

Board

Date: 17 March 2016

Item: Northern Line Upgrade 2

This paper will be considered in public

1 Summary

Northern Line Upgrade 2 'NLU2'				
Existing Financial Authority	Estimated Final Cost (EFC)	Existing Project Authority	Additional Authority Requested	Total Authority
£710m	£695m	£3.422m	£7.892m	£11.314m

Authority Approval:

The Board is asked to approve additional budgeted authority of £7.892m increasing total project authority to £11.314m.

Outputs and Schedule:

This phase of the project will deliver concept designs for all asset areas that form part of the NLU2 project (power, cooling, signalling, track, Highgate Depot and rolling stock modifications). These will be completed by May 2017 after which a further funding request for detailed design and enabling works will be submitted.

Ultimately the project will deliver a 30 trains per hour service on all branches of the Northern Line by April 2023 yielding a strong benefit to cost ratio of 4.8 to 1.

- 1.1 On 2 March 2016 the Finance and Policy Committee endorsed the recommendations in this paper.
- 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.

2 Recommendations

2.1 The Board is asked to:

- (a) note the paper and the supplementary paper on Part 2 of the agenda; and
- (b) approve additional budgeted Project Authority of £7.892m, increasing total Project Authority to £11.314m.

3 Background

- 3.1 Demand for the Northern line is continuing to grow with 275 million journeys in 2014/15 (up by 40 per cent since 2005/06). The recent Northern Line Upgrade provided 20 per cent additional capacity. The Railplan transport planning network model forecasts passenger demand growing by a further 25 per cent by 2023.
- 3.2 The Northern line was upgraded in 2014 with the Thales Transmission Based Train Control (TBTC) signalling system which enabled the train service to be increased from 20 trains per hour (tph) to 24 tph during the peaks through the central section and both northern branches of the line, and to 30tph from Morden. Despite these increases, the Northern line continues to experience significant levels of overcrowding.
- 3.3 The upgraded signalling system has the capability to support a higher tph, thereby increasing the capacity to cater for the increased demand. However, the line is currently constrained to 24tph by the number of trains available and by infrastructure, such as stabling and train maintenance facilities, power supply, and ventilation assets.
- 3.4 Northern Line Upgrade 2 ('NLU2') was therefore initiated in 2014 to assess opportunities to further increase service levels. The Business Plan provision was originally £561m for a 30tph scheme and this was uplifted to £710m in the 2014 planning round with a target to deliver a 33tph scheme.
- 3.5 A feasibility study has been completed. This considered the works required to increase the peak tph on the Northern line for nine service options between 30 and 36tph. The study concluded that the optimal levels of train service, if funding were unconstrained, would be (at least) 36tph on the Bank and Morden branches and 32tph on the Charing Cross branch. However, of the options assessed, only a 30tph scheme was within the current project budget allowance.

4 Proposal

- 4.1 The scope of the preferred 30tph option comprises:
 - (a) 17 additional trains (procured via the Jubilee and Northern Line Additional Trains Project (JNAT));
 - (b) additional stabling at Morden and Highgate;
 - (c) provision of a new heavy maintenance depot at Highgate;
 - (d) installation of a new scissors crossover for reversing at East Finchley;
 - (e) provision of Train Crew Accommodation at East Finchley and fitting out at Battersea;
 - (f) reconfiguration of Morden depot;
 - (g) five signalling workstreams:
 - (i) out-stabling (to reduce the number of additional stabling berths required);
 - (ii) signalling pinchpoint improvements (to support throughput);

- (iii) coasting (for energy efficiency);
 - (iv) depot signalling at Highgate and Morden; and
 - (v) modification to support new track layouts.
- (h) power upgrades (22 substation upgrades, new feeder cable at 14 sites, increased regenerative braking);
- (i) low loss composite conductor Rail, fan renewal and two cooling schemes;
- (j) upgrades to track including development of new track layouts for service pattern and stabling; and
- (k) all associated maintenance and operating changes.

4.2 The phase of the project covered by this paper will deliver all surveys, scope development, consents and Concept Design Statements in support of the above work packages by May 2017. Updated migration plans and procurement strategies will be produced.

Benefits and Value

4.3 A business case appraisal has been undertaken based on the benefits of reduced average journey time, set against the net cost of the project (including capital costs, operations and maintenance costs and revenue). The benefit cost ratio (BCR) for the preferred option is 4.8:1.

Delivery of the Preferred Option

4.4 Delivery will be by the LU Systems Programme team, who bring the prior experiences and lessons learned from the original Jubilee and Northern line Upgrades and will also be closely linked with Four Lines Modernisation (4LM).

4.5 Key milestones for the next stage of the project are as follows:

Milestone	Target Date
Completion of Scope review and Value Engineering	30 September 2016
Completion of all Concept Designs	31 May 2017
Seek funding for Detailed Design phase	30 June 2017

4.6 The target date for delivering the enhanced service level is 2022 with full project close out by 2023.

4.7 The top five project risks for this next phase of the project are as shown in the table below:

Risk no	Risk Description	Mitigation Actions
1	Finalisation of detailed baseline to confirm NLU2 start point.	Review of asset condition and performance to confirm capability to support increased duty cycles.
2	Lack of availability of key resources leads to prolongation.	Resource forecast produced and communicated. The project will seek to build its own design teams.
3	East Finchley Train Crew Accommodation Building is in a worse condition than envisaged and requires significant structural repairs.	Structural surveys and hazardous material surveys to be undertaken at the earliest opportunity.
4	Power works become more extensive because of an interface with redundant signalling equipment.	Early surveys and communication with NLU Decommissioning project.
5	Greater volume of civils design work required	Early engagement of stakeholders.

Alternative Options Considered

- 4.8 Higher service options were considered by the Feasibility Study (see paragraph 3.5 above) and the approach proposed protects the option to increase the scope to accommodate these options in 15 months time if affordability allows. Some scope flexibility will continue until mid 2018 when the JNAT rolling stock supplier would be finalising build quantities.
- 4.9 The feasibility study did not consider options providing less than 30tph as, although these would require fewer trains, they would require most of the same infrastructure works as the higher capacity schemes. Therefore they would provide lower capacity levels and generate reduced benefit to cost ratios.
- 4.10 Extensive value management has been applied, for example, the scope of cooling works required has been significantly reduced as a result of including off-peak coasting and other energy efficiency measures. Depot signalling is being progressed as part of a combined package with Northumberland Park depot to realise economies of scale. Access efficiencies are being achieved through co-ordination of works in the 10 year plan. Where possible, brownfield sites are being created for stabling to improve access. The complete scheme and the concept design phase have been subject to a positive peer review.
- 4.11 Deferral of NLU2 is not a recommended option. The current assumption is that the JNAT trains would be withdrawn in 2040 at the same time as the existing Northern line 95 Tube Stock fleet and the business case would erode if the number of years of beneficial use were reduced. If NLU2 were delayed, then it may be a better strategy to abort this project and consider other strategic options for delivering additional capacity.

5 Financial Implications

- 5.1 The requested authority is fully budgeted.
- 5.2 The cost estimate has been developed using a detailed resource profile for the internal costs. The implementation estimates have used actual costs incurred in similar past projects as a basis.
- 5.3 The project will result in an increase in operating costs and revenue which are recognised in the Business Plan. These costs include an increase in power consumption, additional train operators and maintenance costs of new assets.

6 Assurance

- 6.1 The project has been subject to internal and external assurance reviews. No critical issues were found and management have addressed all recommendations arising from the reviews.

7 Views of the Finance and Policy Committee

- 7.1 On 2 March 2016, the Finance and Policy Committee considered a similar paper. The Committee raised no specific issues for the attention of the Board and endorsed the recommendations in this paper.

List of appendices to this paper:

None.

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

List of background papers:

None.

Contact Officer: David Hughes, Director of Major Programme Sponsorship
London Underground and London Rail
Phone: 020 3054 8221
Email: hughesDa03@tfl.gov.uk