

Date: 6 December 2023

Item: Bakerloo Line Upgrade Stage 1

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## This paper will be considered in public

### 1 Summary

Bakerloo line Upgrade Stage 1				
Existing Financial Authority	Estimated Final Cost (EFC)	Existing Programme and Project Authority	Additional Authority Requested	Total Authority
£2.4m	£1,572 to £1,627m	£2.4m	£0m	£2.4m

- 1.1 This paper provides an update on the Bakerloo line Upgrade (BLU) Programme, notably the case for investment to replace the life expired 1972 tube rolling stock (72TS), delivery planning, the contract option with Siemens Mobility Limited (Siemens) and implications of not being able to exercise the option due to constrained capital funding.
- 1.2 Supplementary information is included in Part 2 of the agenda. This information is exempt and is therefore not for publication to the public or press by virtue of paragraph 3 of Schedule 12A of the Local Government Act 1972 in that it contains information relating to the business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 the meeting.

### 2 Recommendation

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

### 3 Background

- 3.1 Originally, the intention to upgrade the Bakerloo line formed part of the Deep Tube Upgrade Programme (DTUP) which was established in 2012. It sought to replace life-expired trains and signalling systems across the Piccadilly, Bakerloo, Central and Waterloo & City lines as a combined programme.
- 3.2 The DTUP was disbanded as part of the 2019/20 Business Plan to solely focus on the Piccadilly line. Consequently, the Bakerloo line Upgrade was combined with the Bakerloo Line Extension (BLE) to create an integrated Bakerloo Line Upgrade and Extension (BLUE) Programme.

- 3.3 With the significant financial challenges faced by TfL, it is not feasible to fund the BLE in the near term. Therefore, while it remains a longer-term priority, it has proved necessary to decouple BLU from the BLUE Programme. As set out further below, the 72TS is beyond its design life and operating at an unprecedented age of over 50 years old. There are significant daily challenges to keep the fleet available for service. If the fleet is not replaced, there would be an increasing risk that an endemic failure could force the withdrawal of the 72TS from operation. Therefore, given the criticality of fleet replacement on the Bakerloo line, the upgrade element of the BLUE Programme was set up as a standalone BLU Programme.
- 3.4 The BLU Programme is formed of two stages: Stage 1 is seeking to safeguard the future operation of the Bakerloo line through replacing the life-expired rolling stock currently operating. Stage 2 would upgrade the line's signalling and control systems, enabling an uplift in service frequency.
- 3.5 The BLU Stage 1 is critical and requires Government capital funding support to be able commit to it, including the trains from Siemens (as explained in paragraph 3.7). The 72TS (as shown in Figure 1) is the oldest passenger train in daily operation in the UK. Designed for a 36-year life, the fleet is increasingly unreliable given its age, with its maintenance becoming ever more challenging and costly. Consequently, the number of trains available for service each day has started to decline. As a result, the frequency on the Bakerloo line has recently been reduced from 22 to 20 trains per hour.
- 3.6 There is considerable doubt over whether the fleet will be able to operate beyond the next decade. Maintaining and overhauling the fleet into the next decade will cost hundreds of millions of pounds, with no tangible benefit other than maintaining the status quo. Moreover, in doing this there would still be an increasing risk of a fleet-wide failure that could force a withdrawal from service, due to the unprecedented age at which the 72TS is operating. Replacement would offer better value for money and a better whole life cost solution.
- 3.7 The intention is to replace the Bakerloo line fleet of 36 trains using a time limited option for fleet replacement in the 2018 rolling stock contract with Siemens, which is currently being used to replace the Piccadilly line fleet (also shown in Figure 1). Exercising this option would see the benefits of the multi-line strategy developed under the DTUP realised. These include key benefits linked with more standardised fleet across lines, such as more efficient maintenance and use of specialist resources like rolling stock and depot engineers. This option also benefits from the significant design, development testing and facility set-up that has already been incurred as part of the Piccadilly line order. However, the option and its benefits are at risk of being timed out with the latest contractual date for exercising it being in November 2026.



**Figure 1: 72TS in operation on Bakerloo line and proposed 24TS being delivered for the Piccadilly line**

- 3.8 The BLU Stage 1 also includes all necessary infrastructure enabling works to introduce a new fleet of trains including depots, stabling, power, track, legacy signalling, CCTV and comms. The depot and power workstreams have long lead times and have been identified as the critical path to ensure TfL is ready to receive a new Bakerloo line fleet from Siemens.

### **The Case for the Bakerloo line Upgrade**

- 3.9 The Bakerloo line plays a key role in keeping London moving, acting as one of the primary services used by businesses, visitors and tourists to access London and the UK. The line serves areas of north-west London including Harrow and Wembley, providing links to central London and main line terminals at Marylebone, Paddington, Charing Cross and Waterloo stations. The Bakerloo line is a nationally important line, connecting key cultural and educational sites, with over 113 million journeys made in 2019/20. Additionally, in 2023 it is estimated that the line is the 14th busiest passenger railway in the UK (Figure 2).
- 3.10 Tyne and Wear Metro, Glasgow Subway and Merseyrail are all in the process of replacing their fleets – none of which is as old as the 72TS, and with significantly less patronage than the Bakerloo line.

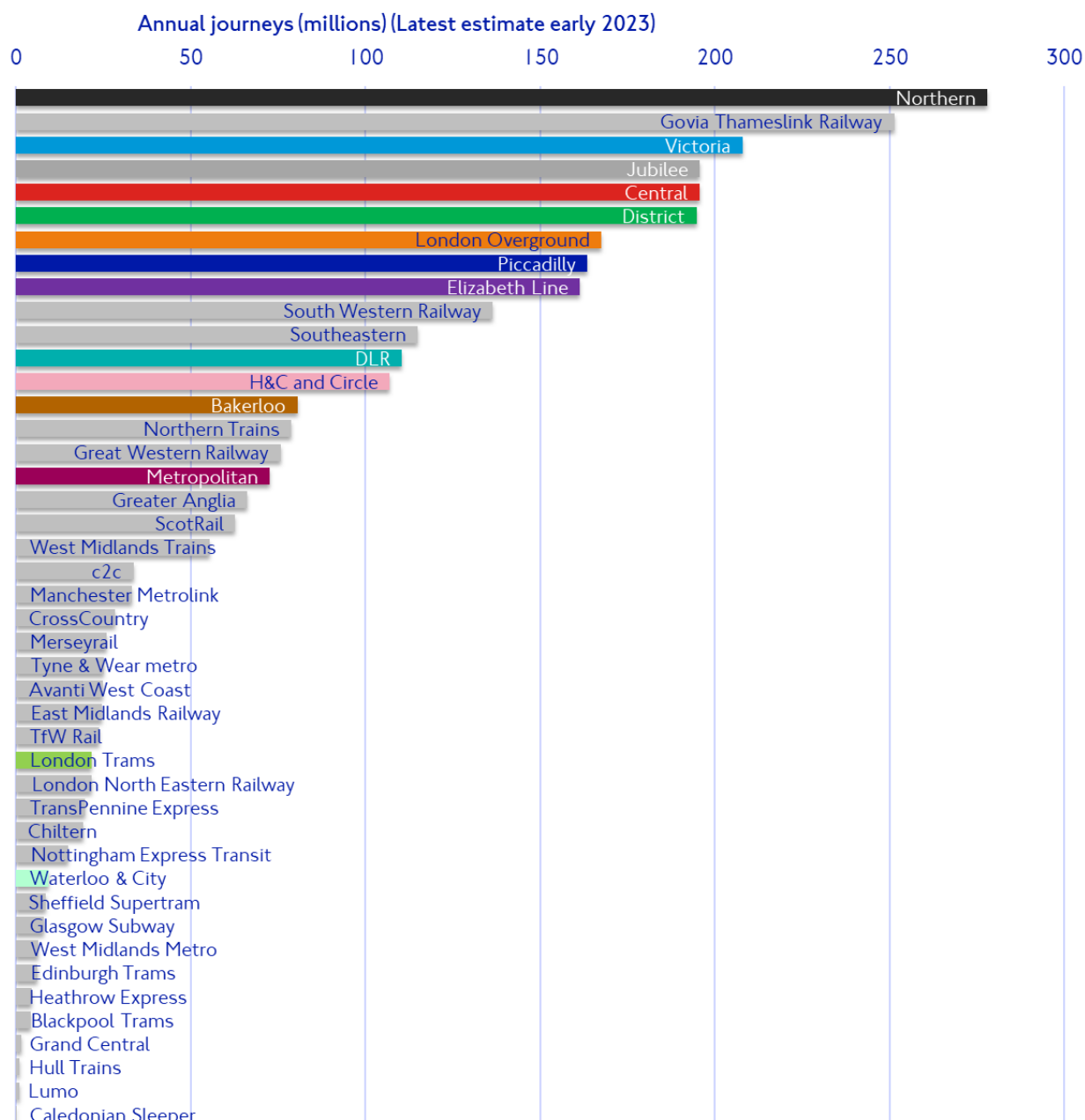


Figure 2: Estimated 2023 annual journeys (millions), TfL & Office of Rail and Road quarterly demand data

- 3.11 The Bakerloo line also serves some of the most deprived locations in England, as is demonstrated by Appendix 1. Upgrading the line also lays the foundation for the delivery of BLE, which will greatly improve public transport connectivity in south-east London and will enable a significant number of new jobs and homes along the corridor.
- 3.12 Due to the age of the fleet, reliability performance has declined in recent years and is projected to deteriorate further in the remaining years of asset life as it becomes more challenging to sustain reliability and availability whilst addressing an increasing volume of repairs. Furthermore, the unreliability of the current fleet constrains the Bakerloo line from delivering its full potential. Replacement would enable a significant improvement in the line's reliability as well as the uplift of the

service frequency in the line's core (Elephant & Castle – Queens Park) to 22-24 trains per hour with the existing signalling. A signalling upgrade (Stage 2) could increase that to 27 trains per hour.

- 3.13 In policy terms, the BLU delivers on the Mayor's Transport Strategy (MTS) proposal to improve the capacity and reliability of the Underground network. More broadly, through the provision of a reliable, high quality public transport experience, it contributes to the MTS aim for 80 per cent of all trips in London to be made on foot, by cycle or using public transport by 2041 by providing an attractive alternative to using the car. The Programme also aligns with TfL's organisational priorities: winning back our customers; empowering and supporting our colleagues; rebuilding our finances; and protecting and improving our environment.
- 3.14 Table 1 sets out strategic objectives which have been developed specifically for the BLU. These objectives align with wider TfL strategies such as aiming for a smoother profile of spend on fleet replacements as well as the reduction of whole life costs achievable through standardising fleets, where practicable, across LU.

Strategic objective
Safeguard the operation of the Bakerloo line for future decades
Reduce the maintenance and operation cost of the Bakerloo fleet
Improve the service offering and customer experience for passengers of the Bakerloo line corridor
Better accommodate current and forecasted passenger demand
Increase the reliability of line's service
Improve the environmental performance and contribute towards carbon neutrality

**Table 1: BLU programme - Strategic objectives**

## **4 Current Progress**

- 4.1 To inform the scope for the BLU, Sponsor Programme Requirements (SPR) have been developed. The requirements provide an initial foundation from which more detailed technical and delivery requirements will be developed. The SPR cover a wide range of areas including rolling stock, stabling, maintenance facilities, infrastructure modifications, environment and carbon, and future-proofing considerations for the BLU Stage 2 (new signalling) and for the BLE.
- 4.2 The BLU Programme has also started to undertake a feasibility study to help define a preferred delivery strategy for Stage 1. The range in the EFC outlined in the summary section reflects the fact that a single delivery strategy has not yet been defined. This work will include identifying and assessing various options to deliver fleet replacement on the line. There will undoubtedly need to be trade-offs between costs, operational impact and customer impact.

- 4.3 Work has also started to develop an up-to-date understanding of gauging and infringements along the line. This work will support early engagement with Siemens should the contract option be exercised.

## **5 Lessons Learnt**

- 5.1 Multiple sessions have been held to learn lessons from a variety of internal and external programmes such as the Piccadilly line Upgrade (PLU) and DLR fleet replacement. Furthermore, regular engagement with programmes that have overlapping or interdependent scope with the BLU has been established and assisted in the early development of scope and Programme requirements.
- 5.2 Owing to the natural similarities between the PLU and BLU as rolling stock renewal programmes, particular effort has been given to learning lessons from this programme. Key lessons include gauging work, understanding the complexities within the PLU depots workstream, and robustly testing key assumptions.

## **6 Benefits and Value**

- 6.1 Aside from securing the long-term future of the line's operation, replacement of 72TS with the Siemens rolling stock would enable the provision of a modern fleet of rolling stock, enhancing the passenger experience through provision of air-cooled, fully walk-through, accessible trains with advanced passenger communication systems. It will provide a better whole life cost solution, with standardisation of fleet across several deep Tube lines.
- 6.2 As part of the economic case within the Programme's Strategic Outline Business Case (SOBC), appraisal of numerous options has been undertaken, drawing together the benefits, costs, and overall value of the Programme. The assessment of fleet replacement using the option within the rolling stock contract with Siemens (our preferred option) has a strong benefit to cost ratio of 5.1:1.
- 6.3 Aside from service frequency, capacity and journey time benefits, several other benefits have also been calculated and factored into the appraisals within the SOBC. These include, but are not limited to, ambience benefits of the new rolling stock, benefits to road users and carbon benefits.

## **7 Equalities Implications**

- 7.1 An initial Programme-level Equalities Impact Assessment (EqIA) was produced for Pathway Stage A. This document will evolve with the Programme and it is anticipated that more detailed EqIA(s) may need to be produced for the individual projects (once they are defined) and/or particular elements of the Programme (e.g. the delivery strategy).

## **8 Financial Implications**

- 8.1 TfL is continuing to make the case to the Government for longer term funding which would enable commitment to the BLU.

- 8.2 Without this commitment, TfL will not be able to exercise the option with Siemens that provides price certainty for the cost of the trains. Not being able to exercise this option will result in the materialisation of the risks set out in section 3. This could delay the replacement of the 72TS by a decade and, in so doing, force substantial expenditure on continual overhaul of the fleet to maintain its safe operation.

## **9 Assurance**

- 9.1 Continuous assurance has been undertaken on the Programme as well as specific assurance activities.
- 9.2 Regular meetings are held with TfL's internal Assurance team to update on progress and co-ordinate reviews. The BLU is currently in the final stages of an Independent Assurance Review (IAR) which was initiated following the passing of Stage Gate A. The IAR is reviewing several areas of the programme, including commercial, engineering, programme management and governance.
- 9.3 In addition, the SOBC for BLU is currently being informally reviewed by IIPAG ahead of its submission to the Department for Transport.

## **10 Next steps**

- 10.1 The BLU team is working to achieve the strategic milestone: "Agreed Stage 1 scope and delivery strategy" by 31 March 2024.
- 10.2 To achieve this milestone further work is required to determine feasibility through working across the TfL value chain to determine an agreed delivery strategy. Once an agreed delivery strategy and programme scope have been determined, the programme will progress to Pathway Stage Gate B (Define Tranches).
- 10.3 Engagement will also continue with Government and HM Treasury about funding along with reviewing the BLU business case. This engagement will cover both short-term funding required to continue programme development, as well as longer term funding decisions in relation to future planned procurements and contract commitments.

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

Appendix 1: Map showing the Bakerloo line and deprivation levels of surrounding areas, measured using Index of Multiple Deprivation (2019)

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

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

None

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**Appendix 1: Map showing the Bakerloo line and deprivation levels of surrounding areas, measured using Index of Multiple Deprivation (2019)**

