

Date: 13 October 2021

Title: London Underground Track Renewals Programme

This paper will be considered in public

## 1 Summary

Table 1: Programme and Project Authority request up to and including 2022/23

LU Track Renewals Programme 2020/21 – 2022/23				
Existing Financial Authority	Estimated Final Cost (EFC)	Existing Programme and Project Authority	Additional Authority Requested	Programme and Project Authority 2020/21-2022/23
£361.9m	£349.9m	£402.0m	Nil	£402.0m

- 1.1 This paper covers the London Underground (LU) Track Renewals Programme, which is a rolling programme delivering prioritised, critical asset renewals to maintain current levels of safety and reliability and, where possible, support upgrade requirements. This is consistent with the Asset Strategy and the **do minimum scenario in Long-Term Capital Plan (LTCP)** to FY2027/28. This paper is the first update submission to the Committee for the current three-year authority period.
- 1.2 The LU Track Renewals Programme consists of multiple projects delivering critical asset renewals, iteratively increasing the State of Good Repair (SOGR) to provide a safe and operable network. The current three-year authority ends in March 2023.
- 1.3 In July 2019, the Committee approved additional Programme and Project Authority of £18.3m for the remainder of 2019/20 taking the 2018/19 to 2019/20 authority to £249.9m. In the same submission, £402.0m Programme and Project Authority was approved for 2020/21 to 2022/23. As such, this paper spans two authority periods over five years:
- (a) 'previous' two-year, 2018/19 to 2019/20, with a total authority of £249.9m; and
  - (b) 'current' three-year, 2020/21 to 2022/23, with a total authority of £402.0m.
- 1.4 This paper will:
- (a) provide an update of the Track Renewals Programme success in delivering projects as presented to the Committee in July 2019;

- (b) summarise planned delivery from October 2021 to the next annual submission to the Committee planned for October 2022, as well as key challenges and opportunities for the year ahead;
  - (c) provide assurance to the Committee on the progress of the Track Renewals Programme, both in terms of delivery and in setting up robust arrangements for future years; and
  - (d) provide a detailed cost and funding breakdown.
- 1.5 The Programme will return annually to the Committee for authority approval, with the October 2022 submission planned to seek Programme and Project Authority for beyond 2022/23.

## **2 Recommendations**

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

## **3 Background**

### **Strategic Context**

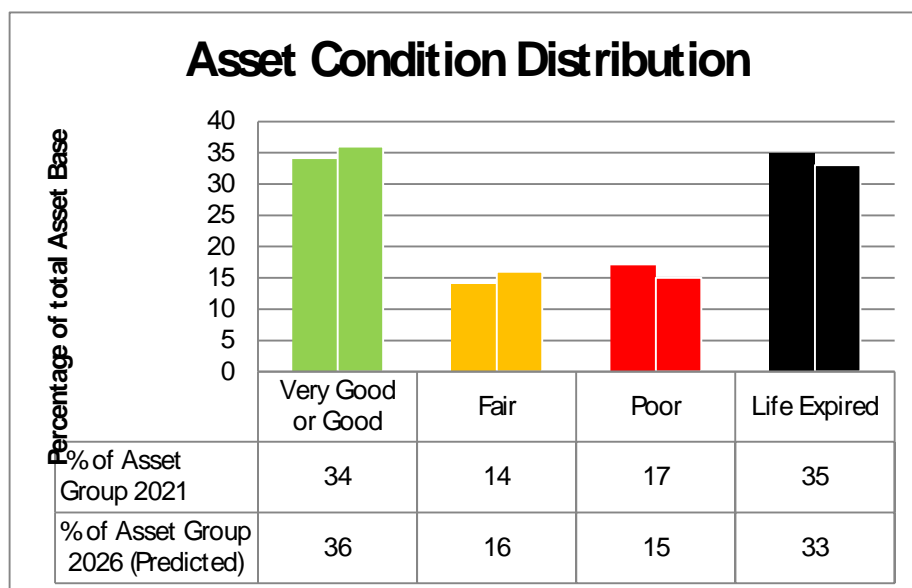
- 3.1 Track assets are an essential component of a safe, reliable railway. It continually degrades with use, requiring rolling maintenance and renewal to maintain a SOGR. Unlike most assets, track does not fail safe; rail breaks or other defects can cause derailments with severe safety consequences and disruption to passengers until normal, safe service can be resumed. To preserve required levels of safety and reliability two to five per cent of the asset needs to be renewed annually.
- 3.2 Overall, the track asset base comprises:
- (a) plain-line track: sections of linear track without any junctions. This can be in open, sub-surface or deep tube sections, requiring Ballasted Track Renewal (BTR) or Deep Tube Renewal (DTR). In addition, in the deep tube, older bullhead style rail is being replaced by more modern flat-bottom rail with a Flat Bottom Conversion (FBC). The different asset types have between 20 and 60 year asset life;
  - (b) points and Crossings (P&C). These are the junctions on the track network (including within depots and sidings) that enable trains to be routed to different locations; and
  - (c) other assets include depot track, long timber bridges, track drainage, lineside fencing, and many other miscellaneous asset types.
- 3.3 Of the 1,115km of track, 79 per cent is for passenger routes with the remainder in depots and sidings. Overall, 80 per cent of the LU network is comprised of modern (flat bottomed) trackform, falling to 73 per cent in deep tube sections. There are also 1,808 units of P&C providing safe guideways for the train fleet around the network; 747 of these are for passenger moves with the rest in depots and sidings.

- 3.4 The Programme aims to install high integrity, low maintenance flat-bottom track on concrete sleepers replacing bullhead rail on timber sleepers, some of which has been in service on the LU Network since the early 1900s with much more dating from the 1960s and 1970s. This modern trackform has far more predictable failure modes and provides a more stable and reliable asset base. Track noise is also a factor in the workbank prioritisation and as below (paragraph 5.2) our Deep Tube work has increased to address targeted areas. This is to supplement the rail grinding in maintenance that has a direct effect on noise reduction.
- 3.5 The Programme plays a vital role in maintaining day-to-day service levels. It supports The Mayor's Transport Strategy (MTS) objective of 'providing a good public transport experience' by improving safety, reliability and capacity by renewing assets in a prioritised manner. Over time, this contributes to a 'SOGR' measure on the TfL Scorecard.

### **Current and Forecast Condition**

- 3.6 Based on average asset life, between £120m and £160m per annum (using current rates of indexation) are determined to be the level of capital investment required to hold steady state condition. Lesser investment is predicted to result in net asset deterioration. This is because the rate at which track asset condition deteriorates would be greater than our ability to renew it, creating an increasing renewals backlog. This would, in turn, drive increased inspection and maintenance rather than full renewal. As safety is always a priority, it is inevitable that once this position is reached other factors such as noise reduction, ride quality and reliability would be compromised.
- 3.7 Recent investment into the renewal programme has provided incremental year-on-year improvement in condition across the asset base. With sustained investment initially to 2025/26, the most recent track asset condition review predicts further improvement as illustrated in Figure 1. For context, condition categorises are broadly defined as per below, based on levels of corrective maintenance completed in the last two years, track geometry, rail type and location to determine asset risk:
- (a) Very Good: No physical degradation/deterioration in observed performance – generally 'as new' condition;
  - (b) Good: No longer 'as new', performing well with limited degradation and no extraordinary maintenance/inspection required;
  - (c) Fair: Adequate track quality but asset is showing signs of reduction in Track quality / increased maintenance but very limited extra inspections compared to modern new track form.
  - (d) Poor: Some additional maintenance/inspection required relative to modern trackform; and
  - (e) Life Expired: Beyond design life or obsolete requiring significant maintenance/inspection relative to modern trackform in order to retain high levels of safety and reliability expected of a modern metro system.

3.8 Figure 1 shows a projected improvement in condition across the asset base. Currently, just over half (52 per cent) of the track asset base is receiving additional maintenance/inspection, but by 2026, with sustained investment, this trend would reverse with 52 per cent being Very Good, Good or Fair condition.



**Figure 1: 2021 ACR Asset Condition Distribution**

3.9 Asset condition is incrementally improved by a prioritised programme of interventions such as ballasted track renewals (BTRs), deep tube track renewals (DTRs), P&C replacement with modern units and drainage improvements. The prioritisation is driven by factors including legal compliance, safety risk, reliability risk, maintenance activity, obsolescence, and preparation for increased train loading supporting line upgrades. The proposed workbank is assessed against the (weighted) driving factors to generate a prioritisation. This is then developed by considering factors such as available resources, materials and available access to generate a rolling programme.

### **Delivery Strategy**

- 3.10 The Track Renewals Programme is delivered via a variety of means usually via routine engineering hours, weekend closures or longer blockades typically over bank holiday periods.
- 3.11 The supply chain for the programme includes a track delivery agreement between TfL and Balfour Beatty Rail Projects Limited. The agreement started in February 2019 and delivers track renewals over four years. Work is carried out by the Integrated Track Team (ITT) and predominantly delivers BTRs, P&C renewals in open sections and drainage works (which are often delivered in line with BTRs).
- 3.12 Deep Tube Renewals (DTRs) / Flat Bottom Conversion (FBC) are delivered using LU's internal delivery group known as the Track Delivery Unit (TDU).
- 3.13 Long Timbered Bridges (LTBs) and Depot Track are delivered by both ITT and TDU.

## 4 Delivery Progress since last Submission

4.1 Towards the end of 2019/20 and through 2020/21, progress of the Programme was impacted by the coronavirus pandemic. TfL brought nearly all project sites to a temporary 'safe stop'. Construction activity was paused between 24 March 2020 and 26 May 2020, aside for limited specifically approved activities needed to keep the worksites in a safe condition. Additionally, a large proportion of staff were placed on furlough during this period which has affected the progress of this Programme.

### 2019/20 Delivery

4.2 This covers the second and final year of the 'previous' 2018/19-2019/20 authority.

Intervention		Planned	Actual	Planned vs Actual
Plain-line (metres)	Deep Tube Renewals (DTR)	4,200	3,786	- 414
	Ballasted Track Renewals (BTR)	6,300	6,740	+ 440
	Flat Bottomed Conversion	7,700	9,115	+ 1,415
P&C (units)	P&C full renewal + heavy maintenance activity	20	16	- 4
Other	Track Drainage (m)	2,900	3,539	+ 639
	Long Timber Bridges (units)	0	0	0

**Table 2: 2019/20 Planned vs Actual Volumes**

4.3 In several areas of the Programme, more plain-line and drainage scope was delivered compared to plan. Key locations delivered in 2019/20 include:

- (a) **DTR:** Baker Street to St John Wood (Jubilee line) and Knightsbridge to South Kensington (Piccadilly line);
- (b) **BTR:** Queens Park (Bakerloo line), Wembley Park to Kingsbury (Jubilee line) and Hammersmith (District) see Figure 2;
- (c) **P&C:** Aldgate (12 units) was not delivered as originally planned in the work bank, resulting in under delivery in this area of the programme. This was in order to facilitate the Four Lines Modernisation (4LM) programme that is upgrading signalling across the network and the dependency on signalling to control points movement. This shortfall was partially mitigated by other prioritised scope, such as South Harrow and Uxbridge (Piccadilly Line), Wimbledon / Wimbledon Park (District) and Embankment (District); and
- (d) **Track Drainage:** Boston Manor (Piccadilly line) and Northfields (Piccadilly line).



**Figure 2: BTR near Hammersmith**

### **2020/21 Delivery**

- 4.4 The first year of the current £402.0m authority was impacted by ‘safe stop’ and revised ways of working associated with the coronavirus pandemic (e.g. social distancing, additional on-site hygiene measures, coronavirus testing and furlough). Further, given funding challenges across TfL arising reduced ridership impacting revenue, track renewal investment in 2020/21 was subsequently reduced from £118.0m to £82.9m. This was considered by the business to be the minimal level of funding the programme could effectively deliver of the originally planned work.
- 4.5 To reduce the impact on asset condition as a result of underspend compared to the original £118.0m plan, a programme of ‘holding work’ interventions was devised. This work was designed to maintain safety and reliability at sites where critical full renewal was planned and subsequently cancelled due to ‘safe stop’. The result is reflected in Table 3 below which tabulates actual versus planned volumes.

Intervention		Original Plan £118.0m	Revised Plan £82.9m	Actual	Actual vs Revised Plan
Plain-line (metres)	Deep Tube Renewals (DTR)	4,259	2,643	2,045	-598
	Ballasted Track Renewals (BTR)	3,129	1,869	1,980	+111
	Flat Bottomed Conversion (FBC)	5,700	2,356	2,490	+134
P&C (units)	P&C full renewal + heavy maintenance activity	27	19	19	0
Other	Track Drainage (m)	1,725	357	487	+130
	Long Timber Bridges (units)	1	0	0	0

**Table 3: 2020/21 Planned Vs Actual Volumes**

4.6 From the revised plan, DTR saw around 600m shortfall due to late access changes and staff shortages due to the pandemic. However, in all other areas of the programme, planned volumes were either met or exceeded. DTR sites that were delivered in 2020/21 include Baker Street to St Johns Wood (Jubilee) and Finsbury Park to Arsenal (Piccadilly).

4.7 Highlights include:

- (a) P&C: this part of the programme recovered well to deliver 19 units, comprising of two major blockades, one at Acton Town (11 units) and a second at Ealing Common Depot Phase 1 (8 units). The work at Acton Town was delivered over a blockade over the Christmas period, as shown in Figure 3;and
- (b) The single long timber bridge at Boston Manor was not delivered due to the affordability position TfL was subject to.



Figure 3: Acton Town P&C Renewal, Christmas 2020

## 5 Key deliverables

### 2021/22 delivery Plan

5.1 Table 4 provides delivery status to end of July 2021 against the volumes submitted to the Committee in July 2019, and subsequently revised at the start of the 2020/21 financial year. The revised plan was driven by the necessary re-assessment of priorities and deliverability, given the reduced programme in the previous year. The table also provides a (July 2021) forecast of what will be delivered by year end.

Intervention		Planned (July 2019)	Revised Plan (start of financial 20/21 year)	Complete (as of July 2021)	Forecast by year end
Plain-line (metres)	Deep Tube Renewals (DTR)	4,978	3,524	1,088	4,269
	Ballasted Track Renewals (BTR)	3,800	4,492	885	4,894
	Flat Bottomed Conversion	5,800	8,408	938	7,365
P&C (units)	P&C full renewal and heavy maintenance activity	23	23	8	28
Other	Track Drainage (m)	2,200	1,174	880	1,515
	Long Timber Bridges (units)	1	3	0	2

Table 4: 2021/22 Planned Vs Complete Vs Forecast Volumes



## 5.2 Highlights include:

- (a) **DTR:** To reduce excessive noise and vibration on the Victoria line, scope has been increased, resulting in a higher year end forecast compared to the revised plan. This is addition to key locations for the year that include, Stratford to Leyton (Central), Holborn to Covent Garden (Piccadilly) and Baker Street to Marylebone (Bakerloo);
- (b) **BTR:** remains on course to deliver the revised plan. Key locations already delivered this year include Chiswick to Acton Town (District), Leytonstone platform 1 (Central) and Embankment (District). Still to come in 2021/22 are West Hampstead to Finchley Road (Metropolitan), Baker Street to Lords (Metropolitan), Hammersmith Platform 3 (Piccadilly) and Ruislip Depot (Central Line);
- (c) **FBC:** is forecast to be reduced from the revised plan by around 1km. This is primarily due to late design and reduced availability of engineering trains. Future years will see an increase in delivery targeted at parts of the network where rail breaks are proven to be more likely. This is a spend to save initiative and will ease pressure on reactive maintenance by replacing old rail (bull head) with new (flat bottom) at a fraction of the price of a full renewal (DTR);

**P&C:** eight units have already been delivered at Ealing Common Depot phase 2 on the District Line (six units) and Oakwood on the Piccadilly Line (two units).

- (d) The remaining scope in 2021/22 includes nine units at Ruislip depot (Central line) which is an increase from the originally planned six units and Northfields (Piccadilly) over a Christmas blockade closure involving the renewal of 11 units. Opportunity has also been taken with this condition improvement to enable speed capacity uplift for the Piccadilly Line Upgrade Programme;
- (e) **Track Drainage:** is forecast to exceed the revised plan by around 340m, with key delivery locations including Gloucester Road to South Kensington (District) and Arnos Grove to Wood Green (Piccadilly);
- (f) **Long Timber Bridges:** Of the three planned LTB's planned for 2021/22, one unit at Lords (Metropolitan) is scheduled for February 2022, however only one of two at Boston Manor (Piccadilly) is likely to be delivered due to availability of materials.

5.3 **Plain Lining P&C Units:** Not included in Table 4 is the plain lining of three P&C units (i.e. replacement of P&C units with straight track) at Hammersmith (District and Piccadilly). These units will be made redundant following 4LM signalling upgrade in the respective areas. The plain lining of these points will improve performance and reduce maintenance cost in years to come.

## 2022/23 delivery plan

- 5.4 Table 5 shows the 2022/23 delivery forecast as of September 2021 compared to the original forecast from July 2019. This forecast could be subject to minor change in the coming months.

Intervention		2022/23 Forecast as of July 2019	2022/23 Forecast as of Sept 2021
Plain-line (metres)	Deep Tube Renewals (DTR)	5,095	4,754
	Ballasted Track Renewals (BTR)	3,721	4,522
	Flat Bottomed Conversion	5,850	10,000
P&C (units)	P&C full renewal + heavy maintenance activity	30	12
Other	Track Drainage (m)	2,500	3,000
	Long Timber Bridges (units)	1	2

**Table 5: 2022/23 Planned Volumes**

- 5.5 Due to complexity, the safety critical nature of the asset and inherent dependency on signalling control, P&C renewals require an 18 to 24 month lead time for design work. Additionally, access planning needs a substantial lead time, as these works typically require blockades where large sections of the railway are closed for the work to proceed. This combined with re-prioritisation within the workbank and as a result of furlough during 2020, design work for much of the 2022 P&C renewals was put on hold, and hence is not ready for delivery in the planned year.
- 5.6 A further driver for reduced P&C work across the sub-surface lines is uncertainty due to movement of the Four Lines Modernisation (4LM) Programme schedule impacting delivery planning and access. Related to this, is availability of signalling design resource (required for P&C control) where the new 4LM system is concerned; this also affects planning for Northern and Jubilee line P&C renewal, as this is the same signalling supplier.
- 5.7 The 12 units planned in 22/23 are at the following locations:
- Oakwood: two units (Piccadilly);
  - Northfields: five units (Piccadilly);
  - Parsons Green: three units (Piccadilly); and
  - Ruislip Depot: two units (Central).

- 5.8 Flat Bottom Conversion will increase significantly in 2022/23. This increase in delivery aligns with the strategic priority to eliminate the current risk of the asset failing through rail breaks. This can be delivered at a reduced cost compared to a full DTR. The increase is considered deliverable as previous associated design and signalling constraints have been removed.
- 5.9 The two Long Timbered Bridges to be delivered in 2022/23 will be at Embankment (District) and Boston Manor (Piccadilly).

## 6 Equalities Implications

- 6.1 This Programme 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.

## 7 Financial Implications

- 7.1 Table 6 shows the financial impact of the Programme by year until authority end in March 2023. All cost figures include inflation; these figures show the plan up to the end of this authority period.

Costs and Funding (£m)	2020/21	2021/22	2022/23	Total
Cost (Outturn)				
Existing Programme and Project Authority	118.0	136.0	148.0	<b>£402.0</b>
This Authority Request	-	-	-	
Future Authority Requests	-	-	-	
Financial Authority*	82.9	131.0	148.0	<b>£361.9</b>
Programme EFC*	82.9	136.0	131.0	<b>£349.9</b>

\*2021/22: The £5m difference between Financial Authority and EFC will be managed in the 2021 Budget process.

**Table 6: Track Programme Financial Implications, 2020/21 to 2022/23**

- 7.2 During the 2020/21 'safe stop' management and overhead costs for the track programme remained broadly the same, driven by contractual obligations with our delivery partner. With downturn in on-site delivery, this increased unit rates of much of the programme.
- 7.3 As with the prior Track programme authority, a separate risk provision is not provided for. In the event of risks materialising, they are funded through efficiencies or, where that is not possible, by pausing or descoping (from the current financial year) less critical scope. This ensures focus is always on delivering higher priority scope, thus improving asset condition as quickly as possible. Any change to the original scope is managed through a change control process.
- 7.4 Collectively, the supply chain for this Programme accounts for around £100m per annum of expenditure, comprising labour, equipment, supplies and services.

Value for money is driven by close evaluation of unit rates for repetitive work such as BTR and DTR. This is in addition to a comprehensive category management strategy.

## 8 Challenges, Opportunities

- 8.1 **Challenge:** In the short to medium term, the coronavirus pandemic is likely to impact staff and the supply chain to the Programme. This will ultimately effect delivery and have a financial impact.
- 8.2 **Challenge:** Supply Chain and Procurement can be stifled leading to closure opportunities being missed. Material prices are subject to the unpredictable impact of trade tariffs and raw material price fluctuations. Procurement of components may become more convoluted and impact timelines.
- 8.3 **Challenge:** The volume of work in the Programme has never been higher and this can create a problem in providing the levels of resources required. Scarce resources, such as signalling, not being available can impact weekend productivity. Alongside the work described in this paper the Programme is also now delivering substantial third party works which can mean projects are competing for resources across the lifecycle from design to onsite labour.
- 8.4 **Challenge:** Late changes to access plans can prove to be costly, and often result in reduced delivery and higher unit rates. Added events can result in planned closures being subject to late change, leaving the Programme little time to react or replace. The announcement of football fixtures every year is a good example.
- 8.5 **Challenge:** Post current signalling upgrades it will become vital that LU establish new signalling arrangements with suppliers to provide support for future signal related P&C work.
- 8.6 **Opportunities:** One of the strengths of the programme is the ability to plan and deliver multiple sites over a single weekend closure. Collaboration within APCD also presents an opportunity within the closure. All weekend closures can demonstrate multiple workstreams operating and delivering within the closure opportunity. ITT and TDU share resources and materials to create savings. Both delivery arms will also share good practice and lessons learnt. A good example of this is where both teams can work on separate sites on weekend closures in the same part of the network where they can share trains and key resources to create efficiencies for all areas of APCD (Asset Performance Capital Delivery). Close planning collaboration with Major Projects Directorate (MPD) can also lead to opportunities and savings from closures.

## 9 Assurance

- 9.1 TfL Project Assurance and the Independent Investment Programme Advisory Group (IIPAG) undertook an assurance review of the Programme in September 2021. A management response to recommendations has been prepared and agreed with TfL Project Assurance.

**List of appendices to this report:**

None

**List of Background Papers:**

Independent Investment Advisory Group (IIPAG) Report

TfL Project Assurance Report

Management response to IIPAG and TfL Project Assurance reports

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