date (Gross) £m	Cost to go (Gross) £m	Forecast £m	Programme and project authority £m	Authority deficit £m
2020/21 to 2024/25	194	501	695	255	(440)
Change since last Investment programme report					
No change	16	(13)	3	No change	

## Financial commentary

Our Air Quality Programme and Project Authority was increased at the December 2020 Programmes and Investment Committee. This includes all spend, from 2017/18 to 2020/21, and expected contracted spend for 2021/22 and 2024/25 required before March 2023.

The Air Quality and Environment portfolio is forecasting an increase in expenditure of £3m from the previous report.

A further contribution of £5m has been received from the GLA to increase the number of polluting vehicles that are scrapped following the overwhelming demand for the scheme ahead of the launch of the expanded Ultra Low Emission Zone.

## Programme update

### Ultra Low Emission Zone expansion

In 2019, we introduced the world's first 24-hour Ultra Low Emission Zone (ULEZ) in central London. This has contributed to a 44 per cent reduction in roadside nitrogen dioxide levels within its boundary.

On 25 October 2021, the existing central London ULEZ was expanded to the North Circular Road (A406) and South Circular Road (A205), creating a zone 18 times larger than the central London ULEZ. This will improve air quality for millions of Londoners. Cars, motorcycles, minibuses (up to five tonnes), vans (up to 3.5 tonnes) and other specialist vehicles driving within the boundary must meet the required emissions standards or pay a daily charge.

A key element of this successful expansion, which was delivered on time and under budget, was to migrate the existing operational systems to a cloud-based platform. This enabled us to deal with the massively increased volumes of data and transactions from the larger zone. We successfully migrated all existing road user charging schemes to the new cloud platform in early October, which substantially de-risked the scheme launch.



Our projects are helping to clean up London's air

In addition to this major software project, a new camera data processing system was deployed, together with around 900 new cameras and more than 1,600 new or altered road signs. Our service provider Capita recruited, trained and deployed almost 800 new operational staff.

We ran a substantial marketing campaign to raise awareness of the ULEZ expansion and inform drivers how and where the scheme operates, encouraging them to check their vehicles and plan their options. This included posters, radio and television adverts, press and online advertising, leaflets for local residents, stakeholder and press activity. An intensive Mayoral launch day secured extensive and largely positive national and international media coverage. In the first week of operation, compliance rates were higher than anticipated.

#### Vehicle scrappage and support schemes

We have continued to operate the Mayor's scrappage schemes to help drivers scrap their older, more polluting vehicles to meet tightened emissions standards. A further contribution of £5m from the GLA was received in August 2021, to meet an increased demand for the scheme ahead of the launch of the expanded ULEZ. The schemes have supported the scrapping of more than 13,000 vehicles, with more than £48m of grant payments issued. The schemes have now closed for new applications as all available funds have been allocated.

#### Congestion Charge changes

Since its implementation in 2003, we have made changes to the Congestion Charge to ensure it remains effective, including changes to discounts and exemptions, charge levels, and days and times of operation. Last year, we made temporary changes to the charging days and hours in response to the transport challenges presented by the pandemic, including operating daily until 22:00.

We have developed proposals to change the Congestion Charge on a permanent basis. The public consultation on the proposed changes ended on 6 October 2021. A consultation report was prepared to inform the Mayor's decision at the TfL Board meeting on 8 December 2021 on whether some or all of these proposals are taken forward, with or without modifications. These proposed changes, if implemented, would take place later this year or early next year.

#### Electric Vehicle infrastructure strategy

On 15 October, the Mayor launched a summary of the London electric vehicle infrastructure strategy. This update report sets out our vision and key principles, captures recent trends and policy changes, forecasts the infrastructure needs to 2030 and sets out our roles and that of the wider public sector. The full document will be published in December 2021.



We are working to support the switch to electric vehicles



We already have one of the greenest bus fleets in Europe

The strategy targets the needs of key user groups, including those making high-mileage essential trips, while encouraging everyone to switch to zero-emission transport. We also set out our commitments to these user groups, including a need to address one of the main barriers – the availability of suitable land, through unlocking GLA group and other public sector sites. Finally, we summarise our key asks for Government, both in terms of support and funding, which has been vital in recent years in enabling London to meet the demand for electric vehicle charging and will be crucial to help maintain consumer confidence and accelerate the switch to these vehicles.

#### Electric vehicle infrastructure delivery

A keystone commitment of electric vehicle infrastructure strategy is for the Electric vehicle infrastructure delivery programme, which aims to provide specific mechanisms to help deliver the charge points needed to meet projected demand, while also generating revenue for the GLA. This includes creating flexible commercial and procurement models, tailored to individual requirements, as well as establishing guidance to help boroughs to consistently implement electric vehicle infrastructure.

Proposals for the programme, including a first tranche of delivery, were endorsed by the GLA Collaboration Board on 5 October 2021. This tranche seeks to deliver 100 charge points and will be a testbed for future, faster, delivery throughout the coming decade.

#### Greener fleet

All buses operating in our Dial-a-Ride fleet now comply with the Euro VI emission standard, which ensures they meet the requirements of the expanded ULEZ.

#### Zero-emission bus fleet

Since January 2021, the bus fleet has continued to meet or exceed the latest Euro VI emission standard. The number of zero-emission buses entering the fleet through competitive bus route tendering continues to rise. There are more than 560 zero-emission buses in service, including 20 hydrogen double-deck buses and we continue to invest in new greener technology. Around 10 per cent of London's bus network will be zero-emission by the end of 2022 and we will have 800 fully electric buses by March 2022.

Together with the Campaign for Better Transport, we organised a successful zero-emission bus summit on 17 September at City Hall, attended by the Mayor, local authorities, manufacturers, bus operators and other key industry stakeholders. The summit sought to find collaborative ways to bring transformational change faster to UK towns, cities and rural areas and speed up the procurement of and investment in zero-emission buses across the UK.

Two key announcements were made that all new buses procured into London's bus fleet will be zero-emission and a commitment to bring forward the delivery of a 100 per cent zero-emission bus fleet in London by three years, from 2037 to 2034.

# Asset investment

Reporting period	Cost to date (Gross) £m	Cost to go (Gross) £m	Forecast £m	Programme and project authority £m	Authority deficit £m
2020/21 to 2024/25	194	139	977	494	(483)
Change since last Investment programme report					
No change	9	13	22	No change	

## Financial commentary

The Asset Investment Programme and Project Authority was increased at the March 2021 Programmes and Investment Committee. This includes all spend from 2020/21 to 2022/23. Current authority remains the same as the previous quarter.

Five-year expenditure is forecast to increase by £22m from the previous report, which is primarily driven by increased investment into the portfolio's Major Asset Renewal projects. Examples include Blackwall Tunnel southbound refurbishment, Kingston Cromwell Road bus station refurbishment, as well as pier and tunnels renewals projects.

## Programme update

Work is under way to ensure the safety and operability of our highest priority assets that need urgent renewals, including critical tunnels, such as Rotherhithe and Blackwall, and structures, such as the A40 Westway, Brent Cross, Croydon Flyover and Gallow's Corner.

Design work is nearing completion on the replacement of the bridge expansion joint scheme on the A40 Westway. Fabrication of the joint is progressing, the enabling works have started and the works on the top side of the structure began on 26 November 2021. The remaining joints, parapets and other planned works will start in 2022.

The detailed design for protective security measures at Westminster Bridge has now received consent from both local authorities plans and are progressing well, and the works began on site on 15 November 2021.

The design work and preparation of tender documents for the design and build procurement stages is complete. A series of short-term capital interventions will be progressed to ensure the tunnel remains safe and operable until the main project can be progressed. The installation of a height barrier to improve compliance of vehicles using the tunnel is currently in design, with implementation to take place in late January 2022.

Advance critical works to install a height barrier to reduce the number of non-compliant vehicles using the Rotherhithe Tunnel and replace the approach road lighting are progressing. The approach road lighting has been installed and was tested for completion on 19 October. The design work for the barrier is nearly complete and installation of the gantry is expected to complete by the end of January 2022.

Tender returns have been received on two key projects, Brent Cross structures and the renewal of Kingston Cromwell Road bus station and we have awarded the contracts for both.

## Hammersmith Bridge

Hammersmith Bridge re-opened for pedestrians and cyclists to cross and for river traffic to pass beneath in July 2021. After a review, the Hammersmith Bridge Taskforce decided on 25 November that there is no longer a need for a ferry service. We will continue to work closely with the Government and the council to ensure people can continue to cross the river in this area.

## Carriageway renewal

Work to renew 325,000m<sup>2</sup> of carriageway continues at pace, with 150,000m<sup>2</sup> delivered by 15 October. Many schemes have been delivered, with large schemes on the A24 Epsom Road and Great Cambridge Roundabout. Schemes in the next quarter include A3220 Warwick Road and A503 Camden Road. Design work to facilitate future renewals is progressing well.

# Public transport

Reporting period	Cost to date (Gross) £m	Cost to go (Gross) £m	Forecast £m	Programme and project authority £m	Authority deficit £m
2020/21 to 2024/25	103	638	741	249	(492)
Change since last Investment programme report					
No change	9	(15)	(6)	No change	

## Financial commentary

The Public Transport Investment Programme and Project Authority was increased at the July 2021 Programmes and Investment Committee. This includes all spend from 2020/21 to 2022/23.

The Public Transport portfolio is forecasting a decrease in gross expenditure of £6m from the previous report.

The five-year forecast reflects lower spend, mainly driven by Royal Docks, as approval for the programme scope originally planned for July was delayed until September 2021, resulting in activity for a work package relating to Pontoon Docks taking place in 2025/26.

There is increased effort following the transfer of Woolwich Ferry to improve the service on the south layby by increasing spend in 2022/23 by £2m. The overall forecast has been offset by over programming in the portfolio.

## Programme update

### Class 710 trains

A further six Class 710 trains will be delivered later in 2021. These will be used on the Barking Riverside Extension as operational spares and provide additional capacity to meet forecasted growth on the London Overground network.

We have continued to develop the concept designs for projects funded by the Housing Infrastructure Fund, which support the development of 14,000 new homes. The concept designs, which are forecast to be completed by January 2022, will inform programme cost estimating and scheduling. We will then return to the Programmes and Investment Committee in spring 2022 to look at proceeding with the programme into the next detailed design and construction stages.



We are delivering more new trains on the London Overground



Work continues on our renewal work for the DLR

We have installed a safety system on the eastern and western Network Rail sections of the Elizabeth line on behalf of London Underground to prevent incorrect side-opening of doors at stations. This will complement the automatic correct-side door control provided by Crossrail in the central section. The system uses new trackside equipment that verifies location so the train knows the next station and position of the platform. Installation has been in phases, with both the section between Liverpool Street and Shenfield and the section between Paddington and Heathrow and Reading now complete. The system is now in use with the Elizabeth line train operator.

#### DLR

In Quarter 3, both construction and procurement activities for the renewal portfolio continue to gather pace. The team, including our contractors, continue to assess the impact of the pandemic and mitigations, and ongoing testing has enabled us to see minimal impact.

The B92 replacement bogie frame project is progressing well with 67 out of 70 frames being delivered, and an additional 20 being ordered.

The Poplar Direct Current High Voltage project is in the final commissioning stage. Switchgear factory building has started, final designs are under way for key high voltage projects to replace the east route ring main units and other vital power substation equipment. New DC switchgear for Custom House is ready for factory acceptance testing.

Good progress has been made on the Poplar and West India Quay station lighting upgrade projects. Migration and final commissioning works are in progress.

We have replaced 90 per cent of the Beckton Depot shore supply equipment and commissioned it into service. Intrusive lighting and power surveys have been completed at several stations, which will enable us to progress with technical documentation for tender.

The lift system upgrade project continued to make good progress, with 10 lifts completed. Following a successful tender process, a contract has been awarded for escalator mid-life overhaul work across 20 DLR stations.

Coper and tactile installation have been completed at Bank station, completing our DfT obligation for Rail Vehicle Access Regulations compliance. Work has now started on London City Airport. Crossharbour station stair tread replacement has been finished. Waterproofing at Limehouse Arches works have been concluded and handed back to the local Council.

Switches and crossovers have been installed at Canary Wharf and Canning Town and commissioned successfully. We have completed 800 metres of rail, including eight new expansion switches between Canning Town and Blackwall, and Canary Wharf and Crossharbour stations. Track fixings continue to upgrade baseplates through critical sites during engineering hours.



We are working to modernise London's cycle hire options

The GLA-funded Royal Docks stations programme concept designs has now been approved for Royal Victoria and Beckton Park. GLA funding has been agreed for the next phase of works.

#### London Trams

The Tram Rolling Stock Replacement programme will replace the life expiring Bombardier CR4000 trams, which are experiencing declining reliability and have one of the lowest states of good repair categorisations across our fleets. The programme has been assessing the outputs from the Sandilands inquest and has fed these into the current tram market study to understand safety innovations available for modern fleets.

The market study, plus assessments of the current depot and infrastructure, will complete in the autumn ahead of starting the market engagement exercise in Quarter 4.

Installation work continued for both the wayside and on-tram upgrades to tram communication equipment, which is a precursor to enabling a correct-side door enable system on the Bombardier CR4000 trams. The next milestone is the completion of the wayside works in January 2022.

Our renewals programme continues across six asset groups, including rolling stock, power, civils, systems and permanent way infrastructure. The third phase of the Reeves Corner embedded track renewal

was completed during a 16-day part-closure of the tramway in August and the final phase is planned for completion during a nine-day closure in February 2022. Highway resurfacing work in the centre of Croydon and further repair works to the Addiscombe Road bridge were also completed during the possession.

Following contract award for Morden Road staircase civil renewals, site works started on 18 October 2021 and the tender evaluation for the Birkbeck retaining wall was progressed, with contract award now expected by mid-December 2021.

Tram 2547, which is a specific type, was transported to Alstom's depot in Ilford and the first phase of condition assessment and repair works is ongoing. The repeat trial-running for the first-in-class Stadler on the CCTV upgrade project was delayed by a technical issue following the installation of the new CCTV, which is being resolved and the roll-out is now forecast to complete by the end of December 2021.

#### Santander Cycles

The programme to modernise, electrify and expand our Santander Cycles scheme is continuing as planned. This initiative aims to broaden and increase Santander Cycles usage and support our financial sustainability plan by increasing revenue and to adapt to the requirements of the latest applicable regulations. It will include the introduction of 500 electric bikes (e-bikes) and enhanced app functionality.



The launch of the 500 e-bikes remains on track for summer 2022. The systems integration team has been formed and is working with suppliers to integrate the back-office payment system, e-bikes and the website and app. The detailed design for the entire solution has been received and is under review.

Options are being explored to expand the geographical footprint of Santander Cycles, with a business case in development to confirm the priority list of areas that would benefit from expansion. Third-party funding has been secured from the London Borough of Southwark for a small expansion within the borough and design work is under way for the potential sites.

#### Woolwich Ferry

Following the transfer of the Woolwich Ferry from the Assets portfolio to the Public Transport portfolio, the Woolwich Ferry resilience and renewals programme has been created. This will establish a prioritised work bank of projects, with the overarching aim of reducing operational expenditure costs, maximising the use of the assets, and exploiting opportunities to generate additional revenue. The programme absorbs the previous Woolwich Ferry Life Extension Phase 3 package, including needing an unrestricted vessel access to a lay-by berth, maintenance access ramp, fender deformation issues and a backup mooring plan.

The Woolwich Ferry is legally required to operate without charge to passengers. The strategic aim is therefore to reduce the net cost of operations, including by generating additional revenue where possible, improve safety, and to maximise the value of the assets and operating expenditure by carrying more passengers. To achieve the latter, the focus is on improving service reliability and resilience as well as attracting new users and winning old users back, particularly local people, through better awareness and improved customer experience.

Following the multiple safety critical work packages earlier this year, the programme has refocused its work on key priorities. This includes the feasibility of a new berth and fuelling system, highway's enhancements in the surrounding area and real-time information changes. These projects are all within feasibility and the berth and fuelling projects expecting early design work began on 2 and 9 September respectively.



We are looking to reduce operating costs for the Woolwich Ferry

# Technology

Reporting period	Cost to date (Gross) £m	Cost to go (Gross) £m	Forecast £m	Programme and project authority £m	Authority deficit £m
2020/21 to 2024/25	35	325	360	130	(230)
Change since last Investment programme report					
No change	4	(4)	No change	No change	

## Financial commentary

The Programme and Project Authority was increased at the March 2021 Programmes and Investment Committee. This included all spend from 2020/21 to 21/22 and expected contracted spend for 2022/23 to 2024/25 required before March 2022. A further authority request was submitted to the committee in October 2021.

The five-year expenditure has not changed since the previous report.

## Programme update

### Compliance, enforcement and safety technology

We are delivering a suite of projects, using technology to improve safety and security on our network. Projects include the enforcement and compliance operations system, which is upgrading the digital capability of our Compliance, Policing, Operations and Security directorate. This will ensure our 600 on-street compliance officers and back-office support staff can enforce the safety and security of our network efficiently and effectively.

Work is also continuing to deliver deployable enforcement cameras. Each year, more than 4,000 people are killed or seriously injured in collisions on London's roads, with 76 per cent of these collisions happening at junctions. These cameras can be flexibly deployed at locations not covered by existing CCTV cameras, which will greatly improve enforcement coverage, reduce collisions and support bus reliability. During a trial, the junctions where these cameras were deployed saw at least a 40 per cent improvement in compliance. A contract was awarded on 26 July 2021 to enable the new cameras to start being introduced from late 2021.

We are committed to preventing violence and aggression across our network. In February 2020, our Safety, Sustainability and HR Panel endorsed a Work-Related Violence and Aggression strategy in response to increasing concerns about the levels of violence faced by our staff. In 2020, we rolled out 4,500 body worn video cameras to colleagues in the highest risk roles.



Body-worn cameras are helping keep frontline staff safe



We are making it easier to book our Dial-a-Ride services

We are now looking across the business to provide further cameras to those who need them. We are also looking to invest in additional emergency alert devices that give staff priority access to the emergency services. As part of the strategy, we are also looking to improve the way incidents are reported, making it simpler. We will also introduce a new case management system, which will help better support victims.

#### Roads technology

We are leading the way in delivering innovative new road traffic management systems to make journeys by walking, cycling and bus, as well as essential emergency services and freight trips, as efficient as possible. Delivery of elements of the Surface Intelligent Transport Systems programme remains on track. The third release of our Common Operational View Incident Management System has now been deployed in our Network Management Control Centre, and the fourth release took place on 30 November 2021.

The latest release includes enhanced data on buses, including passenger counts and delay data, and information on Santander Cycles docking stations, enabling us to focus our response to incident management.

The element of the Surface Intelligent Transport Systems programme that aims to predict the impact of incidents on the network, is approaching the end of

feasibility. The predictive system will use innovative modelling technology, so we are working with experts to baseline the scope to ensure it can contribute to overall journey time benefits.

#### Public transport technology

We are maintaining and developing technology to improve our public transport networks and enhance customer experience. This includes replacing the booking and scheduling system for Dial-a-Ride, which will enable us to book and deliver more trips with the same number of vehicles. Procurement is progressing well, with virtual site visits with potential suppliers concluded earlier in the year.

We are also replacing the iBus system, which is vital to ensure buses continue to operate effectively. Replacing this critical system is a key priority, as it enables us to provide real-time information to customers, enable bus priority at more than 1,800 junctions and supports performance payments to bus operating companies. Refreshing it gives an opportunity to improve bus passenger experience, with targeted enhancements including providing real-time information when a bus cannot follow its normal route and linking virtually to traffic lights at more junctions to help buses travel more quickly. We have published the contract notice for the iBus2 replacement project on the Find a Tender service and expect to shortlist suppliers later this year.

# Professional services

This comprises technology and data, media and the TfL Growth fund



# Technology and data

Reporting period	Cost to date (Gross) £m	Cost to go (Gross) £m	Forecast £m	Programme and project authority £m	Authority deficit £m
2019/20 to 2022/23	169	158	327	320	(7)
<b>Change since last Investment programme report</b>					
No change	12	(13)	(1)	No change	

## Financial commentary

The EFC movement is due to other telecoms income and technology development spend transferred to business-as-usual operating expenditure, and overprogramming transferred with iBus2 to the Surface Transport portfolio, as part of the revised budget.

Authority and EFC shown are for 2019/20 to 2022/23, as per the Programmes and Investment Committee paper that was approved on 6 March 2021.

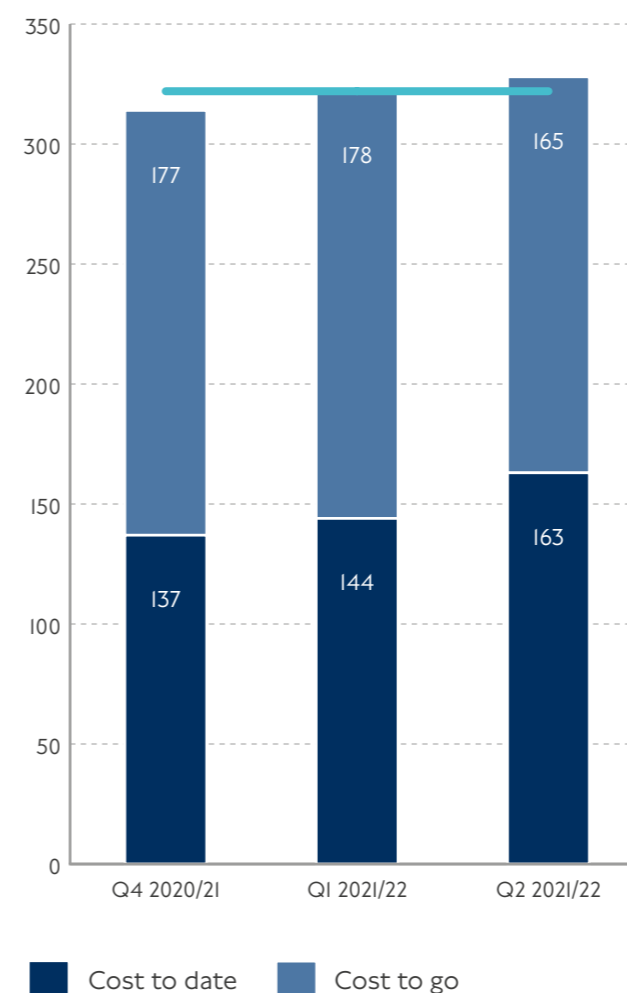
Values shown are for technology and data funded projects only and exclude the Emergency Services Network, the Public Cellular Network and Telecoms Commercialisation Projects.

Other telecoms spend is included from 2021/22 as it was included within the latest Programmes and Investment Committee approval. iBus2 spend is excluded from 2021/22 onwards, as it transferred to the Surface Transport part of the business from 1 April 2021.

## Performance over time

Forecast spend for the three-year reporting period has increased above Programme and Project Authority, driven by transfers of other telecoms income to business as usual operating expenditure and Surface overprogramming transferred with iBus2 to the Surface Transport portfolio, as part of the revised budget. This will be regularised as part of our next submission to the Programmes and Investment Committee in March 2022.

Performance over time – estimated financial cost (£m)



## Programme update

### Payments

On 27 September, we introduced weekly capping on Oyster for rail customers. This involved complex negotiations with the Rail Delivery Group to gain acceptance on all rail services in London. The initial launch is for adult fare payers, with weekly caps for discounts and concessions expected to be introduced next summer.

This change provides the best price for both Oyster and contactless users over a seven-day period, improves best value calculations for Oyster customers in relation to daily cap, improves our ability to provide refunds, and automated refunds are able to be collected for six months.

Oyster and contactless charging outcomes are now more aligned as the same journey construction and forgiveness rules will be applied to both. This means that pay as you go is now more clearly the best value way to pay for travel.

Following the introduction, we will promote pay as you go weekly capping as an alternative to season tickets, helping to reduce demand for season tickets. This aligns with the increasing demand for flexible travel products.



We have introduced price capping for Oyster customers

Oyster journeys will also now be calculated in our back office using contactless logic, with any fare adjustment subsequently issued to the card reader if necessary. This is an important step towards upgrading the Oyster system, which is nearly 20 years old.

This also means we are also able to stop a number of analytics-run refund processes, by creating an automated credit to the customer's card.

#### Digital workplace

The consolidation of all legacy versions of Microsoft SharePoint sites onto SharePoint Online continues to progress ahead of schedule, with 1,087 of 1,225 sites now completed. This project provides a common, online data platform for all our SharePoint sites, giving improved accessibility, security and eliminating the cost and complexity of managing the obsolete infrastructure, and is planned to complete in March 2022.

#### Data centre rationalisation and Cloud migration

Work continues to refresh our hosting platforms, but we did not achieve any major milestone this quarter.

#### Networks

Start-up activities have completed successfully with our telecoms concessionaire BAI including the establishment of governance structures and the agreement of design and build processes with our engineering team. The initial designs have been delivered for approval. We supported the BAI

industry launch event, at which the Anne-Marie Trevelyan, International Trade Secretary, welcomed the launch of the new partnership, which aims to transform London into a smart city, boost connectivity and create 600 jobs. She was joined by Australian Minister Dan Tehan.

The Connect Programme continues to replace London Underground's operational radio base stations. We have now replaced 34 of 293 for this two-year project. This was running to plan, however, unfortunately there were delays to the work as the third-party technical engineers were unable to access the site owing to positive COVID-19 test results. It is now planned to update the core radio software by February 2022 to version 9.1, bringing the system in line with the current supportable version.

We continue to deliver infrastructure to support the Home Office's national Emergency Service Network communications system. In tunnels, we have pulled 418km (99 per cent) of the leaky feeder cable, with 391km fixed (93 per cent) and 363km tested from a total of 422km of tunnels. Fibre installation is unchanged at 411km (97 per cent). Much of the remaining work is dependent on removing existing legacy tunnel telephone assets to create space for our cables and we are now achieving a removal rate of two sections a week. We have completed 94 per cent (up two per cent) of the required station cabling works at the first 65 stations with the remaining stations that we had completed or partially completed, handed over to BAI. We have also installed more than 40 per cent of the required low-powered radios in the back of house areas of the 4G pilot stations, building on the existing front of house deployment.

### Technical service operation

For the transition of IT infrastructure/ services the remaining resiliency improvements for business-critical services are progressing to plan for completion in this financial year. In the next quarter, we will also be initiating projects to replace on premise and cloud network infrastructure to protect our business-critical services. For the GLA head office move, there have been challenges with completing works by third party suppliers on providing network connectivity into the new building. These challenges are being overcome in collaboration between the GLA, the third parties and us, so that GLA's overall plan is supported.

The contract for the software asset management provider was awarded in September and the design of the service and implementation are now under way. We are also progressing an initiative to investigate how we optimise license usage

### Enterprise resource planning

Our new people management solution, myJourney, for employee performance appraisals and succession management went live in early September for an early adopter group of around 3,000 employees. This proved a success and was followed up by the full roll-out to all our employees in early October. This supports the People Roadmap in our Vision and Values, promoting more frequent line manager and employee performance and development conversations in a digital mobile solution. This replaces the old paper forms.

The Procurement and Supply Chain improvement project supplier has been onboarded and work continues to implement the new SAP Ariba supply chain solution. Focus is on the delivery of the upstream sourcing and contract management capabilities first by Quarter 4 2021/22 as these govern and control purchasing, which is planned to be transformed by Quarter 3 2022/23.

We supported Business Services with the transition of our main NPL recruitment supplier from Hays to Reed. The new solution went live in October 2021 and will make significant savings in Business Services from better rates and has given our hiring managers a more user-friendly portal to review and approve timesheets.

### Contact Centre operations

We continue to focus on maintaining the quality and efficiency of our Contact Centre services. Following our re-tender, transition and go live of our new consolidated Oyster customer support contracts in July, we have made increasing progress in carrying out the same activities for our Santander Cycles customer support. Following an evaluation of bids in October, the project will now focus on transitioning to the new contracts without disruption to the customer service being provided.

A milestone was also hit in our Concessions project, where the new Concessions Portal went live. Following challenges, several fixes have been prioritised.

Early market engagement on our future outsourcing framework was completed in November 2021. We remain ready and awaiting the appropriate technical resources to develop the automation of our customers' contactless payment card refund enquiries.

Replacing our main, legacy and business critical lost property system continues to make progress in line with forecast. Following supplier bids' evaluation being completed we have also gained appropriate governance signoff to award the contract and drafted a plan of the rollout of the tool including change management. Next steps will be taking these plans through a review and sign off cycle while joining up content with the supplier.

### Data analytics

We have supported the 27 September launch of weekly capping on Oyster, updating our reporting tools that are used by our payment and finance teams for reporting and the allocation of revenue.

### Digital tools

We continue to progress with the integration of account, journey history and payment card functionality in the TfL Go app. We are working towards a beta release to test the implementation with customers.

We now have an App Store rating of 4.7 and more than half a million customers have downloaded the app since launch. We have achieved a regular update cycle, releasing tangible app enhancements every two to four weeks. This includes real-time information to support the Northern Line Extension.

# Growth Fund

Reporting period	Forecast £m
2020/21 to 2029/30	258
Change since last Investment programme report	
No change	No change

## Programme update

As the Growth Fund schemes have developed, and costs and potential funding have become clearer, it has been possible to identify savings in required contributions.

The revised budget classifies all Growth Fund schemes as fully meeting the Mayoral objectives but are 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 the Government or other third-party sources is needed to complete the funding packages.

We continue to identify additional funding streams, while supporting all Growth Fund projects with contractual obligations and other urgent milestones by providing case-making and programme-level support.

## Challenges

The main challenges centre around continued funding uncertainty for Growth Fund projects, which are necessary to unlock new homes and jobs in areas of high need in London. Several projects with previously complete funding packages are currently at risk due to the programme being contingent on additional funding.

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



Our Growth Fund schemes are contingent on extra funding



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## About TfL

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, TfL Rail, London Trams, London River Services, London Dial-a-Ride, Victoria Coach Station, Santander Cycles and the Emirates Air Line. The quality and accessibility of these services is fundamental to Londoners' quality of life. By improving and expanding public transport and making more stations step

free, we can make people's lives easier and increase the appeal of sustainable travel over private car use.

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, the Ultra Low Emission Zone scheme and more environmentally friendly bus fleets are helping to tackle London's toxic air.

During the coronavirus pandemic we have taken a huge range of measures to ensure the safety of the public. This includes enhanced cleaning using hospital-grade cleaning substances that kill viruses and bacteria on contact, alongside regular cleaning of touch points, such as poles and doors, and introducing more than 1,000 hand sanitiser points across the public transport network.

Working with London's boroughs we have also introduced Streetspace for London, a temporary infrastructure programme providing wider pavements and cycle lanes so people can walk and cycle safely and maintain social distancing.

At the same time, we are constructing many of London's most significant infrastructure projects, using transport to unlock much needed economic growth. We are working with partners on major projects like the extension of the Northern line to Battersea, Barking Riverside and the Bank station upgrade.

Working with Government, we are in the final phases of completing the Elizabeth line which, when open, will add 10 per cent to central London's rail capacity. 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 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 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 recovers from the pandemic and moves forward.



## Programmes and Investment Committee



**Date:** 15 December 2021

**Item:** Independent Investment Programme Advisory Group  
Quarterly Report

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### **This paper will be considered in public**

#### **1 Summary**

- 1.1. This paper presents the Independent Investment Programme Advisory Group (IIPAG) quarterly report for December 2021. It describes the work undertaken since the last report presented to the Committee in October 2021.
- 1.2. A paper is included on Part 2 of the agenda which contains exempt supplemental information that is exempt from publication by virtue of paragraph 3 of Schedule 12A of the Local Government Act 1972 in that it contains information relating to the business affairs of TfL. Any discussion of that exempt information must take place after the press and public have been excluded from this meeting.

#### **2 Recommendation**

- 2.1 **The Committee is asked to note the paper and the exempt supplementary information on Part 2 of the agenda.**

#### **3 IIPAG Quarterly Report**

- 3.1 Under its Terms of Reference, IIPAG is required to produce quarterly reports of its advice on strategic and systemic issues, logs of progress on actions and recommendations and the effectiveness of the first and second lines of project and programme assurance. IIPAG's quarterly report for December 2021 is included as Appendices 1 and 2 to this paper.

#### **4 Management Response to IIPAG Quarterly Report**

- 4.1 We note the identification of the common themes from reviews that IIPAG has highlighted. These align with specific recommendations raised from the assurance reviews undertaken. We will continue to monitor the completion of management actions within the business which address the specific recommendations.

**List of appendices to this report:**

Appendix 1: Independent Investment Programme Advisory Group - Quarterly Report  
December 2021

Appendix 2: Common Themes

Exempt supplemental information is contained in a paper on Part 2 of the agenda

**List of Background Papers:**

None

Contact Officer: Howard Carter, General Counsel  
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## Independent Investment Programme Advisory Group – Quarterly Report December 2021

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### 1. Introduction

- 1.1. This report to the Committee describes IIPAG's activities from September to mid November 2021. It contains no new strategic recommendations but describes common themes emerging from our reviews (see below and Appendix 2).

### 2. IIPAG activity

- 2.1. We have undertaken the following reviews which will be considered at this meeting:
- Railway Systems Enhancements
  - LU Fleet
  - Barking Riverside Extension
- 2.2. We have also undertaken a review of East London line Housing Infrastructure Fund.
- 2.3. We are engaged in continuous assurance of the Four Lines Modernisation programme. We are also participating in some targeted or interim reviews for Executive governance, covering Central Line Improvement Programme (CLIP), Piccadilly Line Upgrade and the New Oyster Reader technology project.
- 2.4. The accompanying paper from TfL Project Assurance describes management progress in implementing IIPAG's recommendations from sub-programme and targeted reviews.

### 3. Common Themes from Reviews

- 3.1. Whilst no new strategic issues have emerged from recent reviews, we have taken stock of our experience over the past 18 months to review the most common themes that arise repeatedly. These fall into the following eight categories:
- The systems and processes for project control and reporting
  - Capability and resources
  - Programme/portfolio management
  - Costs and risk
  - Commercial and contracting strategies
  - Governance
  - Value for money
  - Information

3.2. Appendix 2 provides further detail on what is covered by these themes. We will be monitoring how often they arise in sub-programme and project reviews, and will also ensure that our cross-cutting work continues to address these issues.

#### **4. Progress with Cross-cutting Work**

4.1. We are currently undertaking a review of lessons learned from recent major procurements, and we are finalising our report on Contract Forms. We are scoping a follow up review on the Procurement and Supply Chain (P&SC) transformation programme, and the second part of our review of Asset Information.

4.2. We are also reviewing the progress that TfL has made against the recommendations from our earlier cross-cutting work. We have undertaken a formal review of progress on our Value for Money recommendations, as reported in our last Quarterly Report, and our forthcoming review of P&SC, noted above, will consider progress in that area against our 2019 report. We believe it would be appropriate also to do a follow up review on our report on the Programme Management Office, and check on progress with Commercial Development. We will build these into our future work programme.

Contact Officer: Alison Munro, Chair of IIPAG  
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**Common Themes**

This appendix provides further detail on the common themes emerging from assurance reviews. These themes are not universal across TfL and there is much that is going well.

- 1) The systems and processes for project control and reporting
  - a) Project, programme and portfolio hierarchy.
  - b) Scope, cost and schedule baselines.
- 2) Capability and resources - most frequently shortages in TfL's own engineering, commercial, and project management resources.
- 3) Portfolio management
  - a) Existence/quality of overarching strategies.
  - b) Programme prioritisation.
  - c) Pipeline planning.
- 4) Costs and risk
  - a) Robustness of cost estimates.
  - b) Tracking of costs against estimates and the reasons for changes.
  - c) Adequacy of risk allowances.
  - d) Optimism in forecast progress and spend
- 5) Commercial
  - a) Commercial and contracting strategies.
  - b) Strategic supply chain relationship.
- 6) Governance
  - a) Complexity and integration of financial, commercial and project approval processes.
  - b) Rigour of Pathway gates and challenge in decision making at key project stages (especially in the face of schedule pressure).
  - c) Governance structures, clarity of roles and responsibilities.
- 7) Value for money (VfM)
  - a) TfL's VfM policy and approach.
  - b) Robust, comprehensive and up-to-date business cases.
  - c) Consideration of VfM in prioritisation.
  - d) Treatment of social and environmental objectives and benefits.
- 8) Information
  - a) Understanding of asset health.
  - b) Project and programme reporting.
  - c) Post investment evaluation/lessons learnt.

Improvements are underway to address many of these issues, and we note that steps are being taken to ensure that these efforts are appropriately integrated.

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## Programmes and Investment Committee

Date: 15 December 2021

Item: TfL Project Assurance Update



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### This paper will be considered in public

## 1 Summary

- 1.1 This paper provides an update on the project assurance work undertaken between 19 September and 8 November 2021. Two programme reviews were undertaken during this time, with the Independent Investment Programme Advisory Group (IIPAG) involved in both. In the same timeframe five project assurance reviews were undertaken, with IIPAG involved in two of these.
- 1.2 These reviews gave rise to a total of 27 recommendations being made, of which four were considered to be critical issues. Critical issues are those that the TfL Project Assurance team or IIPAG believe should be addressed before projects proceed to the next stage.
- 1.3 A paper is included on Part 2 of the agenda which contains exempt supplemental information that is exempt from publication by virtue of paragraph 3 of Schedule 12A of the Local Government Act 1972 in that it contains information relating to the business affairs of TfL. Any discussion of that exempt information must take place after the press and public have been excluded from this meeting.

## 2 Recommendation

- 2.1 **The Committee is asked to note the paper and the exempt supplementary information on Part 2 of the agenda.**

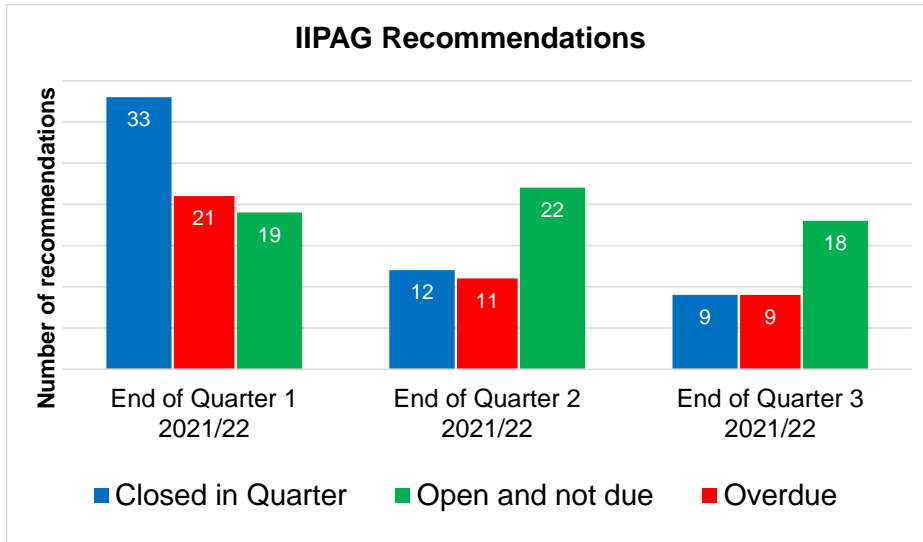
## 3 Background

- 3.1 The TfL Project Assurance update provides the Committee with a summary of the second line assurance, provided by TfL's Project Assurance team, and third line assurance, provided by IIPAG.

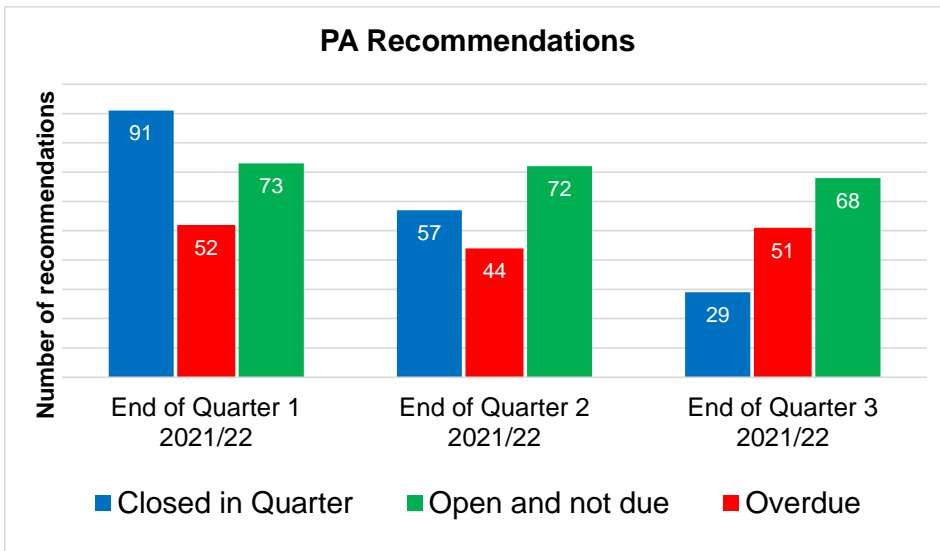
## 4 Summary of Project Assurance Activity

- 4.1 From the reviews undertaken, a total of 25 recommendations were made by TfL Project Assurance. These consisted of 21 general recommendations and four critical issues, with all these having been agreed with the respective project teams. Appendix 1 shows the critical issues that were raised.
- 4.2 IIPAG made two general recommendations with these agreed with the respective project teams.

4.3 The following graphs show the number of open recommendations, the number that are overdue, and the number closed in the last three quarters. The overdue recommendations include three overdue critical issues. One relates to the General Data Protection and Regulation Project and requires that there is a fully validated cost estimate; one is for Barking Riverside Extension and the project team being under-resourced; and one relates to the Central line Signalling and Control Life Extension Project and the need to ensure that the business case demonstrates value for money for all elements of the scope. There are no overdue IIPAG critical issues.



**Figure 1: IIPAG Recommendations**



**Figure 2: Project Assurance Recommendations**

**List of appendices to this paper:**

Appendix 1: New Critical Recommendations

Exempt supplemental information is included in a paper on Part 2 of the agenda.

**List of background papers:**

None

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## New Critical Recommendations

Shown below are the critical issues raised and agreed with the respective project teams.

Project: East London Line - Housing Infrastructure Fund		
Raised by	Critical Issue	Management Response
TfL Project Assurance	A programme-level business case should be created to demonstrate the value of the programme and to assess the relative case for stopping against continuing beyond the end of the preliminary cost phase.	The programme has four project-level business cases, and captures the information and impacts of progressing, cancelling etc. across other programme documentation and briefing papers. A programme-level business case will be created to pull together and improve the presentation of this information for decision-makers.
TfL Project Assurance	Develop robust estimates for all six projects and overall programme to demonstrate cost certainty and alignment to Housing Infrastructure Funding constraint, and address the funding shortfall. Estimates should include assumptions, benchmarking and costed risk register input.	Estimates which have been produced via Early Contractor Involvement and assured by TfL Estimating will be further developed via peer review recommendations and value engineering workshops. Further estimate certainty will be obtained upon finalisation of Concept Designs whereby contractor prices will be provided.

Project: Permanent Current Rail Indicator Device		
Raised by	Critical Issue	Management Response
TfL Project Assurance	The business case to benchmark/validate assumptions, include optimum bias and provide both more comprehensive sensitivity analysis, and a plan for future data recording to support benefits realisation. The case needs to set out the specific benefit effect of the different options more clearly, both alone and in combination. This analysis to inform decision-making on the best value scope.	The need to improve the safety of track access is clear following internal incident analysis. The sponsor is working to update the business case to provide further explanation of assumptions and to include additional sensitivity analysis and optimum bias. The structure will be reviewed to provide greater clarity on the benefit effects and where data should be gathered to monitor benefits realisation.

Project: Barking Riverside Extension		
Raised by	Critical Issue	Management Response
TfL Project Assurance	The Commercial team is critically under-resourced and must be urgently supplemented to protect TfL's commercial position and the teams' wellbeing.	Headcount Approval already sought and authorised, procurement through the Commercial frameworks is underway.

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## Programmes and Investment Committee



**Date:** 15 December 2021

**Title:** Barking Riverside Extension

**This paper will be considered in public**

### 1 Summary

<b>Barking Riverside Extension</b>					
Existing Financial Authority	EFC	Existing Programme and Project Authority	Additional Financial Authority Requested	Total Authority	Additional Procurement Authority Requested
£327.6m*	£331.1m	£328.5m	£0.9m	£328.5m	The amount set out in the paper on Part 2 of the agenda.

\* Reasons for the difference between the existing Financial and Programme and Project Authorities are set out at section 6 below.

- 1.1 This paper provides an update on the progress for the Barking Riverside Extension (BRE) project following the post-coronavirus safe stop and confirmation of revised Network Rail (NR) possession plans, the completion of the viaduct structure and an agreed strategy of construction responsibilities to complete the project. It is requesting an increase in Financial Authority of £0.9m and Procurement Authority for the Main Works Contract (MWC) of the amount described in the paper on Part 2 of the Agenda (which falls within the existing Programme and Project Authority).
- 1.2 The project will deliver a 4.5km extension of the electrified London Overground Gospel Oak to Barking line, from its current terminus at Barking to a new station in Barking Riverside. The four-train per hour service will support 4,000 homes currently being built at Barking Riverside and directly unlock a further 6,800 homes.
- 1.3 The Estimated Final Cost (EFC) of the project resides at the lower end of the range presented to the Committee on 11 December 2020, but is above the authorities granted at that time. The project team continues to plan to exploit the opportunities described in this paper to reduce the EFC to the level of Financial Authority and Programme and Project Authority granted by the Committee in December 2020 (the 2020 Authorities). We will keep the Committee updated of progress in these matters and seek further authorities in advance should they become required.
- 1.4 An increase in Financial Authority (raising it back to the 2020 Authorities) and a further increase in Procurement Authority is requested for the MWC, to meet its

contractual obligations and TfL agreeing to deliver some additional drainage on the east side of the station for the developer, Barking Riverside Limited (BRL). TfL is best-placed to deliver this drainage while on site as part of a co-ordinated effort to deliver wider infrastructure required for station opening at the earliest possible opportunity.

- 1.5 A paper is included on Part 2 of the agenda, which contains exempt supplementary information. The information is exempt by virtue of paragraphs 3 and 5 of Schedule 12A of the Local Government Act 1972 in that it contains information relating to the business affairs of TfL and which is legally privileged. Any discussion of that exempt information must take place after the press and public have been excluded from this meeting.

## **2 Recommendations**

- 2.1 **The Committee is asked to note the paper and the exempt supplementary information contained in the paper on Part 2 of the agenda, and:**

- (a) approve unbudgeted Financial Authority of an additional £0.9m for the Barking Riverside Extension project; and**
- (b) approve additional Procurement Authority for the Main Works Contract of the amount set out in the paper on Part 2 of the agenda; and**
- (c) note that the matters for which Authorities are sought include commitments that extend beyond the period of the Business Plan and Budget approved by TfL Board on 28 July 2021 and provision will need to be made in future business plans and budgets.**

## **3 Background**

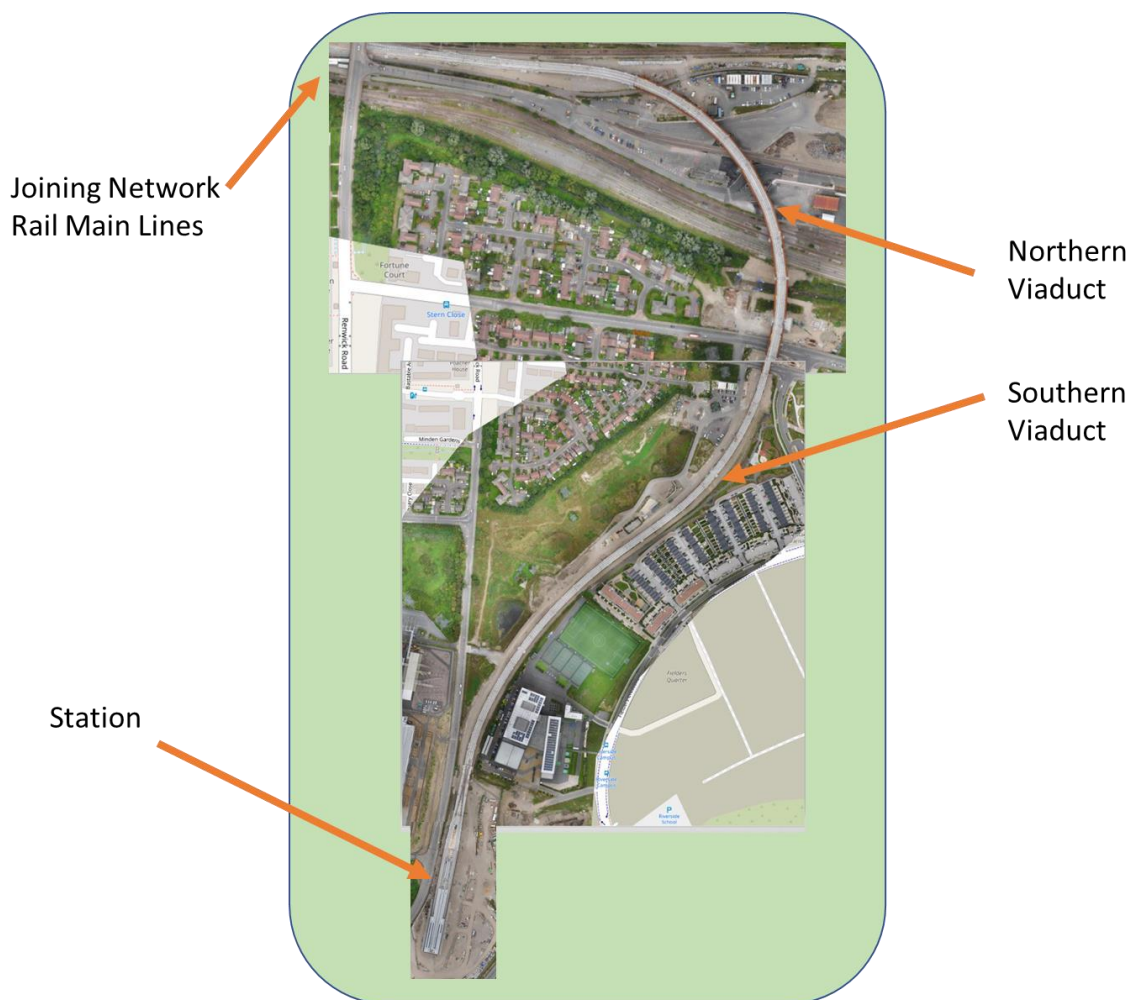
- 3.1 At the meeting of the Committee on 11 December 2020, the BRE project reported that – following the initial impacts of the coronavirus on the rail systems works, changes in the signalling designs and their interface with wider NR systems and the discovery of uncharted buried utilities issues – the EFC for BRE was expected to be within a range of £328.5m to £356.5m. The Committee granted an increase of Financial Authority of £43.1m and £34m Programme and Project Authority in line with the bottom of this range, taking both to £328.5m. The details of an associated increase in Procurement Authority for the MWC are set out in the paper on Part 2 of the agenda.
- 3.2 The December 2020 update to the Committee also reported that further work was required to re-plan the testing and transition activities for the project (including an NR timetable change) associated with revised BRE programme dates. Those programme dates forecast an ‘Entry into Service’ (EIS) range of July 2022-December 2022 although the full impacts of programme changes at that time were yet to be assessed.
- 3.3 We are now entering the final phase of the project and progress with the station and on the viaduct remains on track to complete by a most-likely EIS date in autumn 2022. Delays to the finalisation of the urban realm design around the



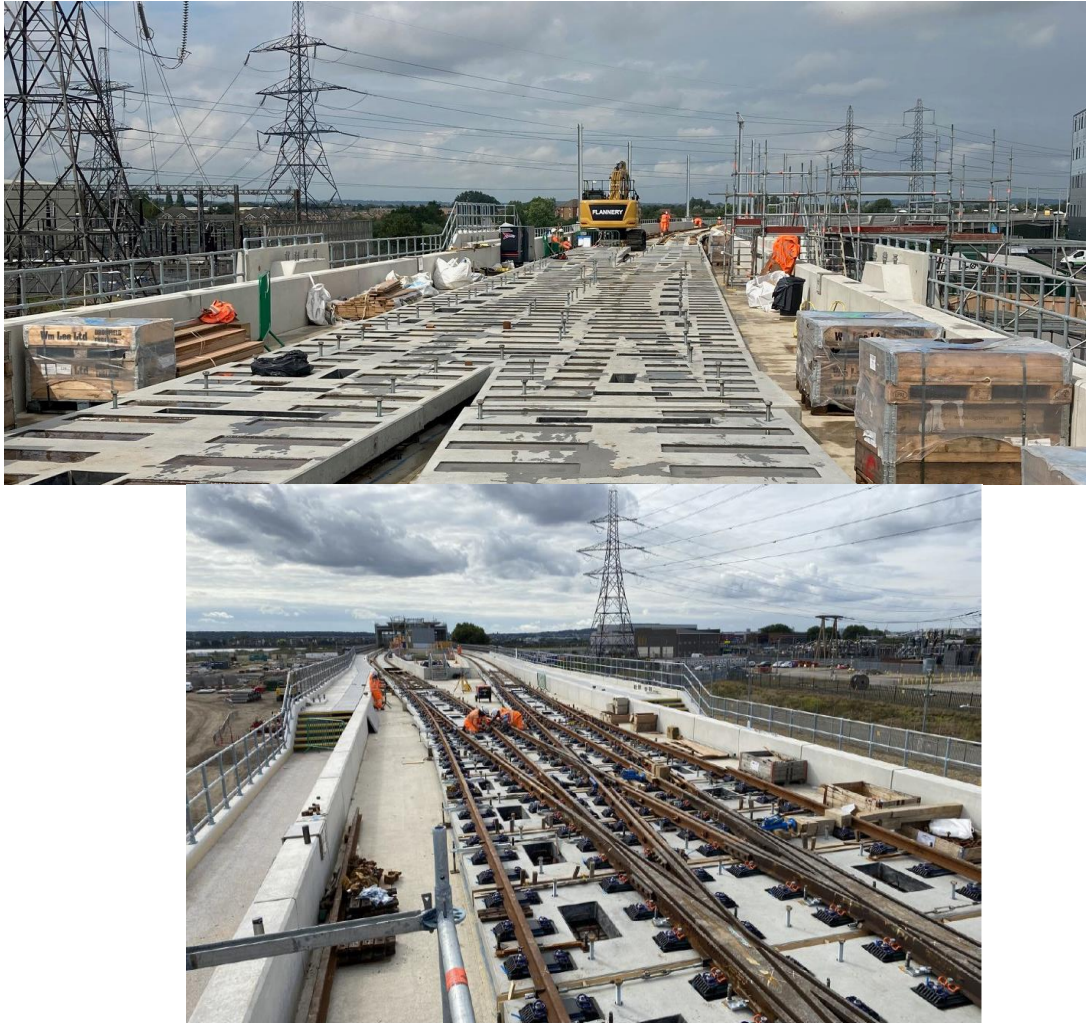
station have led to an alternative construction strategy having to be considered; this will enable us to open the station as early as possible while minimising the associated cost pressures.

## 4 Project Update and Challenges

- 4.1 In early 2021, successful consultation with NR and the region's train and freight operating companies secured the shortest timetable possible for the NR infrastructure possessions required to complete the remaining signal stages. Over the August bank holiday weekend, a halt of all services from Fenchurch Street to Shoeburyness was put in place to update NR's local signalling systems to recognise and test the new BRE extension. This paves the way for the final commissioning signal stage in two weekends in April 2022 to bring the extension into operational use.
- 4.2 On the rail systems construction side, the project achieved its Strategic Milestone for 2021 on time by completing the viaduct structure in July 2021 (see Figure 1). Following completion, the track slab installation has been completed (see Figure 2) on the viaduct and the final works (e.g. handrails and finishings) are due to be completed on the northern viaduct by the end of the calendar year.



**Figure 1: Completion of Viaduct Structure, July 2021**



**Figure 2:**  
**Track slabs, switches and crossings now installed, September 2021**

4.3 Construction works at the station have also progressed at a good rate (see Figure 3) and will complete on time by the end of 2021. Within the station though, some delays have been experienced in the Mechanical and Electrical workstream where lift installation was delayed by three months (now complete, see Figure 4) and the Public Address and Voice Alarm system (PAVA) was discovered to be non-compliant. Further modelling has been carried out and an updated PAVA design will now be delivered approximately four months later than previously programme schedule, which now includes acoustic barriers being installed.



**Figure 3: Station Glazing works and platform finishes being installed (above and below)**



**Figure 4: Lift installation complete three months behind schedule**

- 4.4 As reported at the Committee meeting on 11 December 2020, EIS was forecast to be achieved between July and December 2022. The above progress improves on this slightly with a forecast now of between June and December 2022, with EIS most likely to be achieved in autumn 2022. The final EIS date is now dependent primarily upon deciding how (and by which third party / supplier) the urban realm around the station should be delivered and how this completion fits with NR 2022 timetabling. The outcome of this decision – expected by January 2022 – will also determine the final station testing and commissioning dates for the station and handover to Arriva Rail London, who will operate services from Barking Riverside.
- 4.5 Under the Land and Works Agreement between the wider estate developer, Barking Riverside Ltd (BRL) and TfL, BRL is responsible for the design of the urban realm works around the station and TfL is responsible for constructing it.
- 4.6 Delivery of the urban realm formed part of the scope of the MWC, however delays in the production of a final agreed design for these works, their complexity and how they interface with the wider development has now made it uneconomical to complete using the MWC contract. The reasons for these delays and their commercial impacts are described in more detail in the paper on Part 2 of the Agenda. Planning permission for the station and surrounding urban realm has been submitted. When planning is granted and construction takes place, it will complete compliance with our last major Transport and Works Act Order planning condition.
- 4.7 A decision has been taken to reduce the scope of the urban realm works to be carried out under the MWC to those activities that are vital to make the station operationally ready for EIS. The remaining works will need to be carried out by a third party (the project is currently in discussion with BRL to assess whether they are better placed to complete the works) and we will also need agreement from the London Borough of Barking and Dagenham (LBBD) that ‘non-operationally essential public urban realm works’ can be completed once the station is open.

## **5 Economic Case**

- 5.1 The business case for the BRE has always been based upon the housing, local growth, and regeneration that the scheme unlocks – at the beginning of the project it was the largest brownfield site regeneration in Europe – rather than the pure transport benefits that it delivers.
- 5.2 The benefits of the scheme are still intact but were delayed following the programme challenges reported in December 2020. No more than 4000 homes on the development can be occupied before the station is open and the revised station is still on track to deliver by this ‘deadline’ (building construction on site has also faced a slow down for multiple reasons) and the opening will unlock a planning condition which will allow a further 6,800 homes to be occupied. It should be noted that house sales (and therefore future build) can only be strengthened by BRE opening at the earliest opportunity.
- 5.3 The new service is expected to initially run at an operating loss as a result of demand growing steadily as the new housing at Barking Riverside is built and occupied. Consequently, the operating account is not negatively impacted by a

delayed entry into service; it is forecasted to be 2030 before an operational surplus is realised.

- 5.4 The transport-only Benefits: Cost Ratio (BCR) for Barking Riverside remains poor value for money. However, the housing is a 'dependent development' on the new line opening and, in line with DfT guidance, once wider impacts are also considered for the scheme, including improved productivity and land value uplifts, an adjusted BCR of 1.9:1 still represents medium to high value for money. This is a slight reduction (previously just over 2.0:1) given the changes in demand forecasts following the coronavirus pandemic.

## **6 Financial Implications and Additional Authorities**

- 6.1 Current Financial Authority is provided through the two-year Budget for 2021/22 and 2022/23 that was approved by the Board on 28 July 2021 and provision is included in the proposed Budget submission to the GLA as will be presented to the Board on 8 December 2021. The BRE project is highlighted in within the 'managed decline' scenario reported to the Finance Committee on 24 November 2021.
- 6.2 It is noted that the current funding agreement with government expires on 11 December 2021 and additional government funding will need to be agreed beyond this period. Therefore, a subsequent prioritisation of the TfL Investment Programme will be required to ensure that all projects are affordable within the funding envelope provided and as such revised authority may need to be sought.
- 6.3 Authority granted by the Committee which relates to both the current funding period up to 11 December 2021 and commitments outside of this period, may need to be revised as part of future budgets to be considered by the Board. Provision will also need to be made in future Budgets and Business Plans in respect to commitments made. If additional funding is not available, a prioritisation of the TfL Investment Programme will be required, and some programmes and projects will not be taken forward and revised authority will be sought as appropriate.
- 6.4 All financial commitments related to this request will be overseen in accordance with TfL Business controls in respect of draw down.
- 6.5 As noted in paragraph 3.1, Programme and Project Authority and Financial Authority (each of £328.5m) were granted in December 2020 for BRE based upon an EFC range at the time of £328.5m - £356.5m. By May 2021, the EFC was tracking at a level of £327.6m which informed the Budget for 2021/2022 and 2022/23, approved by the Board on 28 July 2021. During the summer of 2021 the EFC increased by £3.5m, predominantly driven by the impacts of PAVA and urban realm described in section 4 of this paper. Since this increase, the EFC has remained relatively steady at £331.1m. As the project team are striving to remain within 2020 Authorities, the Committee is only being asked to approve the necessary increase of Financial Authority to £328.5m.
- 6.6 Procurement Authority for the MWC contract, having been increased in December 2020 in line with the increase of the EFC, now requires a further, albeit much smaller, increase by the amount set out in the paper on Part 2 of the

Agenda for the MWC to complete its contractual obligations. This is based on the increase in the EFC and also includes around £650k for the completion of an additional scope item of drainage (on the east side of the BRE station). Connecting the foul and surface water drainage of the station to the wider drainage network drainage was the responsibility of BRL. However detailed design work and the programme revealed that it would delay station opening if BRL had to wait until the main works contractor vacated this area before they could complete this construction. As a result, a decision was made to use the MWC to cover this scope (largely funded by BRL) and the works have been completed - before station completion and at least six months earlier than they would originally have been.

- 6.7 The final cost of the project will be heavily influenced by the eventual EIS date – primarily linked to the urban realm procurement route (and its cost) – and the outcome of TfL’s ability to recover costs incurred in relation to the design elements of the project. Further details of these and how the EFC and scope of the project have changed over time are described in the paper on Part 2 of the Agenda.

## **7 Assurance**

- 7.1 An internal assurance review and Independent Investment Programme Advisory Group assurance review took place in October and November 2020, primarily focused on cost increases and the project’s operational readiness planning. Five recommendations were made; four of which were closed but one remains open to ensure sufficient commercial resources are allocated to the project.
- 7.2 The same parties carried out a review in October and November 2021. Aside from the commercial resources issue, four other general recommendations and actions to be taken by the project team are described in the paper on Part 2 of the agenda.

### **List of appendices to this report:**

Exempt supplemental information is contained in a paper on Part 2 of the agenda

### **List of Background Papers:**

TfL Project Assurance Reports

Management response to TfL Project Assurance Report

Papers submitted to the meeting on 11 December 2020

Contact Officer: Alexandra Batey, Director Investment Delivery Planning  
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Contact Officer: Stuart Harvey, Director of Major Projects  
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## Programmes and Investment Committee



**Date:** 15 December 2021

**Title:** London Underground Fleet Heavy Overhaul, Fleet and Engineering Vehicles Programmes

**This paper will be considered in public**

### 1 Summary

Programme	Existing Financial Authority (£m)	EFC (£m)	Existing Programme and Project Authority (£m)	Additional Authority Requested (£m)	Total Authority (£m)
FHO	600.44	602.21	346.23	14.72	360.95
APCD Fleet	751.62	748.41	625.87	8.72	634.59
Engineering Vehicles	355.41	351.84	75.65	11.11	86.76
<b>Total</b>	<b>1,707.47</b>	<b>1,702.46</b>	<b>1,047.75</b>	<b>34.55</b>	<b>1,082.30</b>

**Table 1: Programme and Project Authority requests up to and including FY2027/28.**

**Authority Approval:** The Committee is asked to approve additional Programme and Project Authority of £34.6m across the FHO, APCD Fleet and Engineering Vehicles Programmes, bringing the total authority to £1,082.3m\* up to and including FY2027/28.

**Outputs:** Compliance of London Underground’s passenger trains and engineering vehicles with safety standards and legislation, securing expected reliability and availability levels, and the capability to cater for future forecast demands of the network.

\*Figures subject to change as this is based on P08 Forecasts and Budget agreed in July 2021

- 1.1 This paper covers three train related programmes in London Underground (LU):
- (a) Fleet Heavy Overhauls (FHO) – delivers essential, large scale maintenance of the passenger train fleets and rail adhesion trains as part of the train maintenance regime, to preserve a safe and reliable service;
  - (b) Asset Performance & Capital Delivery (APCD) Fleet – deliver projects that renew life expired or degraded components on passenger trains beyond the scope of FHO, or reconfigure trains to comply with legislation; for example, installing passenger accessibility and information systems,

installing LED lighting, replacing obsolete and unsupportable traction units and addressing train underframe fatigue failures; and

- (c) Engineering Vehicles (EV) – deliver projects related to the EV fleet that serve and support the track renewal programme.
- 1.2 Noting that FHO has previously been a separate submission to Fleet and EV (previously referred to as the ‘Access’ Programme), this paper provides an update on progress since the last submissions to the Committee and requests an additional £34.6m Programme and Project Authority across the three programmes. The request brings the collective total Programme and Project Authority to £1,082.3m and enables continuation of delivery consistent with Asset Strategy and **do minimum scenarios** in the **Long Term Capital Plan (LTCP)** to FY2027/28.
- 1.3 The Integrated Asset Strategy for passenger trains is to ensure compliance with legislation (e.g. accessibility regulations), manage obsolescence of ageing systems such as CCTV and train management systems, ensure the safety of passengers, and provide a reliable train fleet via a considered and optimised heavy maintenance schedule. For EVs, the vision is to mechanise historically labour intensive, lineside track work by introducing new, modern vehicles, plant and equipment to increase productivity whilst simultaneously improving the safety of our workforce.
- 1.4 The paper outlines the programmes that support these strategies, on a project by project basis and is a combined update to the December 2020 submission for FHO and March 2021 for Fleet and EV. Key outputs for these Programmes include (but are not limited to):
- (a) modified Central and Bakerloo line trains that permit accessible travel for mobility impaired passengers;
  - (b) improved reliability on the Central line fleet, by replacing the aging and obsolete DC traction package with a modern AC equivalent (noting some limited overhaul scope prior to replacement), and on the Jubilee line by progressing a long-term solution to the fatigue cracking issue that faced the fleet in late 2019;
  - (c) overhaul of major components and systems on the fleets that serve the Piccadilly, Bakerloo, Jubilee, Victoria and Metropolitan lines;
  - (d) two new vehicles to replace our sole, aged vehicle used to measure track geometry, informing track maintenance priority. The second vehicle will help LU meet the highest inspection frequency standards;
  - (e) commissioning of recently received new vehicles that improve Points and Crossing renewals, and development of a vehicle to improve safety and productivity of deep tube track and concrete renewal; and
  - (f) procurement of a replacement fleet of support wagons to replace the near life-expired wagon fleet, and progress early stages of replacement of the aged locomotives fleet used to haul plant and equipment through the LU network.



## 2 Recommendations

### 2.1 The Committee is asked to note the paper and:

- (a) **approve additional Programme and Project Authority of £14.72m (outturn including risk) to progress mandatory overhaul works within the Fleet Heavy Overhaul Programme. This is the minimum additional authority required to continue this multi-year, in-flight essential maintenance programme and brings the total FHO Programme and Project Authority to £360.95m;**
- (b) **approve additional Programme and Project Authority of £8.72m (outturn including risk) for Central line train improvements and progress rectification of the underframe fatigue cracking issue on the Jubilee line fleet within the Fleet Programme, bringing the total Programme and Project Authority to £634.59m; and**
- (c) **approve additional Programme and Project Authority of £11.11m (outturn including risk) to design a replacement fleet of locomotives, enhance the Mechanical Renewals Vehicle prototype into an on-track machine, and continue the EV overhauls within the Engineering Vehicles Programme, bringing the total Programme and Project Authority to £86.76m.**

## 3 Background

- 3.1 The LU passenger fleet is comprised of 619 trains, across eleven lines, made up from nine fleets, ranging in age from eight year to nearly 50 years old. There is a broad relationship between fleet age, current performance and the works defined in this paper (and longer term strategy). The on-going FHO programme is essential for maintaining minimum acceptable levels of safety and reliability, while the Fleet programme is addressing more severe issues, for example, the poor performing fleet on the Bakerloo and Central lines as detailed in Appendix 1.
- 3.2 The Long Term Capital Plan (LTCP) and fleet asset strategy lay out the roadmap for fleet management, renewals and full replacements in a controlled manner accounting for such factors as market capabilities, financial constraints, existing fleet condition and the needs of network growth. Relatively recently, S7 and S8 trains have been introduced on the Metropolitan, District, and Hammersmith and Circle lines. Piccadilly line trains are due to be replaced from 2025. These trains have and will address age related asset concerns.
- 3.3 Various scenarios have been considered to evaluate how long each fleet might be required to remain in operation. Given the timescales to replace a fleet can stretch to 10 years and to mitigate against the current long-term funding uncertainty, programmes of interventions have been scheduled accordingly to maintain fleet safety and operability, and to ensure compliance with legislation.
- 3.4 Similar to passenger trains, the EV asset strategy sets out the steps to replace and enhance existing capabilities. LU has 275 Engineering Vehicles (EVs), including one specialist track recording vehicle, tampers, cranes, wagons and haulage locomotives. This is a specialised fleet, critical to the upkeep and

management of the railway. Some of the locomotives are already 50 to 60 years old, with 100 years old components in some instances.

- 3.5 A record high of more than 200 vehicles were classified as being in a 'very poor' State of Good Repair, until investment in an EV overhaul programme was made to curtail such deteriorating condition. Recent replacement of vehicles aims to recover this backlog and introduce modern efficient vehicles to undertake track condition inspection and support various track interventions, and the works described in this paper will continue this.
- 3.6 The Programmes support the Mayor's Transport Strategy (MTS) objective of 'providing a good public transport experience' and contribute to the aim within the MTS for 80 per cent of trips in London to be made on foot, by cycle or using public transport by 2041. The Programmes also support LU's priorities for 'Safety and Reliability', 'Customer', 'People' and 'Affordability'.

## 4 Delivery Progress since last submission

- 4.1 Since the last submissions, the Programmes have begun to recover from the impact of the coronavirus pandemic. Challenges of resourcing in early stages of design to prototyping have impeded the delivery progress to enter full production. A LU Fleet Capital Delivery resource management strategy is being developed with professional service business leaders to control and address these issues.
- 4.2 A snapshot of deliverables against those committed in the last submissions to the Committee and EFC changes is provided in Appendix B, while key highlights for selected projects are detailed in the sections below.

### Fleet Heavy Overhaul Programme

- 4.3 The **FHO** Programme delivers heavy maintenance activities on passenger fleets and Rail Adhesion Trains (RATs). These activities are part of the routine maintenance of any fleet which necessitate the removal of trains from service to undergo:
- (a) **Programme Lift**, which predominately overhauls the suspension, wheelsets, motors and brake systems;
  - (b) **Heavy Overhaul**, which includes the programme lift activities but also encompasses overhaul of auxiliary and heating and ventilation systems;
  - (c) **Door Overhaul**, which services the door system; and
  - (d) Other activities, which have been deemed more efficient and cost effective to undertake when the train is out of service.

4.4 **Victoria line:** Programme lift was successfully completed on the whole fleet at the end of the FY2020/21 and through commercial activity, realised a £2.1m efficiency saving. At the end of the programme, 6 trains were returned for completion of work relating to parking brakes and bogie-motor harnesses; this 90 per cent complete with expected completion by the end of the financial year. Figure 1 below shows installation trials of a new pressurised ventilation system to

reduce ingress of tunnel dust (and reduce whole life costs) has been completed on 7 trains.



**Figure 1: Installation trials of a new pressurised ventilation system**

- 4.5 **Bakerloo line:** Being the oldest on the network, the fleet is subject to an ongoing overhaul programme to safeguard continued operation. Programme lift and heavy overhaul has been completed on 11 and three trains respectively. Engineering activities have commenced on door overhaul. The process of disposing of a non-service Bakerloo line train previously assigned for filming purposes has commenced as this has been evaluated as better value compared to refurbishment costs.
- 4.6 **Piccadilly line:** Life extension has been completed on 11 trains, door overhauls and new flooring laid on 25 trains, traction equipment overhauled on five trains and new seating installed on 40 trains. The existing fleet is required to remain operational until 2027 when they will be replaced. To support this continued operation, a programme lift cycle has commenced and 10 of the 59 units are complete including fitment of new axles as shown in figure 2 below.



**Figure 2: Fitment of new axles**

- 4.7 **Metropolitan line:** The first four trains have completed Programme lift and returned to service with newly overhauled bogies. Procurement activities (materials and tooling) and training of depot and engineering workshop resources is in progress to prepare for full production and overhaul at a rate of one train per week in 2022.
- 4.8 **Jubilee line:** Enabling works in preparation for Programme lift commencing in 2022 are in progress, e.g. material procurement, recruitment of resources and installation of plant and equipment in the existing Temporary Fit Out Shed (TFOS). Figure 3 below shows new jacks installed in the TFOS. The project completed condition assessment of doors and developed an indicative overhaul scope.



**Figure 3: New Jacks installed in the TFOS**

- 4.9 **District, Circle and Hammersmith & City lines:** With trains similar to those of the Metropolitan line fleet, data and experience gained from the programme lift is being used to inform optimisation of scope and programme of District, Circle and Hammersmith & City lines. Door condition assessments are in progress as is a final review of coupler overhaul scope for which suppliers have been engaged.
- 4.10 **Rail Adhesion Trains (RATs):** Overhaul of the second Central line RAT was successfully completed in advance of and hence ready for start of the Autumn 2021 leaf fall season.

### **Fleet Programme**

- 4.11 The **Fleet** Programme delivers targeted interventions that fall outside of the routine maintenance regime to safeguard regulatory compliance (e.g. Bakerloo line Rail Vehicle Accessibility Regulations) safety levels, reliability or work requiring redesigns (e.g. Central Line Improvement Programme – CLIP).
- 4.12 The **Central Line Improvement Programme (CLIP)** provides accessibility, reliability and safety improvements, as well as the addition of CCTV, ensuring trains on the Central and Waterloo & City lines<sup>1</sup> remain safe and fit for purpose

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<sup>1</sup> The Central line consists of 85 eight-car trains. The Waterloo and City line consists of five four-car trains.

until replacement as per the Fleet Asset Strategy and LTCP. A new AC traction propulsion system has been successfully tested and the outputs of this stage are informing the production process planned for the rest of the fleet, as shown in figure 4 below. Static testing of the integrated, new data transmission system, CCTV, Passenger Information System (PIS) and LED lighting has also completed. CLIP has also installed the wheelchair bay componentry on the first Waterloo and City line train ahead of programme. The programme will refurbish and repair saloon seats while the train is taken out for CLIP, as shown in figure 5 below.



**Figure 4: AC Traction dynamic testing at an off-site test track**



**Figure 5: Saloon Car Installation**

- 4.13 In July 2021 the newly commissioned **train modification workshop** at Acton Works began work on the first CLIP pre-production train (see 4.12 and figures 6 and 7 below) moving into the AC Traction phase.



**Figure 6: First CLIP pre-production train being shunted to TMU, Acton**



**Figure 7: First CLIP pre-production train being lifted at TMU, Acton**

- 4.14 The **Jubilee line Underframe Modification Project (JUMP)** is the result of routine inspection in Oct 2019 where fatigue cracks were discovered under several Jubilee line trains. At the time, this led to swift withdrawal of 74 per cent of trains from passenger service. Although a temporary repair was quick to return the fleet to service, associated disruption was significant. The project is accelerating into design development of a long-term solution, with early stage commercial activities also progressing. The delivery approach will aim to minimise

impact on the passenger train service and seek out available synergies to reduce costs by collaborating with FHO Programme.

- 4.15 On the **Bakerloo line** trains, work began to install LED lighting and a Passenger Information System (PIS) to comply with Rail Vehicle Accessibility Regulations (RVAR). Only one out of the planned eight trains has completed fitment of wheelchair bays and new colour contrasted grab poles. Competing demands from other fleet projects with limited engineering resource pool has unfortunately impacted project progress, meaning timelines agreed with the Department of Transport (DfT) for RVAR compliance are at risk.
- 4.16 The **Train Cab J-Door Security Improvement** project will prevent unauthorised access through the internal 'J' door that connects the train operator's cab and the train saloon across all LU passenger train fleets. This project has experienced prolongation due to the similar engineering resource issues. As such, this has seen the original planned mobilisation in Spring 2021 deferred to Winter 2021. Our operators have been engaged throughout the process.

### **EV Programme**

- 4.17 The **EV** Programme includes engineering vehicle and specialist train projects. They comprise of battery locomotives (for haulage capability), various wagons for different activities, plant and equipment such as cranes and tampers. LU also rely upon specialist rail vehicles such as the Track (geometry) Recording Vehicle (TRV) for mandatory condition and safety assurance duties.
- 4.18 The Programme is also delivering a number of complex specialist vehicles bespoke to the constraints of LU's infrastructure. These replace and/or enhance existing capabilities and assets. Meantime, this programme ensures legacy vehicles continue safe operations often in excess of their originally intended design life.
- 4.19 The **Locomotive Capability** project completed an options development study inclusive of signalling and value management to support the LTCP on the replacement of the aged battery locomotive fleet. These trains are used to haul plant and equipment around the network predominantly in support of the track renewal programme. Increasing numbers have defects that have resulted in one being withdrawn from service.
- 4.20 The **Remote Track Monitoring (RTM)** project aims to support 'boots free' track geometry recording, replacing capability currently provided by the Track Recording Vehicle (TRV). Without the TRV, there is no alternative method to record track geometry meaning LU would need to apply temporary speed restrictions to assure railway safety, which would impact passenger service. Slow progress in procuring the replacement capability – a result of the coronavirus pandemic – meant TRV modification was needed to operate on the sub-surface lines following commissioning of the signalling upgrade (delivered by the Four Lines Modernisation (4LM) programme). This work is now complete and a new project will explore mitigations to allow the TRV to operate on the Bakerloo and Jubilee lines without a need for special operational measures.

- 4.21 The **Mechanised Renewals Vehicle (MRV)** aims to improve current labour-intensive methods employed to renew track and concrete structures in the deep tube tunnel environment. An in-house designed and built prototype vehicle, shown in figure 8 below, successfully trialled on the Piccadilly line in May 2021 and is planned to be brought into beneficial use at Turnpike Lane in January 2022. One wagon is fitted with cement-mixers with chutes for concrete pouring, whilst two more wagons are re-purposed for material transport. The MRV efficiencies target is to triple deep tube track renewal meterage per shift by 2025/26 with efficiencies ramping up from 2023.



**Figure 8: An in-house designed and built prototype vehicle**

- 4.22 Rectification of quality non-conformities on the four pre-production **wagons** received from China are slow due to the coronavirus impacts on supply chain and restrictions on international travel. A fifth pre-production wagon (with lessons learned from its predecessors) is now in transit from China by ship (expected in January 2022). A sixth and seventh pre-production wagon have been built. Works on the four wagons already in the UK are still being checked before being accepted onto the Great Central Railway (a heritage rail test track) and then on a Network Rail test track for dynamic testing. The project is pursuing third party surveillance in place of being in Shandong, China to ensure quality assurance through the mass production phase. Subject to satisfactory assurance outcomes, delivery of the remaining 66 wagons, starting with bogies, will now commence in Summer 2022. Continuing delays will incur additional expenditure to life extend existing wagons to support the track programme.
- 4.23 Mechanised **Modular Points & Crossing** system comprising of two Kirow cranes and eight tilt wagons successfully completed dynamic brake testing at the South Ealing test track and are fully certified to work in Ruislip Depot. Engineering assurance is ongoing for the open sections of the Sub-Surface network (SSR) which has proved challenging due to shortfall of resources as experienced across many projects and programmes. LU aims to bring the new system into use by Easter 2022, where it is envisaged that reduced blockades will save TfL up to £0.3m per closure (2 to 3 per year) and minimise disruption to passenger service.



**Figure 9: Kirow crane passing South Ealing station**



**Figure 10: Kirow wagon hauled by battery locomotives**

- 4.24 **Ruislip EV Depot track**, by the Central line maintenance shed, has been improved by the Track Programme for long-term operational and maintenance efficiencies. This also enables temporary stabling of existing rail vehicles while reconfiguration and expansion of the depot tracks start in Spring 2022 to accommodate the new wagons arriving from China, and eventually the replacement (heavy haulage) battery locomotives.
- 4.25 **EV Overhauls** is rolling into the sixth year of the 10-year programme. This exists to progressively overhaul 108 different wagon types (hopper, general purpose and rail wagons), bespoke cranes, on-track machines, and the battery locomotive fleet. To date, the programme has fixed structural defects on the hopper wagon fleet, overhauled more than 40 per cent of wagon fleet and a 7.5 tonne crane. Asbestos removal and replacement of wheel suspension parts have also completed on all locomotives. It is prioritising key works such as fleet wide bogie and traction motor overhaul to rectify critical issues to maintain locomotives availability.

## **5 Key deliverables for the Programmes**

- 5.1 The three Programmes are summarised in Tables 2, 3 and 4 (all figures include risk and inflation up to FY2027/28). Tables present the projects and associated financial impact to FY2027/28. A more detailed breakdown of these tables is provided in Appendix C illustrating each constituent project and associated key deliverables expected of each programme to December 2022.
- 5.2 Financial Authority is granted per the Budget, approved by TfL Board in July 2021. In some cases, project EFC's are in excess of financial authority, often for the latter years of projects. Where this is the case, provision will also need to be made in future Budgets and Business Plans in respect to commitments made.
- 5.3 The Programmes deliver value for money by sourcing commonly available components to replace obsolete electronic parts for reliability and safety. Procurement strategies adopt a category management approach and drive value through consolidation across projects, competitive tendering and negotiation, and develop strategic supplier relationships to encourage innovation and delivery.
- 5.4 Specifically, FHO achieved value for money through detailed scope development using failure data and undertaking conditional assessments. Once the production is well understood, the Programme will review opportunities to combine



procurements to leverage economies of scale and where appropriate, look for cheaper alternative sources of supply to mitigate the reliance on the original equipment manufacturers.

### **Fleet Heavy Overhaul Programme**

- 5.5 Table 2 below presents a summary of the FHO Programme. The work delivered by projects within this programme are standard heavy maintenance activities and driven by the size of the fleets. Majority of the £14.7m new authority request will complete the Bakerloo (£4.5m) and Piccadilly line (£3.9m) Programme Lift and heavy overhaul of 24 trains, as well as implementing door overhauls for these lines. A further £4.3m is allocated to the overhaul of Central line fleet DC traction motors due to delays in the CLIP full production phase, where these motors will be replaced by more reliable AC equivalents.
- 5.6 An additional £1.0m new authority will finish overhaul of the two Central line RATs and kick-start a scoping exercise for the Metropolitan line RATs. Also, £0.9m is requested for Jubilee line Programme Lift, whilst £0.1m supports condition assessment of doors overhaul of the Metropolitan line fleet.
- 5.7 A more detailed breakdown of this request is provided in the Appendix 3 along with key deliverables to December 2022.

	<b>Financial Authority (£m)</b>	<b>Estimated Final Cost (EFC) (£m)</b>	<b>Existing P&amp;PA (£m)</b>	<b>This Authority Request (£m)</b>	<b>Future Authority Requests (£m)</b>
<b>Continuing Projects Sub-Totals</b>	591.44	597.91	346.23	10.42	249.42
<b>New Projects Sub-Totals</b>	9.00	4.30	-	4.30	-
<b>Closed Projects Sub-Totals</b>	-	-	-	-	-
<b>Totals</b>	600.44	602.21	346.23	14.72	249.42

Financial Authority is granted by the Budget approved in July 2021 by TfL Board.

\* Financial Authority will be aligned to the overall EFC as part of the next budgeting cycle before the next submission to the Committee.

### **Table 2: Summary of the FHO Programme to 2027/28**

- 5.8 The request for an additional £14.7m Programme and Project Authority will bring the total to £360.9m.

### **Fleet Programme**

- 5.9 The Programme works closely with the FHO Programme and fleet maintenance to maximise efficiencies when trains are taken out of service for works. For on-going projects, the Fleet Programme requests £4.7m new authority to progress seat refurbishment and repairs within CLIP scope. This will enhance the customer travel experience by providing new seat cushions and seat suspension pans where required. It will also introduce the moquette indicating priority seating as already proving successful on the Jubilee line fleet.

- 5.10 Separately, £3.9m new authority is sought for JUMP to develop the concept design and move into the procurement stage, providing the long-term fatigue cracking solution. A further, nominal £0.1m authority request is also made to enable critical new projects on Victoria and Jubilee line trains. Such new projects intend to address pending obsolescence issues with CCTV, Train Management Systems (TMS), Customer Information Systems (CIS) as well as progressing residual life assessments for Central, Bakerloo and Jubilee lines.
- 5.11 Some projects have also completed. Closing projects relate to the Jubilee mid-life refurbishment, which included installation of wheelchair bays and other RVAR related scope, Bakerloo life extension which improved the structural integrity of this aged fleet, and conversion of an redundant Metropolitan line train (the fleet has since been replaced) for rail adhesion purposes.

	Financial Authority (£m)	Estimated Final Cost (EFC) (£m)	Existing P&PA (£m)	This Authority Request (£m)	Future Authority Requests (£m)
<b>Continuing Projects Sub-Totals</b>	576.76	581.85	533.78	4.69	62.93
<b>New Projects Sub-Totals</b>	86.40	78.07	1.09	4.03	73.91
<b>Closed Projects Sub-Totals</b>	88.46	88.49	91.00	-	-
<b>Totals</b>	751.62	748.41	625.87	8.72	136.84

\* Financial Authority is granted by the Budget approved in July 2021 by TfL Board.

\* Financial Authority will be aligned to the overall EFC as part of the next budgeting cycle before the next submission to the Committee.

### **Table 3: Summary of the Fleet Programme to 2027/28**

- 5.12 The request for an additional £8.7m Programme and Project Authority will bring the total to £634.6m. The EFC increase across the Fleet Programme is largely attributed to the material costs and TfL labour rates. This is expected to stabilise as production ramps up to a steady beat rate.

#### **Engineering Vehicles Programme**

- 5.13 The minimum investment requested for the EV Programme is summarised in Table 4 and will bring in new vehicles to address the aging asset base, return to a steady state of planned heavy overhauls, and to support major track works. The programme seeks value for money by working with asset operators to deliver fit for purpose EVs with common spares to reduce the whole life costs.
- 5.14 With the critical repairs on the locomotives underway, EV is requesting additional £9.0m authority to overhaul six locomotives, cranes and tampers, as well as catch back work on 24 wagons over the next two years. £1.0m authority is requested to enable the replacement locomotive project develop technical requirements, assisted by signalling experts (to enable the new fleet to operate across the various signalling systems LU employ). Additionally, £0.8m authority is sought to

investigate a new deep tube tamper, EV braking solutions; and TRV mitigations to unplanned outages until it is replaced by the med term RTM project. Finally, £0.3m is requested to progress the MRV beyond the prototype stage, bring the Kirow system into full beneficial use, and to start concept design on a coupler modification.

	Financial Authority (£m)	Estimated Final Cost (EFC) (£m)	Existing P&PA (£m)	This Authority Request (£m)	Future Authority Requests (£m)
<b>Continuing Projects Sub-Totals</b>	320.24	316.98	75.45	10.36	231.19
<b>New Projects Sub-Totals</b>	35.17	34.86	0.20	0.75	34.12
<b>Closed Projects Sub-Totals</b>	-	-	-	-	-
<b>Totals</b>	355.41	351.84	75.65	11.11	265.31

\* Financial Authority is granted by the Budget approved in July 2021 by TfL Board.

\* Financial Authority will be aligned to the overall EFC as part of the next budgeting cycle before the next submission to the Committee.

**Table 4: Summary of the EV Programme to 2027/28**

## 6 Equalities Implications

- 6.1 These programmes will be delivered in accordance with the Equality Act 2010. As projects progress through feasibility and design, consideration will be given to the need for an Equality Impact Assessment (EqIA).
- 6.2 The FHO and EV Programmes constitute maintenance activities which do not impact on people and ways of working and therefore in consultation with Diversity and Inclusion, EqIAs are not required.

## 7 Financial Implications

- 7.1 Table 5 summarises the financial impact of the three Programmes combined, by year. All cost figures include risk and inflation and illustrate plans up to and including 2027/28. This is considered as the minimum authority required to continue these multi-year, predominantly in-flight projects across all Programmes.
- 7.2 Total Financial Authority of £1,707.5m is based on the Budget approved in July 2021, which didn't include allowances for LTCP workbank scope. This will be addressed as part of the most recent budgeting cycle (based on the EFC's in this paper) to be presented to Board on 8 December, TfL Business Plan will also align the Financial Authority with the LTCP prior to the next submission to the Committee.

Costs and Funding (£m)	Prior Years	2021/22	2022/23	2023/24 to 2027/28	Total
Cost (Outturn)					
Existing Programme and Project Authority	306.94	110.35	195.60	434.86	1,047.75
This Authority Request	-	0.45	22.01	12.09	34.55
Future Authority Requests	-	-	17.34	634.22	651.56
Financial Authority*	304.34	113.39	238.58	1051.16	1,707.47
Programme EFC	304.59	89.96	217.64	1090.27	1,702.46

\* Financial Authority is based on the Budget approved in July 2021 and the EFC is reflected in the proposed budget to be submitted as part of the GLA Budget.

**Table 5: Summary of All Programmes to 2027/28**

- 7.3 Authority granted by the Committee which relate to both the current funding period to 11 December 2021 and commitments outside of this period, may need to be revised as part of future budgets to be considered by the Board. Provision will also need to be made in future Budgets and Business Plans in respect to commitments made. If additional funding is not available, a prioritisation of the TfL Investment Programme will be required, and some programmes and projects will not be taken forward and revised authority will be sought as appropriate.
- 7.4 All financial commitments related to this request will be overseen in accordance with TfL Business controls in respect of draw down.

## 8 Challenges, Opportunities and Lessons Learnt

- 8.1 **Challenges:** The scarcity of resources in engineering and support functions across TfL combined with the production phase of the LU sub-programme is a huge challenge to the UK labour market, depot facilities and logistics. TfL has also seen supplier prices and lead times of materials increased globally whilst working with suppliers to hold stock of raw materials/finished goods. This in turn challenged the programmes to adapt their schedules and allow catch back on outstanding work due to material delays.
- 8.2 **Challenges:** Our passenger fleets, being unique to London Underground, can restrict the opportunity to competitively tender. The Fleet and FHO Programmes are therefore actively looking for opportunities with Alternative Equipment Manufacturers both in and outside the Train Builder Supply to seek value for money from a wider supply chain.
- 8.3 **Opportunity:** The Programme has taken the opportunity to combine material procurement across the fleets to reduce unit rates and drive added value from the supply chain, achieving £30m of efficiencies to date. These are tracked in conjunction with Finance. Recent significant procurements in line with the procurement approach delivered £6.27m of efficiencies on their own (Victoria line (09TS) train fleet Doors and wheelsets for the Piccadilly (73TS) and Jubilee (96TS) fleets).

8.4 **Lessons Learnt:** Following delivery of heavy overhauls to date, it was identified that such refurbishments required three years of project works before delivery of the first train due to the condition assessments, governance and procurement of long lead items. Planning for this period also allowed enough time for any reverse engineering activity to support future competitive tendering/alternatives sources of supply. These lessons are being applied to the rest of the programme.

## 9 Assurance

9.1 TfL Project Assurance and the Independent Investment Programme Advisory Group (IIPAG) completed an assurance review of the Programme in November 2021. No critical issues were identified.

### **List of appendices to this report:**

Appendix 1: Fleet Reliability and EV State of Good Repair

Appendix 2: EFC Movements and Planned vs Forecast Scope

Appendix 3: Project by Project Details

### **List of Background Papers:**

Independent Investment Advisory Group (IIPAG) Report

TfL Project Assurance Report

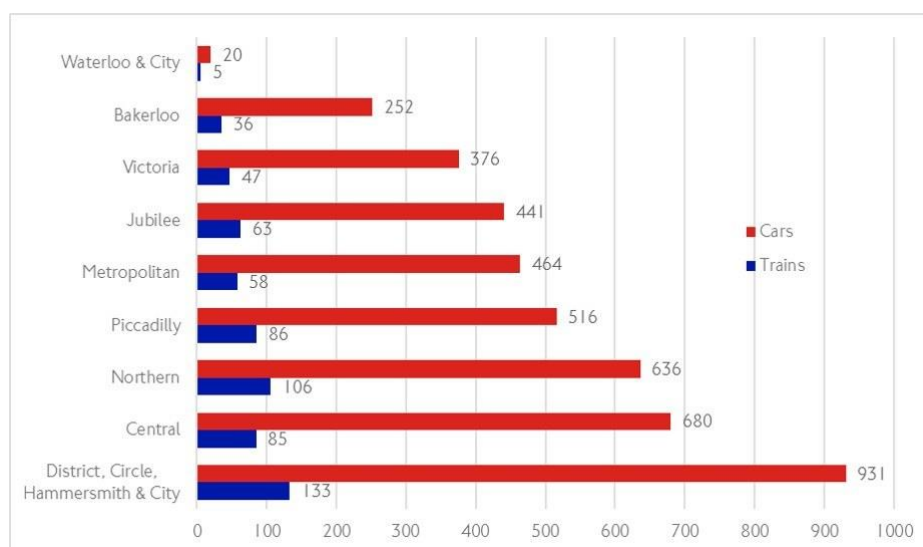
Management response to TfL Project Assurance and IIPAG reports

Contact Officer: Alexandra Batey, Director of Investment Delivery Planning  
Email: [AlexandraBatey@tfl.gov.uk](mailto:AlexandraBatey@tfl.gov.uk)

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## Fleet Reliability and EV State of Good Repair

- 1.1 This Appendix expands on the background of the Fleet Programmes captured in Section 3 of this Submission.
- 1.2 There are 619 customer serving trains, across eleven lines, made up of nine fleets. Currently LU owns 85 per cent of LU Passenger Rolling Stock. The Northern Line fleet, 95TS is not owned by LU and is maintained through a contract with Alstom.
- 1.3 Fleet is a highly safety critical asset controlled by a set of legislations and standards. Whilst the Fleet Programme undertakes the complex performance improvements and regulatory projects to maintain passenger service at current levels; the Fleet Heavy Overhaul Programme focuses primarily on the underside of the vehicles (equivalent to ensuring a car meets its mandatory MOT requirements to keep it safe and reliable until it's next MOT, which in the case of fleet could be up to 9 years away depending on age, condition and duty).
- 1.4 The schedule of interventions is led by the various factors listed in the main text - Figures A1 and A2 below shows an overview of the fleet numbers and fleet ages.



**Figure A1: LU passenger vehicle fleet numbers**

			Line	Fleet	Approx Year of introduction	Age
			Bakerloo	1972 TS	1974	46
			Piccadilly	1973 TS	1975	45
			Central	1992 TS	1994	26
			Waterloo & City	1992 TS	1994	26
			Jubilee	1996 TS	1997	23
			Northern	1995 TS	1998	22
			Victoria	2009 TS	2009	11
			Metropolitan	S8	2010	10
			District, Circle, Hammersmith & City	S7	2012	8
			Total			Avg age 24

Figure A2: Passenger fleet age

- 1.5 Figure A3 shows that the Bakerloo and Central lines have the highest frequency of faults, i.e. the lowest Mean Distance Between Failures (MDBF) of 8,000kms – 10,000kms. It also shows that the general trend, between 2017/18 and 2019/20, has been an increasing number of failures, illustrated by the declining MDBF (Piccadilly, Jubilee, Northern, Victoria, Metropolitan and Sub-Surface lines).

	Fleet	Age	Utilisation in AM peak	Utilisation Off-peak	Annual Opex per car (£k) Routine Maintenance	Service Failures (past 4 years) per train	Mean Distance Between Failure ('000kms)		
							17/18	19/20	Target 20/21
Ageing	Bakerloo (72 TS)	46	86%	81%	65	70	10	10	10
	Piccadilly (73 TS)	45	92%	79% N	69	34	31	23	24
	Central & W&C (92 TS)	26	92% / 100%	78% N /60%	64	128	8	8	10
Mid life	Jubilee (96 TS)	23	92%	76% N	48	67	24	15	21
	Northern (95 TS)	22	91%	76% N	61 *1	33	33	20	24
Newer	Victoria (09 TS)	11	87%	64% N	47	29	40	45	37
	Met-S8 (S Stock)	10	83%	61%	43	23	36	23	30
	SSR-S7 (S Stock)	8	82%	70%	43	23	60	32	38

Figure A3: Mean Distance Between Failures

- 1.6 Figure A4 shows the direct relationship of the recent investments in renewing and replacing of EVs and their State of Good Repairs. Continued investments are critical to maintain LU's ability to provide EV support to track renewal programme.



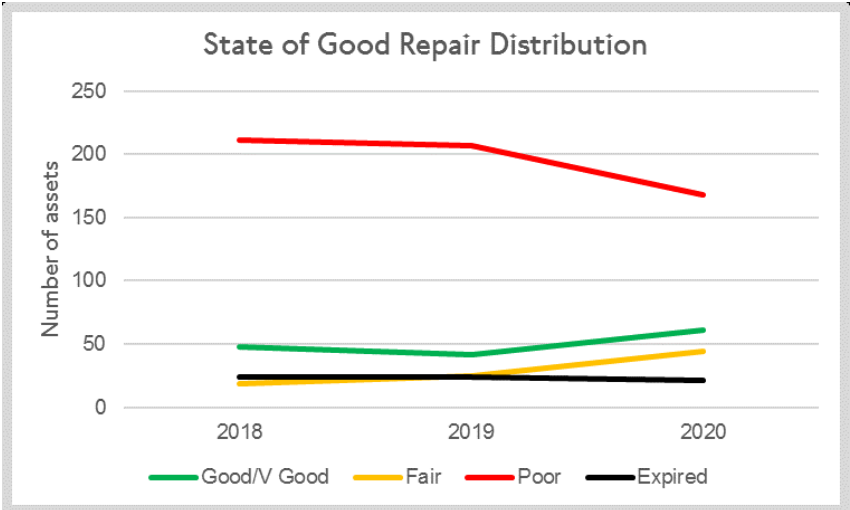


Figure A4: State of Good Repair of Engineering Vehicles

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## **EFC Movements and Planned vs Forecast Scope**

- 1.1 Table B1 provides an overview of the key EFC movements from the last submissions to this submission to the Committee. It also reports the deliverables up to December 2021 against those forecast in the last submissions.
- 1.2 The key drivers behind the EFC variance is the introduction of new APCD Fleet projects (£52m) which is in line with the LTCP; and increase in materials costs (£20.6m) for the FHO Programme.
- 1.3 The renewals projects flex scope depending on asset condition (State of Good Repair) and changes in network performance. Therefore, the project scope in these Programmes will change more over time than standard build projects, and the EFC will reflect the different scope. Increases or decreases in EFC are more than cost overruns or efficiencies, it responds to changing asset and market conditions.

Table B1 - Overview of the key EFC movements

	Key EFC Movements				Deliverables against Committed in last submission		
	Programmes/Projects	EFC - Last submission	EFC - This submission	Variance	EFC Commentary	Planned	Completed
FHO	Jubilee, Victoria and Piccadilly line fleets	289.20	298.89	9.69	Materials costs increase including floats	Jub line: 4 programme lifts, confirm door scope Vic line: 14 programme lifts, commence catch back, commence couplers overhaul Pic line: 13 life extensions, 26 door overhauls, 13 traction motor overhauls, 26 new floorings, 40 new seating	Jub line: 0 programme lifts, indicative scope complete Vic line: 14 programme lifts, 90% catch back complete, coupler overhaul not started Pic line: 11 life extensions, 25 door overhauls, 4 traction motor overhauls, 25 new floorings, 40 new seating
	District, Circle, Hammersmith & City line fleets	139.80	138.71	-1.09	Maturity in project scope	Place S7/S8 combined orders, commence S7 materials procurement,	S7/S8 orders 90% complete, S7 materials procurement plan created.
	Bakerloo line and Metropolitan line	146.30	155.35	9.05	Rolling overhaul for additional 2027/28	Met line: 24 programme lifts, confirm door overhaul scope. Bak line: 11 programme lifts, 3 heavy overhauls.	Met line: 4 programme lifts, indicative door scope complete Bak line: 11 programme lifts, 3 heavy overhauls.
	Rail Adhesion Train Overhauls	3.90	4.97	1.07	Condition assessments	2 <sup>nd</sup> overhaul complete.	2 <sup>nd</sup> overhaul complete.
	Live projects Sub-Totals	579.20	597.92	18.72			
	Central line DC Motors Overhaul	0.0	4.30	4.30	New projects	-	-

Fleet	<b>Central line Improvement Programme (inc Programme Lift)</b>	525.47	525.57	0.10	Risk maturity	Commission new TMU workshop, and start first train production	TMU Workshop commissioned, completed static testing and included CLIP Seats
	<b>Bakerloo line RVAR</b>	40.26	41.48	1.22	Risk maturity and prolongation (COVID-19, resource, and supplier performance)	Installed LED lighting, wheelchair bay and grab poles on eight trains	One train fitted with wheelchair bay and grab poles, LED lighting and Passenger Information System.
	<b>Train Cab J-Door Security Improvements and JUMP</b>	49.60	36.05	-8.78	Train Cab J-Door security, JUMP driven by maturing project scope.	Complete feasibility study for JUMP and remobilise Cab Security project after the COVID-19 'safe stop'	JUMP completed feasibility stage and preparing concept design
	<b>Other projects with no EFC change or closing</b>	88.50	88.50	-	Jubilee Mid-life, Bakerloo weld repairs, Met line RAT	Closed	Closed
	<b>Live projects Sub-Totals</b>	703.83	691.60	-7.47			
	<b>Vic &amp; Jub lines Obsolescence Management</b>	0.0	52.10	52.10	New projects	-	-

Engineering Vehicles	<b>Locomotive Capability</b>	187.60	187.20	-0.40	Excludes future year estimates	Feasibility study and commercial strategies	Completed feasibility study
	<b>EV Overhauls</b>	36.70	34.15	-2.55	Maturity in project scope	Overhaul 6 locomotives, 80 wagons and 7.5ton cranes	Locomotives: 2 overhauls, completed all asbestos removal; 54 wagons and one 7.5ton crane overhauled
	<b>Remote Track Monitoring (RTM)</b>	17.00	23.90	6.90	Includes 2027/28	RTM Contract award and complete TRV overhauls	TRV overhauls and 4LM Mitigation solution completed
	<b>Mechanised Renewal Vehicle (MRV)</b>	25.30	24.00	-1.30	Efficiencies from in-house LU delivery	MRV prototype trials in 2021	Completed on-site trials in LU network and in Ruislip Depot
	<b>Engineers Vehicle Depot Enabling - Ruislip</b>	8.80	5.95	-2.85	Maturity in project scope	Design depot redevelopment and commence work on site	Track works started as planned; and collaborated with Lillie Bridge Depot redevelopment project
	<b>Other projects with no EFC change or closing</b>	39.90	40.64	0.70	Mod P&C and New Wagons	Complete new CRRC wagon testing and start mass production; Operate Modular P&C system in open sections of LU SSL railway	Completed repairs of the seven pre-production wagons only; Mod P&C system obtained full Ruislip depot operation
	<b>Ward Couplers Modification</b>	0.0	1.14	1.14	New project	-	Completed feasibility study
	<b>Live projects Sub-Totals</b>	315.30	316.98	1.64			
	<b>TRV, Tamper and Braking Solution</b>	30.0	34.87	4.87	New projects	-	-

+ PL: Programme Lift

## Project by Project Details

1.1 **Fleet Heavy Overhaul Programme:** Table C1 below provides a detailed project-by-project breakdown.

**Table C1: detailed project by project breakdown**

Project and Key Delivery to December 2022	Financial Authority (£m)	Estimated Final Cost (£m)	Existing Programme and Project Authority (£m)	This Authority Request (£m)	Future Authority Requests (£m)
<b>Jubilee line fleet:</b> <ul style="list-style-type: none"> <li>Commence pull forward activities and Programme Lift</li> </ul>	155.87	155.97	103.68	0.86	51.44
<b>District, Circle and Hammersmith &amp; City line fleets:</b> <ul style="list-style-type: none"> <li>Place contracts for programme lift</li> <li>Complete programme lift optimisation review from Metropolitan line programme lift experience.</li> </ul>	138.67	138.71	57.58	-	81.12
<b>Victoria line:</b> <ul style="list-style-type: none"> <li>Complete programme lift catch back activities.</li> <li>Complete door overhaul of 22 trains.</li> <li>Complete coupler overhaul of 47 trains.</li> <li>Complete Pressure Ventilation system replacement on 32 trains</li> </ul>	70.61	71.35	51.45	-	20.16

Project and Key Delivery to December 2022	Financial Authority (£m)	Estimated Final Cost (£m)	Existing Programme and Project Authority (£m)	This Authority Request (£m)	Future Authority Requests (£m)
<b>Bakerloo line:</b> <ul style="list-style-type: none"> <li>• Complete new* Programme Lift cycle of 24 trains,</li> <li>• Complete new* Heavy Overhaul cycle of 9 trains</li> <li>• Complete Door Overhaul of 5 trains.</li> </ul>	58.38	58.37	16.86	4.53	47.54
<b>Metropolitan line fleet:</b> <ul style="list-style-type: none"> <li>• Complete overhaul of all 47 trains</li> </ul>	95.86	96.98	58.21	0.12	39.58
<b>Piccadilly line:</b> <ul style="list-style-type: none"> <li>• Complete 8 units of Programme lift</li> <li>• Complete remaining 5 units of seating overhaul</li> <li>• Complete remaining 12 units of Door scope 1</li> <li>• Commence Door scope 2 works</li> <li>• Remobilise pneumatic control module works</li> </ul>	68.10	71.57	55.72	3.91	9.58
<b>RATs:</b> <ul style="list-style-type: none"> <li>• Complete catch back activities on the two Central line RATs.</li> <li>• Develop overhaul scope for Metropolitan line RAT.</li> </ul>	3.94	4.97	2.74	1.00	-
<b>Continuing Projects Sub-Totals</b>	591.44	597.92	346.23	10.42	249.42
<b>Central line: DC Motors Overhaul</b>	9.00	4.30	-	4.30	-
<b>New Projects Sub-Totals</b>	9.00	4.30	-	4.30	-
<b>Totals</b>	600.44	602.21	346.23	14.72	249.42

\* Due to their age (approaching 50 years old), Bakerloo line trains undergo a continuous cycle of overhauls to maintain safe and reliable operation.



1.2 Table C2 below illustrates the time-based financial implications of the FHO Programme to 2027/28. All figures, at outturn and inclusive of risk, represent the minimum additional authority required to continue this multi-year, in-flight programme.

**Table C2: Time-based financial implications of the FHO Programme to 2027/28**

Costs and Funding (£m)	Prior Years	2021/22	2022/23	2023/24 to 2027/28	Total
Cost (Outturn)					
Existing Programme and Project Authority	71.28	47.00	89.01	138.95	346.23
This Authority Request	-	0.45	10.66	3.61	14.72
Future Authority Requests	-	-	17.02	232.40	249.42
Financial Authority*	71.00	50.79	117.73	360.91	600.44
Programme EFC	71.28	47.58	117.13	366.22	602.21

\* Financial Authority is currently provided through the two-year Budget for 2021/2022 and 2022/23 as approved by the Board on 28 July 2021, referenced within the paper as “Revised Budget”, will be aligned to the overall EFC as part of the 2021 GLA Budget before the next submission to the Committee.

1.3 **Fleet Programme:** Table C3 below provides a detailed project-by-project breakdown of Table 3 from 5.6.3 in the main text.

**Table C3: detailed project-by-project breakdown**

Project and Key Delivery to December 2022	Financial Authority (£m)	Estimated Final Cost (EFC) (£m)	Existing P&PA (£m)	This Authority Request (£m)	Future Authority Requests (£m)
<b>CLIP, Programme Lift and New Workshop:</b> <ul style="list-style-type: none"> <li>• AC Traction Infrastructural testing in Spring 2022</li> <li>• Design Sign-off by Spring 2022</li> <li>• First train back to fleet in Spring 2022</li> <li>• Withdrawal of five trains from service from Summer 2022</li> <li>• Seats Repairs</li> </ul>	522.96	525.57	488.52	4.69	50.55

Project and Key Delivery to December 2022	Financial Authority (£m)	Estimated Final Cost (EFC) (£m)	Existing P&PA (£m)	This Authority Request (£m)	Future Authority Requests (£m)
<b>Bakerloo line RVAR</b> <ul style="list-style-type: none"> <li>• First train installation of LED, PIS, lighting, wheelchair bays and grab poles</li> <li>• Deliver above and below waist rail components</li> <li>• Commence works on 2<sup>nd</sup> train by Spring 2022</li> </ul>	39.00	41.48	30.65	-	12.38
<b>Train Cab J-Door Security Improvement:</b> <ul style="list-style-type: none"> <li>• Complete Detailed Design on all passenger fleets.</li> <li>• Commence installation on 92TS, 72TS &amp; 09TS.</li> </ul>	10.08	10.09	10.77	-	-
<b>Victoria line passenger fleet:</b> <ul style="list-style-type: none"> <li>• Continue to deliver ventilation and fan cleaning</li> <li>• Complete floor repairs where required</li> </ul>	4.72	4.72	3.81	-	-
<b>Continuing Projects Sub-Totals</b>	576.76	581.85	533.74	4.69	62.93
<b>JUMP:</b> <ul style="list-style-type: none"> <li>• Commence procurement for design and manufacture</li> <li>• Develop technical specifications</li> </ul>	34.30	25.97	1.07	3.93	21.81
<b>Victoria and Jubilee line Obsolescence Management (CCTV, Customer Information Systems, TMS, and life extension)</b>	52.10	52.10	-	0.10	52.10
<b>New Projects Sub-Totals</b>	86.40	78.07	1.07	4.03	73.91
<b>Jubilee line passenger fleet mid-life refurbishment</b>	26.10	26.10	26.25	-	-
<b>Bakerloo line Life Extension</b>	55.20	55.23	57.66	-	-
<b>Metropolitan line Rail Adhesion Train</b>	7.16	7.18	7.15	-	-
<b>Closed Projects Sub-Totals</b>	88.46	88.49	91.06	-	-

Project and Key Delivery to December 2022	Financial Authority (£m)	Estimated Final Cost (EFC) (£m)	Existing P&PA (£m)	This Authority Request (£m)	Future Authority Requests (£m)
<b>Totals</b>	751.62	748.41	625.87	8.72	136.84

\* Financial Authority (based on the Revised Budget) will be aligned to the overall EFC as part of the 2021 GLA Budget before the next submission to the Committee.

1.4 Table C4 below illustrates the time-based financial implications of the Fleet Programme:

**Table C4: time-based financial implications of the Fleet Programme**

Costs and Funding (£m)	Prior Years	2021/22	2022/23	2023/24 to 2027/28	Total
Cost (Outturn)					
Existing Programme and Project Authority	185.59	50.80	96.72	292.76	625.87
This Authority Request	-	-	4.56	4.16	8.72
Future Authority Requests	-	-	-	136.84	136.84
Financial Authority*	186.64	45.27	104.63	415.08	751.62
Programme EFC	186.60	31.45	82.93	447.44	748.41

\* Financial Authority (based on the Revised Budget) will be aligned to the overall EFC as part of the 2021 GLA Budget before the next submission to the Committee.

1.5 **Engineering Vehicles Programme:** Table C5 below provides a detailed project-by-project breakdown of Table 4 in the main paper.

**Table C5: detailed project-by-project breakdown**

Project and Key Delivery to December 2022	Financial Authority (£m)*	Estimated Final Cost (£m)	Existing P&PA Authority (£m)	This Authority Request (£m)	Future Authority Requests (£m)
<b>Locomotive Capability:</b>					
<ul style="list-style-type: none"> <li>Develop technical requirement specifications for the new fleet</li> <li>Start procurement activities</li> </ul>	183.86	187.19	0.78	1.02	182.51
<b>EV Overhauls Life extension:</b>					
<ul style="list-style-type: none"> <li>Overhaul of 6 locomotives, 24 wagons, deep tube cranes, and tamping machines</li> </ul>	40.80	34.17	21.20	8.94	11.80

Project and Key Delivery to December 2022	Financial Authority (£m)*	Estimated Final Cost (£m)	Existing P&PA Authority (£m)	This Authority Request (£m)	Future Authority Requests (£m)
<b>Remote Track Monitoring (RTM/TRV):</b> <ul style="list-style-type: none"> <li>Contract award for the track geometry equipment and progress concept design</li> <li>Close out of TRV SSL project</li> </ul>	22.10	23.89	5.00	-	15.93
<b>Mechanised Renewals Vehicle (MRV)</b> <ul style="list-style-type: none"> <li>Initiate MRV enhanced phase 2 to add functionality and reduce manual handling on site and in the depot</li> </ul>	23.60	24.05	3.70	0.10	19.64
<b>Engineers Vehicle Depot Enabling – Ruislip:</b> <ul style="list-style-type: none"> <li>Complete feasibility study for a parallel stabling track for the new wagons</li> <li>Conduct familiarisation for Mod P&amp;C and supply welfare facilities for O&amp;M</li> </ul>	9.00	5.94	4.77	-	0.84
<b>Mod P&amp;C:</b> <ul style="list-style-type: none"> <li>Obtain certification to work on LU Sub-surface network (open section) and Ruislip depot for track renewals.</li> </ul>	27.70	28.28	27.62	0.10	-
<b>New Wagons:</b> <ul style="list-style-type: none"> <li>Commence mass production of remaining wagons</li> </ul>	12.30	12.32	11.88	-	0.50
<b>Ward Coupler Modifications:</b> <ul style="list-style-type: none"> <li>Start concept design phase</li> </ul>	0.85	1.14	0.50	0.20	-
<b>Continuing Projects Sub-Totals</b>	320.21	316.98	75.45	10.36	231.21
<b>Future Projects</b> (Including deep tube gauge tamper, EV braking solutions and TRV contingencies)	35.20	34.86	0.20	0.75	34.10
<b>New Projects Sub-Totals</b>	35.20	34.86	0.20	0.75	34.10
<b>Totals</b>	355.41	351.84	75.65	11.11	265.31

\* Financial Authority (based on the Revised Budget) will be aligned to the overall EFC as part of the 2021 GLA Budget before the next submission to the Committee.

1.6 The additional request of £11.1m Programme and Project Authority will bring the total to £86.8m. Table C6 below illustrates the time-based financial implications of this to the EV Programme to 2027/28.

**Table C6: time-based financial implications of this to the EV Programme to 2027/28.**

<b>Costs and Funding (£m)</b>	<b>Prior Years</b>	<b>2021/22</b>	<b>2022/23</b>	<b>2023/24 to 2027/28</b>	<b>Total</b>
<b>Cost (Outturn)</b>					
Existing Programme and Project Authority	50.06	12.56	9.88	3.15	75.65
This Authority Request	-	-	6.80	4.31	11.11
Future Authority Requests	-	-	0.33	264.98	265.31
Financial Authority*	46.70	17.32	16.22	275.17	355.41
Programme EFC	46.70	10.95	17.58	276.61	351.84

\* Financial Authority is based on the Revised Budget and the EFC is reflected in the GLA budget.

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## Programmes and Investment Committee



Date: 15 December 2021

Item: London Underground Railway Systems Enhancements Programme

This paper will be considered in public

### 1 Summary

Railway Systems Enhancements				
Existing Financial Authority	EFC	Existing Programme and Project Authority	Authority Reduction Requested	Total Authority
£ 150.1m	£ 167.7m	£ 245.1m	£ (73.8m)	£ 171.3m

**Outputs and Schedule:** A programme initiated in 2013 to deliver Power, Signalling and Rolling Stock enhancements to improve and sustain system capability and reliability in support of planned capacity increases on the Victoria, Jubilee and Northern lines. The majority of authorised programme scope has been delivered. Remaining works to be completed include:

- (a) Northern line Signalling software updates to improve reliability and support increased service frequency on the Morden branch;
- (b) rolling Stock modifications to optimise performance on the Jubilee and Northern lines and remove legacy signalling equipment;
- (c) power supply system upgrades on the Northern line to replace life expired assets and improve system resilience; and
- (d) Jubilee line Signalling system software updates.

- 1.1 This paper provides an update for the Committee on progress with delivery of the London Underground (LU) Railway Systems Enhancements (RSE) Programme, as authorised in July 2018. The last update was provided to the Committee in October 2019.

## 2 Recommendations

- 2.1 **The Committee is asked to note the paper and approve a reduction in Programme and Project Authority of £73.8m for the Railway Systems Enhancements Programme, giving a total revised Programme and Project Authority of £171.3m.**

## 3 Background and Context

- 3.1 The Railway Systems Enhancement (RSE) (formerly 'World Class Capacity') programme was authorised in 2013 to deliver service capacity increases on the Victoria, Jubilee and Northern lines.
- 3.2 In 2017 the Programme successfully delivered an end to end 36 trains per hour (tph) peak service capability on the Victoria line making it one of the highest frequency metro services in the world. The Programme then delivered enabling works which supported an extended duration of 30tph peak services on the Jubilee line from 2018.
- 3.3 After careful consideration to balance investment priorities across the network, the decision was made in 2017 not to proceed with the procurement of additional trains to enable service uplifts on the Jubilee and Northern lines. Following this decision, the RSE Programme was refocused to the optimisation of existing infrastructure, train and signalling system capability on the Jubilee and Northern lines to maximise utilisation and performance within the Programme and Project Authority of £245.1m.
- 3.4 The revised RSE Programme, as authorised by the Committee in July 2018, included the following scope for the Jubilee and Northern lines:
- (a) Jubilee Line capacity optimisation (JLO) to deliver up to 32 trains per hour between West Hampstead and North Greenwich stations in the peak periods;
  - (b) Northern Line capacity optimisation (NLO) to deliver 31 trains per hour on the Morden branch in the peak periods (one of the most congested parts of the entire London Underground network in the peak periods) and also to facilitate a small improvement in peak capacity on the Bank branch and opening of Northern Line Extension services to Battersea;
  - (c) rolling Stock modification works to optimise train system performance and reliability to support the service level enhancements following the Jubilee and Northern line signalling upgrade projects; and
  - (d) essential Power system works on the Northern line to replace life-expired equipment, address asset condition concerns and provide additional network resilience to support increased service levels on the Northern and the Sub-Surface lines (District, Circle, Hammersmith & City and Metropolitan) following the Four Lines Modernisation (4LM) Programme.
- 3.5 Since the previous update to the Committee in October 2019, the TfL Capital Investment Programme has been under severe financial pressure following the impact of the coronavirus pandemic on TfL ridership and revenues.



- 3.6 Despite the pandemic disruption, good progress has been made with the RSE programme through collaboration and new ways of working to mobilise resources and the supply chain. This has enabled completion of several projects which have supported the opening of services on the Northern line Extension to Battersea in September 2021.
- 3.7 In 2020 the JLO elements of the RSE programme, including enhanced signalling capability and fleet availability improvements to support a 32tph peak service, were deferred. These scope items remain paused and are not currently prioritised within the TfL Capital Investment Programme in view of the currently reduced levels of demand on the tube network.
- 3.8 London's economic recovery and projections of demand growth on the LU network are the subject of ongoing modelling and analysis by TfL. Service levels on the Jubilee line form a key element of this review and JLO programme is expected to be re-instated in line with demand forecasts and funding availability, albeit unlikely in the next five years.
- 3.9 This paper provides a summary of progress achieved since October 2019 and a review of costs and outcomes against the baseline of the July 2018 authority. The paper also seeks a reduction in the Programme and Project Authority to reflect scope reductions, delivery efficiencies and the deferral of the JLO programme elements.

## **4 Programme Delivery Since October 2019**

### **Northern Line**

- 4.1 The RSE programme has successfully implemented the Northern line capacity improvements to enable introduction of a new Working Timetable (WTT58) in September 2021. This has enabled 31 trains per hour on the Morden branch in the peak periods. The new timetable has also facilitated a small improvement in peak period capacity on the Bank branch and has released an extra train within the existing fleet to support the extension of Northern Line services to Nine Elms and Battersea Power Station.
- 4.2 In June 2020, a new mobile wheel lathe was commissioned at Morden depot on the Northern line. This has enabled changes to the maintenance production process to reduce turnaround timescales for wheel turning. The resulting improvement in overall fleet availability has supported the timetable changes introduced for the initial extension of services to Nine Elms and Battersea Power Station and will support the improved service to be implemented on the Northern Line Extension from mid-2022.
- 4.3 Track upgrades have been completed to enable higher train speeds in the Kennington area to improve customer journey times and support both a 31 trains per hour service on the Morden branch and the new Nine Elms and Battersea services.
- 4.4 An initial package of power system enhancement works has been progressed on the Northern line to replace life-expired equipment, address asset condition concerns and support the service enhancements described above.

- 4.5 All the above works have enabled the introduction of services on the Northern Line Extension to be possible within the capability of the existing fleet and signalling system without the need for reductions in service elsewhere on the Northern line.

### **Jubilee Line**

- 4.6 Following the re-scoping exercise in late 2017, the Jubilee Line Optimisation (JLO) sub-programme was developed to optimise capability and availability from the existing rolling stock and signalling assets and hence enable achievement of a peak service level of 32 trains per hour in the central area.
- 4.7 The scope of works for the existing Jubilee line 96 Tube Stock fleet to improve its reliability and availability included development of a real time on-train condition monitoring system (RTCM) and the provision of a new wheel lathe at Stratford Market depot to improve wheel turning productivity.
- 4.8 The programme also included Signalling system modifications required to enable higher peak services to be operated on the Jubilee line. The package of signalling software-related changes was planned to be delivered to support an uplift in peak services to operate at 32tph between West Hampstead and North Greenwich stations on the Jubilee line from mid-2022.
- 4.9 In 2020, the signalling enhancements and RTCM scope elements of the JLO programme were deferred. Work continued with the new wheel lathe installation at Stratford Market depot which was completed by August 2020. The re-instatement of the proposed peak capacity uplifts on the Jubilee line will be considered in the context of demand growth recovery over the next few years and overall investment prioritisation.
- 4.10 For the Jubilee line signalling system, further works have been identified to allow completion of software updates by the supplier. This will ensure consistency of operational functionality and software status between the Sub-Surface, Northern and Jubilee line systems.

### **Legacy Rolling Stock Work**

- 4.11 Rolling Stock modifications have been undertaken to complete the removal of redundant legacy signalling equipment and updating of the train-borne management system following the earlier Jubilee and Northern line signalling upgrade projects.
- 4.12 Additionally, modifications to train braking systems are being progressed on the Northern and Jubilee line fleets to better optimise friction and regenerative braking performance regimes.
- 4.13 Works are also underway to enable an uplift in train entry/exit speeds at Neasden and Stratford Market depots on the Jubilee line to support the Metropolitan line service enhancements being delivered by the Four Lines Modernisation (4LM) programme.

## 5 Financial Implications and Authority Proposal

- 5.1 Financial Authority is currently provided through the two-year Budget for 2021/2022 and 2022/23 as approved by the Board on 28 July 2021. It is noted that the current funding agreement with Government expires on 11 December 2021 and additional funding will need to be agreed beyond this period, therefore a subsequent prioritisation of the TfL Investment Programme will be required to ensure that all projects are affordable within the funding envelope provided and as such revised authority may need to be sought.
- 5.2 Table 1 below shows the current financial status of the RSE Programme including the original authority, current EFC and Financial Authority in line with the 2021 Budget. Financial Authority beyond 2024/25 will require provision in future Business Plans and Budgets.

	Prior years	FY2022	FY2023	FY2024	FY2025	FY2026	Total all years
<b>Financial Authority (Gross)</b>	<b>138.0</b>	<b>6.8</b>	<b>5.4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>150.1</b>
<b>Programme and Project Authority</b>							
Existing Authority							245.1
This Authority Request							- 73.8
<b>Total Programme and Project Authority</b>	<b>138.0</b>	<b>9.9</b>	<b>8.9</b>	<b>12.5</b>	<b>2.0</b>	<b>-</b>	<b>171.3</b>
Future Authority Requests	-	-	-	-	-	-	-
<b>Current EFC (Gross)</b>	<b>138.0</b>	<b>8.7</b>	<b>7.8</b>	<b>11.4</b>	<b>1.8</b>	<b>-</b>	<b>167.7</b>

**Table 1: Project Authority and Estimated Final Cost breakdown (all costs £m outturn values)**

- 5.3 The RSE Programme and Project Authority of £245.1m exceeds the Financial Authority due to scope reductions and efficiency savings achieved and reflected in the Business Plan. To reflect these reductions since 2019, it is now proposed to reduce the overall Programme and Project Authority by £73.8m, from £245.1m to a total of £171.3m.
- 5.4 A new authority will be sought for a Jubilee line capacity optimisation scheme in line with future business plans and investment prioritisation.
- 5.5 By reducing the authority by £73.8m, the revised authority value remains above the current EFC by £3.6m. This represents 14 per cent of the Cost of Work to Go (COWG). It remains prudent to not align the EFC and authority values completely as the EFC is dynamic and may fluctuate period on period, predominantly through the active review and management of risk and opportunity.

- 5.6 Authority granted by the Committee which relate to both the current funding period up to 11 December 2021 and commitments outside of this period, may need to be revised as part of future budgets to be considered by the Board. Provision will also need to be made in future Budgets and Business Plans in respect to commitments made. If additional funding is not available, a prioritisation of the TfL Investment Programme will be required, and some programmes and projects will not be taken forward and revised authority will be sought as appropriate.
- 5.7 All financial commitments related to this request will be overseen in accordance with TfL Business controls in respect of draw down.

## 6 Efficiencies and Scope Reduction

- 6.1 Since the July 2018 when original authority was granted by the Committee, the RSE Programme has continued to refine train system scope, specifications, and costs to deliver the Northern line capacity improvements and enable the Northern Line Extension to Battersea whilst work on the optimisation of the Jubilee line (JLO) has been paused. Details of EFC movements are tabled in Appendix 1.
- 6.2 These refinements have resulted in scope and cost reductions compared with the originally authorised (July 2018) baseline position, as shown in Table 2 below:

Scope element	£(m)'s	Change Year
<b>Original RSE Authority (July 2018)</b>	<b>245.1</b>	
Original Authority headroom	- 13.5	2018
Jubilee line Capacity Optimisation Programme - deferred	- 15.9	2020
Northern line East Finchley Reversing facility - descope	- 18.5	2019
Power high voltage cables scope transferred to DTUP	- 10.3	2019
Power Enhancement (Resilience Package) scope reduction/Value Engineering	- 19.0	2020
VLU2 and other efficiencies	- 4.2	2018
<b>Total reduction</b>	<b>- 81.4</b>	
Original Authority minus total reduction	<b>163.7</b>	
Signalling software updates (Jubilee line)	<b>4.0</b>	2021
Current Estimated Final Cost (EFC)	<b>167.7</b>	
Authority Headroom (14% COWG)	<b>3.6</b>	
Revised Programme and Project Authority	<b>171.3</b>	2021

**Table 2: Changes from Authority position since July 2018**

6.3 The key scope and efficiency reductions made since 2018 are:

- (a) The Jubilee Line Capacity Optimisation (JLO) programme to achieve a service level of 32 trains per hour in the central area was paused in 2020. Whilst work was progressed with the delivery of a new wheel lathe at Stratford Market depot and initial feasibility work for a remote train condition monitoring system, capacity optimisation through signalling system enhancements will remain deferred until supported by demand growth and a demonstrable requirement for capacity enhancements as an investment priority;
- (b) An enhancement scheme was originally included as part of the Northern line capacity optimisation to provide a new 'scissors' crossover at East Finchley to enhance reversing capability. Following further modelling and value analysis to demonstrate the robustness of peak timetable uplifts and the introduction of NLE services without additional reversing capability, this scheme was removed from scope.
- (c) High voltage cable replacement and associated optical fibre cable scope which supports future service enhancements on the Piccadilly line was originally included in the Northern Line Upgrade (NLU2) and later RSE scope. These works have been transferred to the Piccadilly line Upgrade programme to co-ordinate their delivery as part of a wider package of HV power scope upgrades on the Piccadilly line;
- (d) Power Package 2 (PP2) scope was reviewed in summer 2020 in response to the impact of the pandemic on TfL's financial position to prioritise the scope and maximise value. This review considered the probability and consequence of asset failures and available mitigations to further prioritise scope. This resulted in a reduction of the PP2 scope including sub-station upgrades at Elephant & Castle, Clapham Common, Stockwell and Highgate and lower priority sub-station ventilation works. The deferral of prioritised PP2 works by 3 years is under consideration and the impact of deferral is currently being assessed; and
- (e) The Victoria Line Upgrade 2 programme elements and the Northern line wheel lathe projects have been successfully completed with the costs lower than their original authorities, resulting in efficiency savings. At Morden depot a mobile wheel-turning solution was adopted instead of a fixed lathe installation, improving flexibility, and reducing the cost and complexity of building construction.

## 7 Benefits and Value

7.1 Since the last update, the RSE Programme has delivered the following capacity outcomes on the Jubilee and Northern lines:

	Start Capacity (Trains Per Hour)	End Capacity (Trains Per Hour)	Capacity Increase	Completion Date at Oct 2019 P&IC	Current Status
Victoria line	33	36	9%	Delivered 2017	Complete
Jubilee line	30	32	7%	Mid-2022	Deferred
Northern line (Morden branch) *	30	31	3%	Autumn 2021	Delivered Sept 2021
Northern line (Bank Branch) *	26	27	4%	Autumn 2021	Delivered Sept 2021
Northern line (other existing branches)	24	24	No change		

\*morning peak hour in the Northbound direction

### Table 3: Capacity outcomes

7.2 As authorised in July 2018, the business case for the revised Northern line capacity improvements was sub-divided as below:

- (a) Working Timetable 58 (WTT58): The project to deliver improved customer journey times was financially positive with a payback period of 10 years; and
- (b) the remaining elements of scope to provide train resources to operate services to Nine Elms and Battersea whilst maintaining service levels on the rest of the Northern line had a range of benefit to cost ratios up to 5.7:1. This included the new wheel lathe facility at Morden depot and Kennington speed uplift track work.

7.3 With the successful delivery of WTT58 in 2021, the Business case remains financially positive, using current projections of reduced demand, with a payback period of 11 years.

7.4 The value engineering and reduced cost of the Morden wheel lathe solution has improved the overall benefit-cost ratio from 3.3:1 in 2018 to a currently assessed value of 5.7:1.

7.5 The business case for the second package of Power works is financially positive based on an assessment of the probability and consequence of equipment failures at specific locations on the Northern line. Following the line upgrade re-signalling and the increase in service levels, equipment failures can result in a need to reduce services, or for a partial line suspension until the fault is rectified with significant disruption to customer service.

- 7.6 This package of Power works will provide the necessary power system capacity and redundancy to achieve the required levels of system resilience. This will reduce the probability of asset failures and allow services to be maintained across the line in the event of any localised equipment failures. Further scope detail is included in Appendix 2.
- 7.7 The business case for the deferred Jubilee line optimisation (JLO) enhancements has been weakened by the current reduction in peak demand. The business case remains highly sensitive to demand levels since the main objective of the scheme is to alleviate peak crowding levels on the central section of the line. Analysis using a range of TfL demand growth scenarios indicates that JLO would no longer be revenue positive. The case for the scheme will continue to be assessed using updated demand models to enable its re-instatement as early as possible as part of TfL's investment prioritisation process.

## **8 Assurance**

- 8.1 As part of continuous assurance, a briefing was given by the programme team to IIPAG and TfL Project Assurance to update on programme progress. No significant concerns were identified. An action was allocated to the programme team to provide a reconciliation of the original EFCs against the latest EFCs or final costs, with an explanation of variances together with an update on the associated business cases (see Appendix 1).
- 8.2 The cost-to-go for works currently underway is £9.6m across 6 projects, these are at different stages in their lifecycle, but all are in their delivery stage. This estimate includes risk provisions for these works, there is a separate £3.6m provision to cover cost and scope uncertainty, notably for remedial works to address asset concerns on the Northern and Jubilee Lines, this is currently being costed and negotiated with the supplier.
- 8.3 The separate Northern Line Power Package 2 project under the programme has just restarted. This has a current EFC of £15.7m and is the subject of a separate assurance review which is currently underway.
- 8.4 A management response to the recommendations made has been provided and all recommendations have been accepted.

### **List of appendices to this report:**

Appendix 1: Baseline comparison of EFC's and benefits

Appendix 2: RSE Programme Remaining Scope

### **List of Background Papers:**

None

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## Baseline comparison of EFC and benefits since July 2018

Table 1: EFC movements since July 2018

RSE Projects (£m)	July 2018 EFC	Current EFC	Variance	Cost to Date	Cost to Go	Variance/Change explanation
Northern Line Speed Improvement Works (WTT58)	18.00	18.81	0.81	18.21	0.49	Programme slippage and re-mobilisation due to the pandemic have resulted in EFC increase
Northern Line Wheel Lathe	10.98	5.95	-5.03	5.95	-	Value engineering. Mobile lathe solution and optimised scope has resulted in cost savings.
Kennington Speed Uplift	1.60	2.76	1.16	2.75	-	Scope increased to address track condition, geometry and reduce noise levels to enable NLE services.
East Finchley Reversing Facility	20.00	-	-20.00	-	-	Project descope following further assessment. Not essential for peak service enhancements.
NL Power Upgrade Package 1	15.00	12.00	-3.00	10.71	1.41	EFC has reduced with improved scope and cost certainty
NL Power Upgrade Package 2	46.20	15.63	-30.57	0.05	15.58	Value engineering. Scope optimisation and prioritisation has resulted in significant cost reduction whilst securing required network resilience
Neasden Depot Injection Rates	2.64	2.14	-0.5	1.11	1.04	Minor reduction in EFC due to scope certainty.
Brake System Improvements	1.60	2.09	0.49	1.31	0.76	Programme slippage and resource constraints due to pandemic
RS Legacy Modifications	2.73	5.92	3.19	4.70	1.22	Programme slippage and resource constraints due to pandemic
Jubilee Line Optimisation (JLO)	19.20	3.26	-15.94	3.26	-	JLO programme paused. £3.26m sunk cost in delivery of new wheel lathe at Stratford market depot.
WCC Programme Management	3.98	5.39	1.41	3.29	2.11	Prolongation due to slippage and re mobilisation as a result of pandemic
Historic WCC Project Costs	89.70	89.70	-	89.70	-	Historic costs
Jubilee line Signalling software updates	-	4.0	4.0	-	4.0	Newly identified work to ensure consistency of operational functionality and software status between SSR, Jubilee and Northern lines.

<b>Total EFC</b>	<b>231.63</b>	<b>167.65</b>	<b>-63.98</b>	<b>141.04</b>	<b>26.61</b>	Net EFC reduction of £64m achieved since 2018
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**Table 2: Business case changes since July 2018**

The table below highlights the movements in RSE project-specific Business Cases against the baseline position of July 2018. The Current Position in 2021 has been assessed using latest TfL demand scenarios for post-pandemic recovery assuming the lowest growth projections.

<b>RSE Projects</b>	<b>Baseline Position (2018): BCR; Rationale</b>	<b>Current Position/Outcome (2021)</b>
Northern Line Speed Improvement Works (WTT58)	Financially Positive; Payback 10 years	Financially Positive; Payback 11 years
Northern Line Wheel Lathe	BCR 3.3:1	BCR 5.7:1
Kennington Speed Uplift	NLE dependency	NLE dependency
East Finchley Reversing	NLU service uplift	N/A - Project descoped
NL Power Upgrade Package 1	BCR 9.6 :1	BCR 28 :1
NL Power Upgrade Package 2	Financially Positive	BCR 4.1:1
Neasden Depot Injection Rates	4LM dependency	4LM dependency
Brake System Improvements	Financially Positive; Payback 6 years	Financially Positive; Payback 9 years
RS Legacy Modifications	No quantified case. Address JNUP residual scope items.	N/A
Jubilee Line Optimisation (JLO)	Overall scheme Financially Positive; Payback 11 years	Business case no longer revenue positive due to sensitivity to peak demand and reduced crowding /congestion relief impact.

### RSE Programme Remaining Scope elements

#### Northern Line Capacity

- 1.1 This includes final Northern line signalling software updates to resolve emerging post-delivery reliability issues and remove temporary speed restrictions.

#### Northern Line Power

- 1.2 The Programme includes power works required to address asset condition concerns and provide additional system resilience on the Northern line. Upgrade works will also provide enhanced network power capacity to support future increases in service levels on the Sub-Surface lines (District, Circle, Hammersmith & City and Metropolitan) following delivery of the Four Lines Modernisation (4LM) Programme.
- 1.3 Since 2014 the Northern line power system has been non-compliant with LU standards and an Engineering concession is in place. There is sufficient power capability for Northern line services during normal circumstances (including the introduction of Working Timetable 58 and the NLE) but not under contingency scenarios (i.e. planned or unplanned outages). This requires a reduction of service levels in the event of some asset failures – on the Northern line and on other lines due to the integrated nature of the LU power network.
- 1.4 There are two main packages of works.
- 1.5 Power Package 1 to address poor asset condition remaining scope, comprising:
  - (a) replacement of life expired coupling transformers at Stockwell substation; the condition of these assets is poor with no residual life remaining. This is 70 per cent complete and remaining work will be completed by April 2022.
  - (b) works at Whitechapel and Mile End Substations to reduce existing loads on the coupling transformers at Mansell Street and release capacity for future load growth associated with the service improvements to be delivered on the Sub-Surface lines. This work is 95 per cent complete; and
  - (c) an upgrade to the High Voltage network between Stockwell and Clapham Common substations to support service levels on the Northern line. This is in progress and will be completed by March 2022.

- 1.6 Power Package 2 to restore power system resilience on the Northern line to achieve compliance with LU Standard S1972, comprising:
- (a) two HV panels at Hendon to extend the existing HV panels, 2.2km of HV cable, the rephasing of Finchley Intake, DC cabling reinforcement of up to 20 track feeders at 14 sites totalling over 4.8km of cable. This work is required to provide the firm capacity to deliver a reliable service during planned or unplanned outages; and
  - (b) improved ventilation and temperature monitoring at West Ham Bulk Supply Point (BSP), new forced ventilation schemes at 3 sites, a ventilation upgrade at 1 site and overhaul of ventilation systems at 6 sites to ensure optimum operational performance of power supply equipment.



**Image 1: New HV Coupling Transformer installation at Stockwell sub-station**

### **Northern and Jubilee Line Rolling Stock**

- 1.7 This is a programme of fleet modifications to improve reliability and performance, remove redundant signalling equipment and alleviate a capacity constraint at Neasden depot. This includes following projects:
- (a) updates to the Northern line fleet (95 Tube Stock) Train Management System (TMS) software to reflect the removal of legacy signalling and train protection equipment as part of the earlier signalling upgrades. This work is planned to compete in early 2023;
  - (b) software modifications for Jubilee and Northern line trains to improve the optimisation of regenerative and friction braking performance. This work

is planned to complete in early 2024; and

- (c) modifications to enable trains to operate at increased speeds (up to 10mph) in the Jubilee line Neasden and Stratford Market depots. The Neasden Depot Injection Rate project will improve train entry/exit performance to support a timetable uplift on the Metropolitan line to be delivered under the 4LM programme. This work is on target to complete by September 2022 in line with planned delivery schedule for 4LM uplifts.

### **Jubilee line Signalling software update**

- 1.8 Jubilee line signalling system requires a software updates by the supplier to ensure consistency of operational functionality. This will improve degraded performance on the Jubilee line and maintain software consistency across Jubilee, Northern and Sub surface lines.





Images 2 and 3 - Mobile wheel lathe installation at Stratford Market depot Jubilee line





**Images 4 and 5 - Mobile wheel lathe in use on 95 TS train at Morden depot Northern line**

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## Programmes and Investment Committee



Date: 15 December 2021

Title: London Underground Lifts and Escalators Renewals Programme

This paper will be considered in public

### 1 Summary

Existing Financial Authority (£m)*	EFC (£m)	Existing Programme and Project Authority (£m)	Additional Authority Requested (£m)	Total Authority (£m)
£938.90m	£938.90m	£885.13m	£19.11m	£904.24m

**Table 1: Summary of Programme and Project Authority request.**

\* Financial Authority is based on the 2021 TfL Budget and Business Plan. Financial Authority beyond 2022/23 will be considered as part of future Budgets and Business Plans. See table 3 below for breakdown by year.

- 1.1 This paper covers the renewal of London Underground lifts assets which form part of the London Underground (LU) Lifts and Escalators Renewals Programme, which is a rolling programme delivering prioritised, critical asset renewals to improve asset condition and to maintain current levels of safety, accessibility, and reliability.
- 1.2 The purpose of this paper is to request authority **for essential renewals to existing Secondary Means of Vertical Transport (SMVT) lift assets providing Step Free Access (SFA)**. The remaining Lift and Escalator renewals projects either have existing Programme and Project Authority or will form part of future requests.
- 1.3 Supplementary information is included in Part 2 of the agenda for Members. This information is exempt and is therefore not for publication to the public or press by virtue of paragraphs 3 and 5 of Schedule 12A of the Local Government Act 1972 in that it contains information relating to business affairs of TfL and which is legally privileged. Any discussion of that exempt information must take place after the press and public have been excluded from this meeting.

## **2 Recommendations**

**2.1 The Committee is asked to note the paper and the related paper on Part 2 of the agenda and:**

- (a) approve additional Programme and Project Authority of £19.11m for the LU Lifts and Escalator Programme, bringing the total Programme and Project Authority to £904.24m, comprising:**
  - (i) £14.51m to complete the replacement of nine life expired Secondary Means of Vertical Transport lift assets for design in 2022 and delivery between 2023 and 2024; and**
  - (ii) £4.60m to carry out the necessary capital whole life maintenance interventions on the nine new lift assets in (i) above and a further 36 existing lift assets until 2034; and**
- (b) approve additional Procurement Authority in the sum requested in the paper on Part 2 of the agenda to carry out the works identified in (a) above.**
- (c) note that the matters for which Authorities are sought include commitments that extend beyond the period of the Business Plan and Budget approved by Board on 28 July 2021 and provision will need to be made in future Business Plans and Budgets.**

## **3 Background**

### **Strategic Context**

- 3.1** There are currently 259 lifts installed at LU stations. These numbers will grow by 25 per cent between now and 2026 due to delivery of major station projects, the Accessibility programme, and the Elizabeth line. Lifts make the network more accessible to more people and contribute positively to customer journey times.
- 3.2** There are two types of lifts on the London Underground network:
- (a)** lifts which are a Primary Means of Vertical Transport (PMVT) these lifts are the main mode of transport from street to platform and typically have a 40-year asset life; and
  - (b)** lifts which are a Secondary Means of Vertical Transport (SMVT) these lifts supplement stairs or escalators and are used principally to provide step free access (SFA) and typically have a 20-year asset life.
- 3.3** Eighty per cent of the 259 lifts on the London Underground network are SMVT lifts with the principle purpose of providing step free access.
- 3.4** Our Lift Asset Strategy can be summarised as a proactive rolling programme of renewals and maintenance to maintain a State of Good Repair (SoGR) and consistently achieve 99 per cent availability across the fleet to ensure customers






(including those requiring step free access) have safe, reliable, and quick access to our train service.

- 3.5 The Lifts Asset Strategy supports the Mayor's Transport Strategy (MTS) objective of 'providing a good public transport experience' and contributes to the aim within the MTS for 80 per cent of trips in London to be made on foot, by cycle or using public transport by 2041. The Asset Strategy also supports LU's priorities for 'Safety and Reliability', 'Customer', 'People' and 'Affordability' and is aligned to both the Financial Sustainability Plan and the TfL Long Term Capital Plan (LTCP).
- 3.6 Asset Renewals are a key aspect of TfL's LTCP which recognises the importance of planned and sustained investment at the optimum intervention point within the asset lifecycle. The LTCP is a 25-year plan of investment with principles agreed at board level across TfL. The LTCP enforces the strategic aspiration to invest in asset renewal prior to asset failure.
- 3.7 Maintaining lift availability levels requires ongoing maintenance and renewal. As described in paragraph 3.2 above, typically, lifts need replacing every 20 to 40 years depending on the type. This means we need to replace around four per cent of our lift assets each year to maintain condition levels.
- 3.8 The interventions that are carried out are however prioritised and informed by the condition and performance of each asset and are not purely based on asset age (see paragraph 4.3 below). With prioritised interventions it is expected that a minimum of eight lift renewals per annum (broadly two PMVT and six SMVT) are needed to hold the condition of the current asset base in a steady state (the Do Minimum scenario in the LTCP). This rate will need to increase as the number of assets grows in the future.
- 3.9 The management and volume of lifts has grown progressively. This has resulted in a diverse product base (seven different types of lifts). Our asset strategy is to actively pursue efficiencies and reduced maintenance costs through a policy of standardisation. This involves challenging scope and standards.. To date this process has resulted in the rationalisation of lift interventions and a new reduced and simplified specification for surface level lifts.
- 3.10 In line with our asset strategy, we also seek to upgrade safety systems and improve maintenance working environments when undertaking lift renewals as well as looking for opportunities and synergies to align with other planned works, for example line closures, to minimise disruption or save costs.

### **Asset Condition and State of Good Repair**

- 3.11 Overall, the level of investment in lifts in the past few years has been below the required levels to sustain the assets in a steady state. The deferral of work from 2020/21 to later years because of the coronavirus pandemic has exacerbated this problem. This has created a backlog of investment to be completed to reach the Do Minimum scenario of the LTCP and recover the SoGR of our lift assets to 2019 levels.
- 3.12 The SoGR of lifts is in decline and this has had a knock-on impact on reliability which is now also in decline. The performance target for lift availability is 99 per

cent, but this has not been met across the network in 2020/21 even with reduced footfall.

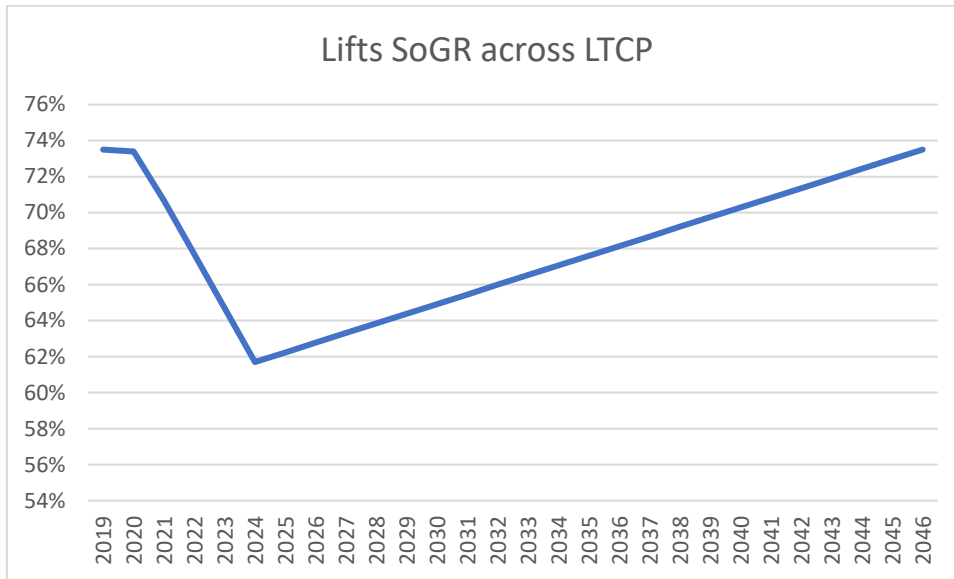
Year	Size of Asset Base	% of Assets in a state of Good Repair	% Availability in service
2019	226	73.5%	98.44%
2020	248 10% new 	73.4% 	98.42%
2021	259 5% new 	70.7% 	98.19%
<b>2024 (forecast including proposed investment)</b>	<b>259</b>	<b>61.7%</b> 	<b>98.13%</b>

**Table 2: State of Good Repair and Performance of Lift Assets**

- 3.13 Table 2 shows that over the past two years the asset base has grown by roughly 15 per cent, however despite this increase in “as new” assets we have seen a decrease in SoGR, which highlights how the condition of our existing asset base is in decline.
- 3.14 Safety mitigations, maintenance and inspection regimes will continue to be carried out by Asset Operations to sustain LUs high level of safety. However, in the short term there are potential operational budget pressures and risks to operational performance as assets deteriorate.
- 3.15 The proposal in this paper seeks to slow this decline and only start to recover the position from 2025 onwards. This is constrained by the lead times to start works on site and the need to build up delivery capability from a low base having only completed one SMVT lift replacement in 2021/22.
- 3.16 The projection for the SoGR and availability for 2024 (in table 2 above) includes the proposed level of investment in this paper but does not include any new assets being added to the asset base (because this masks the deterioration in the condition of the existing asset base). Future availability is based on a deterioration of performance as assets move towards the end of their residual life. This network decline will not fall equally across the network. So regular users of some stations will be disproportionately affected by assets that are in a poor condition.
- 3.17 Whilst the proposed level of investment on lift replacements between now and 2024 is not enough to reverse the decline in SoGR (see table 2 above) it will build capability towards achieving a run rate of six SMVT lift renewals per annum by 2024 (to add to the two per annum achieved by the PMVT renewal workstream). Without the proposed investment there would be a further decline in the SoGR by 2024. Such a large backlog of renewals would be very difficult to catch up particularly as our asset base is growing and access is a finite resource. Note that

availability is a lagging indicator of condition and will follow the same trajectory as the SoGR within a few years.

- 3.18 We will need to increase the renewals run rate in future years with investment increasing from in the region of £16m to in the region of £20m per annum over the course of the 25-year LTCP. This is to be able to recover back towards the 2019 SoGR levels in line with the Do Minimum Scenario in the LTCP (illustrated by figure 1 below) and to account for our growing asset base. This investment will need to be addressed in future Budget and Business Plans and authority requests (subject to affordability and deliverability constraints).



**Figure 1: Potential SoGR of lift assets over the 25-year LTCP (existing 259 asset base)**

### Delivery Strategy

- 3.19 There are currently two delivery workstreams for lifts renewals, PMVT and SMVT renewals.
- 3.20 There are detailed work banks that prioritise which lift assets should be renewed. These work banks are prioritised using the following criteria:
- (a) Asset risk profiles. An assessment of the risk associated with the failure of any of the asset sub systems or components or obsolescence risk, and the controls in place to prevent such failure and assure safety.
  - (b) Asset condition. Determined through the asset's compliance against standards, its reliability, and its estimated residual life.
  - (c) Asset criticality. A measure of the asset's importance to the operation of the station and the potential impact on the customer which could result from failure; and
  - (d) Opportunities and synergies from alignment with other planned works, for example line closures, to minimise disruption or save costs.

3.21 The work bank is regularly reviewed, and the priority list evolves as asset condition, safety or reliability concerns or work synergies emerge. Most of the lift renewals within the programme are repeatable scope items, with minor variations due to site specific constraints.

## 4 Delivery Progress

### Impact of the coronavirus pandemic

4.1 Since March 2020, the delivery progress of the component parts of this Programme have been significantly impacted by the coronavirus pandemic. TfL brought nearly all project sites to a temporary safe stop to limit the spread of the coronavirus, with construction activity paused between 24 March and 26 May 2020, except for limited specifically approved activities.

4.2 Additionally, there have been knock on impacts to the supply chain in terms of remobilisation which has constrained productivity and project progress. A large proportion of staff were placed on furlough during this period which has affected the progress of this Programme.

4.3 Our financial constraints following the pandemic has also had a significant impact on the Programme. As a result of the significant funding reduction in 2020/21 the overall volume of work completed has been reduced. Works which were not yet contractually committed were deferred from 2020/21.

### PMVT Lift Replacements

4.4 It was planned to complete the replacement of two PMVT lifts at Belsize Park Station during 2020/21. However only one of the two replacements could be successfully completed in 2020/21 with the second delayed to 2021/22. This was due to works being delayed on site due to the temporary safe stop as a result of the pandemic. Works re-commenced in May 2020 (with appropriate pandemic safe measures in place). One of the lifts was completed in December 2020 and the second was completed in July 2021.



**Figure 2: Installation of new lift ropes and controller at Belsize Park**

- 4.5 Following completion of the works at Belsize Park, works commenced on site in June 2021 to replace both lifts at Borough Station and are due to complete in Summer 2022. These works have been planned to coincide with the temporary Bank branch Northern line closure to minimise disruption to customers.
- 4.6 Design activities have now commenced to replace both lifts at Holloway Road station to support a start on site in late 2022 (following the completion of works at Borough) with completion planned for late 2023. Replacement of both lifts at Mornington Crescent Station is currently planned as the next intervention (to follow Holloway Road) for delivery in 2024.

### **SMVT Lift Replacements**

- 4.7 Design works at Tottenham Hale continued throughout 2020/21 but progressed slower than expected due to the unique nature of the asset at this location which required a complex intervention. Works have now commenced on site and are due to complete in January 2022.
- 4.8 It was originally planned to begin work on a new package of SMVT lift replacements in 2020/21 to support a start on site from 2021/22. However, work on this new package was deferred due to funding constraints arising from the coronavirus pandemic and is now requested in this submission to enable design and procurement of parts in 2022 and delivery on site between 2023 to 2024.

## **5 Proposal**

- 5.1 This submission seeks £19.11m of Programme and Project Authority for renewal of SMVT lifts. Additional Procurement Authority is also requested in Part 2 of the agenda. The remaining Lift and Escalator renewals projects either have existing Programme and Project Authority or will form part of future requests.
- (i) £14.51m for replacement of nine existing life expired SMTV lift assets for design in 2022 and delivery between 2023 and 2024.**
- 5.2 Our prioritisation process (described in paragraph 3.9 above) has generated a workbank of nine lifts forming the next package of critical SMVT lift replacements.
- 5.3 These lifts are all in a poor condition (categorised as life expired in the Asset Condition Register, the worst category), with poor performance and obsolete components. They are hydraulic lifts which were not designed for the level of footfall they have received and have consistently failed to meet performance targets.
- 5.4 The replacement of these nine lifts between now and 2024 is essential to slowing the current decline in SoGR and lift availability and reliability and maintaining step free access at these stations. The replacements also help mitigate the risk of asset failure and associated loss of service.
- 5.5 Due to the 12-month lead time for undertaking design, failure to initiate these renewals now would result in zero SMVT lift replacements being completed in 2023 and 2024.

Intervention	SMVT Lift renewals completed			
	2022	2023	2024	Total
SMVT Lift replacements	0 (design and procurement)	3	6	9

**Table 3: Proposed volumes for SMVT replacements 2022 to 2024**

(ii) **£4.60m for capital whole life refurbishment interventions on the nine new SMVT lift assets above and a further 36 existing SMVT lift assets until 2034.**

5.6 These interventions are required as part of the whole life maintenance and intervention approach to ensure these lift assets remain in a State of Good Repair and capable of meeting availability targets.

## **6 Financial Implications**

6.1 Table 5 below shows the financial impact of the Programme by year. Due to the long-term nature of the pan-TfL contracts, there is approved Project and Programme Authority to cover commitments up to 2035.

6.2 The Financial Authority is provided through the two-year Budget for 2021/22 and 2022/23 approved by the Board on the 28 July 2021.

6.3 It is noted that the current funding agreement with government expires on 11 December 2021 and additional government funding will need to be agreed beyond this period, therefore a subsequent prioritisation of the TfL Investment Programme will be required to ensure that all projects are affordable within the funding envelope provided and as such revised authority may need to be sought.

6.4 Authority granted by the Committee which relate to both the current funding period to 11 December 2021 and commitments outside of this period, may need to be revised as part of future budgets to be considered by the Board. Provision will also need to be made in future Budgets and Business Plans in respect to commitments made. If additional funding is not available, a prioritisation of the TfL Investment Programme will be required, and some programmes and projects will not be taken forward and revised authority will be sought as appropriate.

6.5 All financial commitments related to this request will be overseen in accordance with TfL Business controls in respect of draw down.



Costs and Funding (£m)	Prior Years	2021/22	2022/23	2023/24	2024/25	Future Years	Total
Cost (Outturn)							
Existing Programme and Project Authority	456.2	30.0	37.3	46.8	54.0	260.9	885.1
Additional Authority Requested		<b>0.5</b>	<b>3.0</b>	<b>7.8</b>	<b>3.9</b>	<b>3.9</b>	<b>19.1</b>
Total Programme and Project Authority	456.2	30.4	40.3	54.6	57.9	264.8	904.2
Existing Financial Authority	456.2	32.3	38.6	54.6	61.7	295.4	938.9
Estimated Final Cost (EFC)	456.2	30.4	40.3	54.6	61.7	295.6	938.9

**Table 4: Lift and Escalator Programme financial implications**

## **7 Equality Impact Assessment**

- 7.1 The Programme is delivered in accordance with the Equality Act 2010. Equality Impact Assessments are carried out for each intervention, with due regard to our obligations under the public sector equality duty.
- 7.2 Successful delivery of the programme particularly impacts on customers requiring step free access.

## **8 Assurance**

- 8.1 TfL Project Assurance has been undertaking continuous assurance on the Lifts and Escalator Sub-Programme on a periodic basis. Previous assurance recommendations have been reviewed and progress noted. No critical issues have been identified in the areas reviewed as part of the continuous assurance. As a result, a Sub-Programme review was not required for this submission.
- 8.2 An Integrated Assurance Plan for the Programme has been agreed with TfL Project Assurance for the next 12 months and is updated quarterly. It is planned to undertake a detailed assurance review prior to the next submission to the Committee.

**List of appendices to this report:**

Appendix 1: Lifts Delivery Summary

Exempt supplemental information is contained in a paper on Part 2 of the agenda

**List of Background Papers:**

None

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## Appendix 1: Lifts Delivery Summary

		2020/21		2021/22			22/23	23/24	24/25
		Planned (Dec 2019)	Actual	Planned (Dec 2019)	Revised (July 2021)	Forecast	Forecast	Forecast	Forecast
<b>Lifts Spend £ms</b>		<b>7.4</b>	<b>3.6</b>	<b>11.1</b>	<b>6.8</b>	<b>6.1</b>	<b>9.5</b>	<b>13.2</b>	<b>15.5</b>
<b>Lift Interventions</b>	PMVT Volume	2	1	2	2	2	2	2	2
	SMVT Volume	0	0	4	1	1	0**	3	6
	<b>*Volume Total</b>	<b>2</b>	<b>1</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>5</b>	<b>8</b>

**Table 1: Planned vs Actual vs Forecast Lifts Delivery to 2024/25**

\*Volumes refer to completed replacements, spend also includes capitalised maintenance interventions (and in 21/22 a stairlift replacement at Hounslow West station deferred from 2020/21, and life extension works at Elephant & Castle station).

\*\* Works will start on site in 2022/23 following design and procurement but will not complete until 2023/24

See section 4 in the cover paper for further details.

As lift replacement works take 18months from feasibility to completion there is spend for design /works starting on site in the year prior to completion of the interventions. Deferral of design works from 2020/21 accounts for a significant amount of the reduction in planned spend in that year and had a knock-on impact for spend to 21/22 (as works were not ready to start on site).

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## Programmes and Investment Committee



**Date:** 15 December 2021

**Item:** Members' Suggestions for Future Discussion Items

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### **This paper will be considered in public**

#### **1 Summary**

- 1.1 This paper presents the current forward plan for the Committee and explains how this is put together. Members are invited to suggest additional future discussion items for the forward plan. Members are also invited to suggest items for future informal briefings.

#### **2 Recommendation**

- 2.1 **The Committee is asked to note the forward plan and is invited to raise any suggestions for future discussion items for the forward plan and for informal briefings.**

#### **3 Forward Plan Development**

- 3.1 The Board and its Committees and Panels have forward plans. The content of the plan arises from a number of sources:
- (a) Standing items for each meeting: Minutes; Matters Arising and Actions List; and any regular quarterly or periodic reports. For this Committee, these are the quarterly Investment Programme Report and the regular report on the Crossrail project.
  - (b) Programmes and Projects at a level requiring Committee approval. These include the annual review of the 20 sub-programmes in the Investment Programme and other approvals sought following advice from the operating businesses.
  - (c) Items requested by Members: The Deputy Chair of TfL and the Chair of this Committee will regularly review the forward plan and may suggest items. Other items will arise out of actions from previous meetings (including meetings of the Board or other Committees and Panels) and any issues suggested under this agenda item.

#### **4 Current Plan**

- 4.1 The current plan is attached as Appendix 1. Like all plans, it is a snapshot in time and items may be added, removed or deferred to a later date.

#### **List of appendices to this report:**

Appendix 1: Programmes and Investment Committee Forward Plan 2021/22

**List of Background Papers:**

None

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## Programmes and Investment Committee Forward Plan 2021/22

**Membership:** Prof Greg Clark CBE (Chair), Dr Nelson Ogunshakin OBE (Vice Chair), Heidi Alexander, Mark Phillips, Dr Nina Skorupska CBE, Dr Lynn Sloman MBE and Ben Story

Abbreviations: Managing Director (MD), Customer, Communication and Technology (CCT), London Underground (LU), Surface Transport (ST), CFO (Chief Finance Officer), Investment Delivery Planning (IDP) and Director (D)

<b>Standing Items</b>		
Use of Delegated Authority	General Counsel	Standing item
Quarterly Programmes and Investment Report	MD LU and TfL Engineering, MD ST and D Major Projects	To note high-level progress update against the 20 grouped Investment Programme and Major Project items and any specific approvals required in relation to programmes not on the deep-dive list for that meeting.
IIPAG Quarterly Report (appendix on Second line Assurance Activities)	Project Assurance	Standing item
TfL Project Assurance	Project Assurance	Standing item

<b>2 March 2022</b>		
Enterprise Risk Update – Delivery of key project and programmes (ER8)	D Major Projects	Annual update
DLR	MD ST	Update and approval
Air Quality Environment	D Major Projects	Update and approval
LU Technology	MD LU	Update and approval
Tech and Data	MD CCT	Update and approval
Silvertown Tunnel	MD ST	Update and approval
Barking Riverside	D Major Projects	Update

**Regular items:**

- Use of delegated authority by Chair, Commissioner and CFO.
- Quarterly Monitoring Report – to include:
  - high-level progress update against the 20 grouped Investment Programme and Major Project items;
  - specific approvals required in relation to programmes not on the deep-dive list for that meeting;
  - identification of programmes about to issue tenders so Members can input;
- Second Line Assurance Activities
- IIPAG Quarterly Report
- 4/5 deep dive papers each meeting from the rolling programme of Investment Programme / Major Project items. Papers to seek annual approval for the programme.

**Items to be scheduled:**

- London Overground future planning
- Rotherhithe Tunnel
- Fiveways Corner in Croydon
- Innovative Technology in Signalling
- Lessons Learnt from Complex Projects with Commercial Issues (D Major Projects)
- London Underground Enhancements (May 2022)
- Surface Transport Assets (May 2022)
- Surface Technology (May 2022)
- East London Line HIF programme (May 2022 – TBC)

**Future items for Committee or Board:**

- How TfL Investment Programme is affected by:
  - Potential rail devolution
  - Heathrow expansion
  - Oxford Street pedestrianisation
  - Football stadiums/events



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