



**This paper will be considered in public**

**1 Summary**

- 1.1 This paper summarises the need, and seeks approval, for additional project authority of £11.27m until March 2014, for the continuation of the Deep Tube Programme (DTP) Feasibility project to Gateway B.
- 1.2 The recommendations in this paper were supported by the Finance and Policy Committee.
- 1.3 A paper is included on Part 2 of the agenda, which contains exempt supplemental 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 Recommendations**

- 2.1 **The Board is asked to:**
  - (a) **note the current status of the Deep Tube Programme in the draft Business Plan and the need to continue feasibility works to develop programme scope and requirements; and**
  - (b) **grant additional project authority of £11.27m to a total of £22.91m until March 2014, for the completion of the Deep Tube Programme Feasibility project to Gateway B.**

**3 Background and Current Position**

- 3.1 The DTP aims to deliver a co-ordinated series of line upgrades for the Bakerloo, Piccadilly, Waterloo & City and Central lines in a more sustainable and cost efficient manner than previously achieved under the PPP contracts.
- 3.2 Following the completion of extensive preparatory work and a Gateway 'A' Review, the Feasibility stage of the DTP was authorised by the Committee on 11 July 2012, to undertake a series of technical investigations, scope development studies and strategic analysis to establish a specification for line upgrade delivery.

- 3.3 An authority of £11.64m was granted to progress Feasibility studies until 31 December 2012, pending the outcome of decisions made during the TfL Business Planning round and confirmation of the strategic priority and funding status of the DTP.
- 3.4 The DTP provides a unique opportunity to transform the customer experience and the operating and maintenance model on the deep tube lines through technology-enabled change and the catalyst of asset renewals. Increased network capacity is sought, but with improved energy efficiency to realise a sustainable line upgrade solution to meet demand but without a significant rise in tunnel temperatures or the need for high cost cooling schemes.
- 3.5 Lessons learnt from recent Jubilee and Victoria line upgrades are being incorporated into the formulation of the DTP. Specifically it is clear that many of the final cost and performance characteristics of an upgrade and subsequent operation and maintenance have been determined by PPP decisions/constraints made early in the programme lifecycle. Furthermore, understanding the interaction between different parts of the overall operational system – particularly the human-machine interface – is critical to achieving the high levels of performance and reliability required for automation. For these reasons, the DTP is adopting a more rigorous, structured and systemic approach to engineering management in the feasibility and delivery stages than has been the case previously.
- 3.6 The aim is to achieve a standardised and generic design of rolling stock to enable higher volume procurement and greater operational consistency leading to lower whole life costs. The need to increase capacity without exacerbating tunnel temperatures has driven a focus on weight reduction and more active consideration of the opportunities for energy recovery within the power supply and service control systems, alongside other mitigation measures such as tunnel ventilation and station cooling.
- 3.7 In support of the July 2012 Feasibility authority request, the DTP was the subject of a second Gateway 'A' review (A++) and external scrutiny by the Independent Investment Programme Advisory Group (IIPAG). At its meeting on 11 July 2012, the Projects and Planning Panel received a verbal update from the IIPAG. Both the Gateway 'A' review and the IIPAG review were supportive of the proposed approach, the recommendations were accepted by the DTP Programme Team and have been addressed in the development of the project.
- 3.8 As part of the Business Planning round, a broad programme implementation timescale and expenditure phasing for DTP has been agreed and the need for continuation of the feasibility project beyond December 2012 is proposed. It is recommended that LU progress the DTP Feasibility project to its conclusion at a Programme Gate B review in October 2013 and then continue to engage the core programme team in conceptual design and procurement specification pending Gateway B approval and project authority for the next stage of the DTP by March 2014, at an overall cost of £22.91m.

## 4 Proposal – Deep Tube Programme Feasibility Stage

- 4.1 It is proposed to conclude the Feasibility stage of the DTP to develop a robust scope definition, cost estimate and business case for an optimised, more co-ordinated series of line upgrades for the Bakerloo, Piccadilly and Waterloo & City lines. By combining feasibility work for these line upgrades into a single managed programme cost efficiencies will be achieved compared to the line-specific approach previously taken.
- 4.2 This feasibility project will continue to take a whole railway system approach to the specification of asset renewals and will investigate the potential for innovation and higher levels of automation through the following key activities:
- (a) **Programme Management:** A cross-directorate team will progress operational and maintenance model development, procurement strategy and supplier engagement. Transport planning, safety and business case analysis of implementation options will be developed. Programme controls, reporting and governance arrangements will be applied.
  - (b) **Railway design:** Functional requirements for a fully automated railway will be developed based on operational and maintenance concepts and an engineering governance process established to include a System Design Authority and testing/integration plan. A generic railway migration strategy and line-specific implementation plans will be developed with co-ordinated plans for access and closures during implementation.
  - (c) **Infrastructure design:** Surveys of track, depots and stabling facilities will be completed and analysis of infrastructure constraints and pinch-points will focus detailed studies for remodelling schemes. Depot concept design development will focus on upgrade and migration requirements for automation and extensive surveys will be conducted at the platform-train interface (PTI) to develop safe interface management solutions, for example, curved platform gaps. Equipment evaluation trials will be undertaken for obstacle/intruder detection systems necessary for open section or 'at grade' automation. Analysis of tunnel and station temperature impacts will be progressed to develop station-specific cooling scheme designs at critical locations.
  - (d) **Control Systems:** Railway control system requirements and technical specifications for higher levels of automation will be developed with full engagement of the supply chain. Equipment trials will be undertaken to prove the effectiveness of data communications technology in the deep level tube environment.
  - (e) **Train systems:** The functional requirements and technical specification for the New Generation train will be developed and supply chain engagement continued. Industrial design for 'look and feel' requirements will be finalised and system concept design studies undertaken for the compact application of saloon air cooling equipment on deep tube rolling stock. Integrated railway system modelling will include power, cooling, energy and run-time analysis for overall system optimisation.

- 4.3 Feasibility work will develop functional requirements for the renewal of assets and systems based on new operational and maintenance concepts. Extensive surveys of track, depots and stabling facilities will be completed and analysis of infrastructure constraints and pinch-points will focus detailed studies for site remodelling schemes. Maintenance depot concept designs for higher capacity will be developed and surveys will also be conducted at the platform-train interface to develop safe interface management solutions for new trains and curved platform gaps.
- 4.4 Equipment evaluation trials will be undertaken for enhanced energy recovery systems and technologies to enable obstacle/intruder detection. Analysis of tunnel and station temperature impacts will be progressed to develop station-specific cooling scheme designs at critical locations. Equipment trials will also prove the effectiveness of data communications technology in the deep level tube environment.

## **5 Commercial and Financial Implications**

### **Commercial**

- 5.1 The DTP aims for a higher volume, evenly paced production of new trains for each of the deep tube lines, while maintaining competitive pressure from the supply market. The need for additional trains to support capacity enhancements on the Northern and Jubilee lines has also been identified as a strategic priority in the Business Plan. The potential for synergies and economies of scale by co-ordinating procurement with DTP train orders will be examined as part of the Feasibility stage.
- 5.2 The procurement approach for DTP will also ensure that sub-system procurements are linked together and managed as a programme, in view of their interfaces and dependencies as part of an integrated railway system.

### **Financial**

- 5.3 To period 7 2012/13, £5.71m of the current authority has been incurred on the Foundation and Feasibility phases of the DTP, with further commitments made to a total value of £7.20m. This expenditure has supported scoping, modelling, system and business requirements work using internal resources augmented by specialist external consultants.
- 5.4 The additional authority sought of £11.27m will allow the programme to progress to a conclusion at Programme Gate B 'Feasibility' by October 2013 and will enable a core team of resources to be engaged in preparatory design and enabling works in the ensuing period until Gateway 'B' Review by February 2014.

## **6 Conclusions and Next Steps**

- 6.1 The DTP has now reached a critical stage in its development, where the broad implementation sequence, scope and business case have been defined and a range of potential system solutions identified. The programme is now in a

position to conclude the more detailed Feasibility stage to develop the DTP line upgrades to a point where scope can be finalised and a single option selected.

- 6.2 The Feasibility stage of the DTP will determine the specification, scope and business case to establish the essential building blocks for the next generation of line upgrades. This will be achieved by a comprehensive programme of studies, surveys and analysis into the operational, technical and business change aspects of the upgraded railway system and the opportunities this presents for higher levels of automation on the deep tube lines.
- 6.3 The draft TfL Business Plan, considered as a separate item elsewhere on the agenda for this meeting, confirms the continued priority of the Deep Tube Programme within the investment programme. Board authority is therefore sought to conclude the current Feasibility studies and investigations by October 2013 and then to undertake preparatory design and procurement activities pending a further submission to the Board in February 2014 for the next stage of DTP implementation.

## **7 Finance and Policy Committee Views**

- 7.1 At its meeting on 27 November 2012, the Finance and Policy Committee noted this proposal and recommended that the Board approve the additional project authority.
- 7.2 The Committee recognised the important opportunity to establish a continuous integrated programme for the deep tube. To ensure that TfL made the most of that opportunity members requested further regular discussions on the Deep Tube Programme progress, focusing on key trade-offs, choices arising and any initial views on the feasibility of the options.
- 7.3 Members were assured that lessons from the work on the design, look and feel of the New Bus for London would be applied to the New Generation train that was being developed.

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

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

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

None

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