

Date: 11 March 2015

Item 18: Track and Track Drainage Renewals Programme

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This paper will be considered in public

1 Summary

ID/UIPXXX		NAME		
Existing Financial Authority	Estimated Final Cost (EFC)	Existing Project Authority	Authority Requested	Total Authority
£ 421.585m	£ 414.282m	£ 0	£ 414.282m	£ 414.282m
<b>Authority Approval:</b> To approve budgeted Project Authority of £414.282m to undertake Track and Track Drainage renewals in accordance with the current Business Plan.				
<b>Outputs and Schedule:</b> To undertake 39.2 km of Ballasted Track Renewal, 21.1 km Deep Tube Renewal, 66 Units of Points and Crossings renewals and 31.7 km Drainage Renewal by 31 March 2018.				

- 1.1 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.

2 Recommendation

2.1 The Committee is asked to recommend that the Board:

- (a) approves budgeted Project Authority of £414.282m up to the end of March 2018 for the delivery of the track and track drainage renewals programme;
- (b) approves the implementation of the two year extension option in the current Track Partnership contract with Balfour Beatty;
- (c) approves an increase in Procurement Authority, including the two-year contract extension in (b) above, to support the Track and Track Drainage Renewals Programme, presented in the paper on Part 2 of the agenda;
- (d) approves in principle the changes to the contract terms, including the revised incentivisation model, to align more closely to the current delivery model, as set out in the paper on Part 2 of the agenda; and
- (e) delegates approval of the final changes to contract and contract extension to the Managing Director Rail and Underground or, in his absence, the Commercial Director Rail and Underground.

### **3 Background**

- 3.1 This programme supports London Underground's (LU's) Asset Management Strategy to recover Track and Track Drainage asset condition and to provide a safe and reliable railway. It also provides for the installation of modern assets capable of supporting the increased speed and frequency of passenger services enabled by the line upgrades to support London's growth.
- 3.2 The Track and Track Drainage Renewals Programme is a mature programme that has been delivering track improvements for many years. Since 2009 the programme has yielded a reduction in the unit rate of renewals of between 23 and 46 per cent, depending on the type of work.
- 3.3 This reduction has been underpinned by a stable scope which has provided the opportunity for innovation, including deployment of mechanised delivery methods, optimisation of access opportunities, use of new materials as well as improvements to the overall management of delivery through smarter contracting and other organisational improvements. The trend in unit rate reduction is expected to continue with the introduction of further innovation and mechanisation (as part of LU's engineering train and plant strategy).
- 3.4 In a recently published CoMET benchmarking study report from 2014 it is stated that LU has a depth and breadth of understanding relating to track investment which is regarded as best practice. It shows that LU has the greatest level of innovation amongst its peer group which includes the use of novel welding and construction techniques and modern materials to improve longevity, noise and vibration.
- 3.5 The programme to date has been progressively replacing life expired track assets, which are predominantly of a 19<sup>th</sup> century design, with more modern track forms. The adoption of these more modern track forms will extend asset life, reduce whole life costs and improve the reliability of track assets.
- 3.6 A five year Track and Track Drainage renewal programme commenced on the Bakerloo, Central and Victoria Lines (BCV) and Sub-Surface Lines (SSL) on 1 April 2011 and expires on 31 March 2016. The programme has been addressing the backlog of track renewals, is within budget and is on course to achieve the Department for Transport (DfT) milestone to renew 25 per cent of BCV and Sub-Surface track by 31 December 2018.
- 3.7 A three year Track and Track Drainage renewal programme commenced on the Jubilee, Northern and Piccadilly lines (JNP) on 1 April 2012 and expires on 31 March 2015. The programme is on target to deliver the required volume of renewals within its budget.
- 3.8 In the summer of 2013, the JNP track renewals team was successfully integrated together with the BCV/SSL delivery organisation in the Capital Programmes Directorate. The asset management functions were also integrated into the Strategy and Service Development Directorate at the same time. LU now has a single track asset strategy and a single delivery organisation, ensuring a consistent whole life value approach is adopted for both the identification and prioritisation of Track and Track Drainage renewals across the network and their subsequent execution.
- 3.9 The current delivery arrangements are that the design and delivery of Ballasted Track Renewals (BTR), replacement of points and crossings (P&C) and renewal of

track drainage is carried out under a partnership arrangement with Balfour Beatty. The plain Line Renewals in the deep tube environment (Deep Tube Renewal or DTR) is undertaken by the in house Track Delivery Unit which has the specialist skills required for these works.

## 4 Proposal

### Preferred Option

- 4.1 The preferred option is to continue with the existing delivery arrangements, thus triggering the extension opportunity in the existing Track Partnership contract with Balfour Beatty. Alongside the Track Delivery Unit the programme plans to deliver the following scope of renewals by March 2018, thus supporting the achievement of the DfT milestone in December 2018.

Intervention	2015/16 JNP Only	2016/17 Network	2017/18 Network	Total Network Delivery
BTR (metres)	7,037	18,933	13,213	39,183
DTR (metres)	3,671	8,369	9,090	21,129
P&C Renewal (No.)	6	37	23	66
Drainage (metres)	12,702	9,545	9,490	31,737

- 4.2 The above scope of work has been carefully prioritised to determine the optimum renewal point to provide lowest whole life cost.
- 4.3 Existing track and drainage assets will be replaced with the following configurations:
- for open and sub-surface sections:** Flat Bottom Continuously Welded Rail on concrete sleepers and granite ballast with renewed drainage (BTR);
  - for deep tube sections:** Flat Bottom Continuously Welded Rail and resilient baseplates fixed directly to the concrete base of the tunnel (DTR);
  - for Points & Crossings:** Flat Bottom rail on concrete sleepers with modern point machines with remote condition monitoring, pre-fabricated where possible and assembled on site (P&C); and
  - for drainage:** Installation of plastic drainage pipes at appropriate gradients to provide increased capacity and self cleaning.
- 4.4 The programme includes renewals at a number of critical locations; these include areas such as the single bore tunnels between Baker Street and Finchley Road on the Metropolitan line. Here, as a result of deteriorating condition, mixed track type and poor drainage design the area has been subject to performance concerns over recent years.
- 4.5 While there will still be a need to deliver a significant proportion of these works in weekend closures and blockades, the enhanced working practices that the track programme has developed recently has led to the opportunity to carry out some

renewals during midweek nights. Renewals carried out in this way do however carry a premium unit cost when compared to weekend working due to the very tight working windows each night. Nevertheless the reduced passenger disruption associated with weekend closures means that the overall cost is less.

- 4.6 In addition, the opportunity of working during midweek means that the programme can include areas such as the west end of the Piccadilly line towards Heathrow, which has been a difficult area to access due to its obvious high demand.
- 4.7 This request will secure authority for three years work for the JNP network and two years for the BCV/SSL network based on an integrated and optimised programme of works and will therefore regularise all track renewals works under one authority.

### **Benefits (and Value)**

- 4.8 Undertaking the recommended programme of renewals will improve the condition of the track and drainage assets, leading to an improvement in network performance and a reduction in maintenance costs, failures and delays.
- 4.9 The benefits will be measured in line with the approved Benefits Management Strategy and are based on the forecast profiles for asset performance, maintenance and Lost Customer Hours presented within LU's Line and Asset Network Plans, published annually and supporting the TfL Business Plan. Since 2005, the track programme has contributed towards a 70 per cent reduction in rail defects and a 70 per cent reduction in Lost Customer Hours.
- 4.10 The track programme will improve the Platform Train Interface at stations where the track is renewed and where practicable (and in conjunction with platform works via other programmes) achieve compliance with the Rail Vehicle Accessibility Regulations stepping distances, therefore improving access for mobility impaired persons and reducing safety risks to all passengers.

### **Options Analysis**

- 4.11 As part of the 2015/16 business planning process, various options for reducing capital expenditure were considered. All result in a worse business case compared to the recommended option. This is because the recommended option is developed using sophisticated modelling and software ("WiLCO"), which produces optimised whole life renewals plans. Two of the discounted options are summarised below.
- 4.12 **Option 1:** Cut total track expenditure by 10 per cent between 2016 and 2023. Although this would have reduced short term capital expenditure by £183m, the whole life cost increases by £344m (outturn) owing to the need to recover the renewal backlog in later years and accommodate the increased corrective maintenance and performance impact in the aforementioned years.
- 4.13 **Option 2:** Defer total expenditure from critical plan years (2016-2020) and increase expenditure from 2021. Although this would have reduced short term capital expenditure by £121m, the whole life cost increases by £58m (outturn) owing to the need to recover the renewal backlog in later years. The disbenefit shown here excludes the implication of shutting down a fully mobilised programme, with a proven record of delivery, which in turn would pose a significant risk to delivery in the early years beyond 2021.

## Delivery of Preferred Option

- 4.14 The delivery of Track and Track Drainage renewals across the network will be managed by the existing Infrastructure Programme. The delivery is split among two organisations recognising the different track forms for DTR and BTR, the constraints of their respective environments and opportunities to take advantage of external expertise and plant.
- 4.15 DTR will be delivered by the Track Delivery Unit using permanent and non-permanent staff. Non-permanent staff are acquired through the COO (Chief Operating Officer) framework contractors. The 2014 Infrastructure Benchmarking Report shows that this approach has yielded a 46 per cent reduction in unit rates since 2011/12 and continues to improve with ongoing adoption of innovative technologies such as 'concrete bursting' and resilient baseplates.
- 4.16 BTRs and P&C renewals will be delivered by the Track Partnership contract between LU and Balfour Beatty, which takes advantage of their position in this field and utilises their plant expertise in the renewal of this type of track, which is common to many urban railway networks. The 2014 Infrastructure Benchmarking Report shows that this approach has yielded a 23 per cent reduction in unit rates since 2011/12. This paper seeks approval to take up the option in the existing contract to extend it by a further two years to capitalise on this accrued knowledge and expertise, leading to further improvement of unit costs.
- 4.17 No additional permanent staff resources are required within either the Track Partnership or Track Delivery Unit to support the renewal programmes. Increasing the labour site workforce to support the increase in DTR renewal will be achieved by letting additional sub-contracts within the existing supply chain.
- 4.18 The staff resource required to support the programme is summarised in the table below:

Category	2015/16	2016/17	2017/18
Permanent	521	521	521
Fixed Term Contract	20	20	20
Contractor	148	137	137
Total Staff	689	678	678

## Milestones

- 4.19 The key DfT milestones for the programme are detailed below:

Milestone	Target Date
DfT 13.03% precursor BCV/SSL (73.21 km)	31 March 2015
DfT 17.42% precursor BCV/SSL (97.87 km)	31 March 2016
DfT 20.73 % precursor BCV/SSL (116.47km)	31 March 2017
DfT 23.20% precursor BCV/SSL (130.35 km)	31 March 2018
DfT 25% of BCV/SSL renewed (140.465 km)	31 December 2018

## Risk

4.20 The top five risks extracted from the risk register are summarised below. The P50 value of risk is £18m, representing 4.3 per cent of the authority. This is lower than the original BCV/SSL risk provision which was approximately 8.4 per cent and is justified by experience to date which has seen a low level of risk drawdown owing to improved management, better cost estimating and greater efficiency.

Risk Title	Mitigation
1) Programme volatility. Access availability dictated by internal / external stakeholders.	(a) Joint strategic planning; (b) Ability to flex workforce; (c) Recover utilising third party possessions; (d) Reprioritising the programme; and (e) Overnight and weekend working.
2) Cost of new signalling system upgrades for asset renewal (e.g. Neasden).	Engineering review of scope and requirements.
3) Frustrated access.	Access Transformation Programme and improved access planning will mitigate this issue.
4) Prioritisation of Drainage Scope – is greater than the amount of Financial Authority.	Review with Strategic Planners, Commercial, Finance, and Sponsor in order to balance and agree which jobs go ahead.
5) Prioritisation of Track and P&C scope is greater than the Financial Authority.	Review required with Strategic Planners, Commercial, Finance, and Sponsor in order to balance and agree which jobs go ahead.

## 5 Financial Implications

5.1 This submission is fully budgeted within the current Business Plan.

5.2 The cost estimate was built up using a pricing model from individual renewal sites that has been developed using actual costs from the last four years. The model takes account of constraints (such as access, engineering hours, engineering trains, plant and resources), track geometry and configuration, site length and renewal methodology.

5.3 The costs and funding are provided below. Re-phasing of the forecast, where necessary, will be made as part of Quarter 1.

Funding and Project Authority Breakdown (Outturn)	Prior Yrs £000's	2015/16 £000's	2016/17 £000's	2017/18 £000's	2018/19 £000's	Future £000's	Total £000's
<b>Funding</b>							
Budget/Plan	-	75,413	165,686	180,486	-	-	421,585
Estimated Final Cost	-	78,237	183,315	152,730	-	-	414,282
<b>Budget/Plan Surplus/(Shortfall)</b>		(2,824)	(17,629)	27,756	-	-	7,303
<b>Project Authority Breakdown</b>							
Prior Submissions	-	-	-	-	-	-	-
This Submission Request	-	78,237	183,315	152,730	-	-	414,282
Future Submission Requests	-	-	-	-	-	-	-
<b>Total EFC</b>	-	78,237	183,315	152,730	-	-	414,282

5.4 This programme EFC already takes into account £52.3m of efficiencies, including £36m arising from future unit rate improvements and £7m attributed to the Access Transformation Programme over the life of this authority. The programme includes an efficiencies and opportunities register which will be used to support additional renewal volumes where they provide for a more optimal whole life cost approach.

## **6 Assurance**

6.1 The TfL Programme Management Office completed a Contract Award Integrated Assurance Review (IAR) of the Track Programme on 10 December 2014. An Independent Investment Programme Advisory Group review was also undertaken in parallel. The review concluded that the programme was being delivered effectively and efficiently with no critical issues being identified, and recommended approval of the authority. A management response to the recommendations has been provided.

6.2 Subject to the Board approving the Authorities sought, a further IAR of the Programme will be undertaken after six months.

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

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

### **List of background papers:**

Reports from the TfL Programme Management Office and the Independent Investment Programme Advisory Group, and the management response to those reports.

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