Programmes and Investment Committee

Date: **30 November 2016**

Item: **Surface Intelligent Transport System**

This paper will be considered in public

1 Summary

1.1 The Surface Intelligent Transport System (SITS) programme will be delivered in two phases and will replace and upgrade TfL's current systems and data capabilities for traffic signal control and incident management across London's road network. In addition to replacing systems which will no longer be supported from November 2020, the programme will use an integrated suite of new systems and tools to transform TfL's capability to understand and manage operations on the road network. This will not only enable TfL to respond quicker to unplanned incidents, reducing delays, but will also allow customers and stakeholders to make informed and timely travel decisions.

1.2 This paper sets out the detail of the phasing of the programme and key outcomes. The Committee is asked to approve additional budgeted Programme and Project authority to undertake the procurement for Phase 1.

1.3 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. Any discussion of that information must take place after the press and public have been excluded from this meeting.

2 Recommendations

The Committee is asked to note the paper and the related paper on Part 2 of the agenda and approve additional budgeted Programme Authority of £3.6m to undertake procurement of Phase 1 of the Surface Intelligent Transport System.

3 Background

3.1 Demand for London's road space is increasing with the annual cost of delay to London's economy projected to more than double by 2036. The SITS programme will address the growing demand for road space by detecting and responding to incidents faster and improving information. TfL's current systems and data capabilities are not advanced enough to meet this growing demand and the platform for the traffic signal control system will no longer be supported from November 2020.

3.2 The SITS programme was established in 2014 to help meet this challenge by delivering a step change in TfL's capability to manage the road network effectively. SITS will introduce an integrated suite of road management systems replacing a number of stand-alone systems which are approaching end of life, to provide some £1bn of customer benefits by 2036.

3.3 SITS has already delivered early enabling projects which improve Surface Transport's road mapping systems. A further SITS project, LondonWorks, is now in delivery, building on these mapping systems, and will improve London's system for coordinating road works. It is also providing insights on how to harness new technology.

3.4 In September 2015 the Board approved additional Project Authority to prepare for procurement of the main systems that follow on from the enabling projects above. A number of options to deliver the SITS programme have been explored following the Board's approval. This paper sets out the proposed option and requests approval of £3.6m Programme and Project Authority to meet the costs of undertaking the procurement of the Phase 1 systems.

3.5 In addition, section 4 of this paper sets out how the procurement approach is intended to improve TfL's intellectual property rights (IPR) in an element of the traffic signal control system, including possible opportunities for commercial exploitation.

What SITS means to the Customer

3.6 SITS will deliver significant improvements in TfL's ability to manage London's road space. Traffic flow will be smoothed over a greater geographic area and customers will be provided with improved information on which to base their journey decisions. The improved technology will allow TfL to optimise the use of London's limited road space. Reduced delay and improved journey time reliability (JTR) will be further benefits, whilst the likelihood of casualties and pollution will be reduced by minimising stop-start driving conditions. SITS will contribute to the Mayor's vision of "A City for all Londoners" by enabling reliable roads through smart technology.

3.7 The TfL traffic signal control system, which comprises the Urban Traffic Control (UTC) system and Split Cycle Offset Optimisation Technique (SCOOT) traffic signal optimiser, will not be supported beyond November 2020. The UTC system allows the London Streets Traffic Control Centre (LSTCC) to monitor and deliver strategic control of the road network. The SCOOT system detects traffic approaching junctions and minimises congestion through real time optimisation of the traffic signal timings. UTC and SCOOT prevent some £3.3bn of delay per year in London. The improved system will replace and ensure availability of UTC which is the core system for management of London's road network 24 hours a day.

3.8 The UTC system has been developed in-house over a number of years and is owned by TfL. SCOOT is the optimisation "engine" and is not owned by TfL but TfL does have a perpetual licence to use SCOOT. Over the decades TfL has made a substantial investment in SCOOT and has been at the forefront of SCOOT development.

3.9 SCOOT is co-owned by three suppliers. In order to improve TfL's position in relation to the intellectual property in SCOOT, the SITS Programme team has determined that it would be best to partner with a SCOOT owner. In this partnership TfL would offer up our UTC product in exchange for developing a jointly owned new UTC SCOOT product. Further information on the intellectual property position is set out in the paper on Part 2 of the agenda.

3.10 The new incident management system will allow TfL to detect and respond to incidents faster, and improve information dissemination to the public and policy makers. It will reduce the average time taken to detect and respond to incidents from 15 minutes to five minutes, saving valuable time when responding to unplanned incidents of which there are thousands per year.

4 SITS programme - Preferred Option

4.1 The SITS programme is broken down into six projects listed below:

Delivery Projects

Phase 1

(a) **UTC SCOOT –** Establish a partnering arrangement with an owner of SCOOT IPR through a competitive process to update our UTC and SCOOT systems using future-proofed technology, supportable and maintainable in the long term. UTC SCOOT will be regularly upgraded in line with an agreed product roadmap. This approach will deliver the ability to develop and commercially exploit the new UTC SCOOT system.

(b) **Incident Management System –** The Incident Management System project will replace TfL's Traffic Information Management System (TIMS) to allow TfL to detect and manage incidents more quickly and more effectively, reducing delay. This project will also deliver Common Operational View (COV) functionality, providing a single, integrated user interface for our operators to manage the road network. Systems integration will be included, configuring TfL's own data exchange software, the TfL Integration Service (TIS), to "glue" together all road management systems.

(c) **LondonWorks –** LondonWorks is a system for coordination of planned road works. Phase 1 will complete the in-flight delivery of LondonWorks and then combine this system into the COV, making planned works management a seamless part of the suite of road management systems.

Phase 2

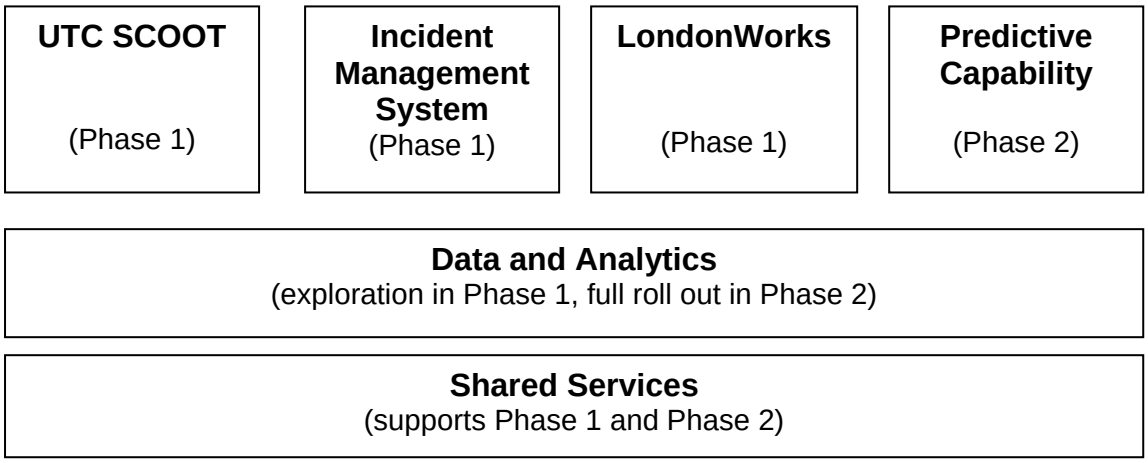
(a) **Predictive Capability (Phase 2) –** Expected to be a competitive procurement process for a predictive system, which will complement UTC SCOOT, and drive further substantial benefits through smoothing traffic flow over a greater geographic area.

Support Projects – (required to implement Delivery Projects)

(a) **Data and Analytics (exploration in Phase 1, full roll out in Phase 2)** - Provision of data sources, analytical tools and skills to deliver and run SITS. Analysing wider data sources to gain a more in depth understanding of the road network, allowing for enhanced management and predictive capabilities.

(b) **Shared Services (supports Phases 1 and 2)** - Coordination within TfL and with external suppliers to make cost-effective use of TfL's shared communication, software and IT services.

4.2 The four delivery projects and two support projects are shown in the diagram below:



Phase 1

4.3 SITS will be delivered by flexing the delivery approach between agile and waterfall methodologies as appropriate. Waterfall methodology is a traditional sequential, non-iterative approach to design, development, test and implementation. An agile approach uses incremental, iterative work with frequent feedback and prioritises early delivery and continuous improvement allowing for flexibility during development. Each methodology has its merits and is best suited to certain parts of the programme. The proposed approach is to deliver the most business critical parts first through Phase 1 and then align future systems to these. The estimated costs of Phase 1 are set out in the paper on Part 2 of the agenda. Phase 1 can be effective without Phase 2, but would provide reduced benefits as set out in paragraph 4.16 below.

UTC SCOOT

4.4 The partner selected would be required to move TfL traffic management operations to their solution whilst maintaining functionality. The partner will be required to design, develop, test and gain acceptance for the new UTC SCOOT product and then collaborate with TfL to roll out the new system, switching over from the existing system on a geographically phased, area by area basis. Both parties would contribute to the future costs of development of the combined UTC SCOOT product based on an agreed product development roadmap. Importantly, it is envisaged TfL will jointly own the IPR in the new UTC SCOOT product, and all future developments, providing the opportunity for commercial exploitation.

Strategy for UTC SCOOT Partnering Arrangement

4.5 During July 2016 the SITS Programme team carried out a desktop analysis to determine whether any product other than SCOOT could fulfil TfL's requirements for traffic signal optimisation software, to work alongside UTC. This analysis determined that no other product could meet TfL's requirements due to the complexities around inter-operability, programme, functionality and the very significant costs and risks associated with integrating an alternative product.

4.6 To test the desktop analysis and in the interests of transparency and fairness, TfL issued a Prior Information Notice (PIN) in the Official Journal of the

European Union to invite potentially interested owners of traffic signal control systems to consider TfL's requirements. These were set out in a supporting briefing paper and suppliers were asked if they could offer a viable alternative and provide details on how this might be achieved. Having undertaken this thorough market engagement exercise, it was clearly demonstrated to TfL that, as anticipated, there are no viable alternatives to SCOOT. TfL issued a further PIN setting out this conclusion, stating that it would engage directly with the SCOOT owners without further market engagement.

Incident Management System

4.7 To detect and respond to incidents faster and more effectively, TfL needs improved incident management functionality. The new system will be integrated with UTC SCOOT, and be procured cost-efficiently through existing commercial frameworks that allow for a cost-effective procurement process. This improved incident management system will be procured in a package that includes the COV, which already contains the LondonWorks system currently under development, to provide an integrated software application for monitoring and controlling all road management systems. The procurement exercise will be undertaken from early 2017, with contract award anticipated by July 2017. Transition to the new incident management system is expected to complete by July 2018.

4.8 TfL will own the IPR in any development carried out for the new Incident Management System. TfL will own the IPR in any configuration done using its data exchange software, the TIS, to support delivery of this system.

Associated Data

4.9 Alongside the UTC SCOOT replacement and new incident management system, a data pilot will be carried out to test new technologies, tools and skills and ascertain the specific inputs the new systems require. The information gained here will also feed into Phase 2 and guide TfL’s approach for lean delivery.

Use of TfL shared strategic services

4.10 SITS will use the following TfL shared strategic services:

(a) Interoperable Middleware: TfL Information Management (IM) has recently procured an open source integration platform, the TfL Integration Service (TIS). Suppliers will be required to supply the capability to configure the TIS and provide technological solutions which are aligned with it;

(b) GISaaS: SITS will make use of TfL’s Geographical Information System (GIS) as a Service mapping and geospatial platform but avoid lock-in by being compatible with open-standards to allow other compatible GIS solutions should TfL migrate to an alternative solution in future; and

(c) Cloud Services Framework: data storage capability will be provided through TfL’s framework for cloud computing services.

Systems Integration

4.11 A key element of SITS relates to improving existing systems, creating new systems and accessing information held across these systems. It is therefore

essential that all of these systems work together efficiently. The solution to ensure this happens is the TIS, which is a configurable platform that “glues” different systems together and provides robust data connections. The SITS programme is not delivering or funding the TIS programme itself, but will pay to consume the TIS as a shared service.

4.12 A role exists for a supplier to use the TIS to carry out this integration. This supplier will have responsibility to configure the TIS to link all SITS sub-systems together and to link to external systems. They will also have responsibility for data connections between all systems. Further details are included in the paper on Part 2 of the agenda.

Phase 2

4.13 In Phase 2, SITS will move on to its wider Data and Analytics and Predictive Capability deliverables. We will use what we have learnt in Phase 1 to procure data for the wider network and feed this into a new predictive signalling system which will automatically detect and deal with the many smaller incidents that we face, allowing operators to focus on the most serious incidents. These capabilities will increase overall benefits to some £1bn by 2036. Phase 2 has an estimated cost as stated in the paper on Part 2 of the agenda.

Benefits and Value

4.14 The SITS Programme team have estimated that SITS will deliver some £1bn of benefits related to delay reduction and JTR improvement. These benefits are driven by two key factors. Firstly, enhancing the UTC SCOOT and incident management functionality to automatically detect incidents on the road and running pre-determined traffic signal strategies faster than real time to select the optimum strategy in response. Secondly, having better capability to manage the location of traffic congestion to where and when it has least impact.

4.15 It is estimated that some £390m of the £1bn benefits will be delivered by Phase 1, through an ability to detect and respond to incidents faster. A summary of the economic appraisal and benefits for the preferred option is tabulated below:

Economic Appraisal	**Over 11 years to 2027**	**Over 20 years to 2036**
Total Benefit (Phases 1 & 2 combined)	£320m	£1,000m
Benefit : Cost Ratio	**3.6**	**7.8**

4.16 The SITS quantified core benefits, which are conservative estimates, arise from three sources shown in the table below:

SITS Core Benefits	Phase 1 Only To 2036	Phases 1 & 2 combined To 2036
Delay and journey time reliability improvements associated with unplanned incidents	£210m	£370m
Delay and journey time reliability improvements associated with planned works/events	£70m	£140m
Delay savings associated with typical daily demand variation/capacity constraints	£110m	£490m
Estimated Total Benefits	**£390m**	**£1,000m**

Delivery of Preferred Option

4.17 This authority request is to undertake procurement of UTC SCOOT and the replacement incident management system and the development of data. The timeframe for this is from January to July 2017 and requires approval of £3.6m project authority as set out in Section 5. This is the start of the Phase 1 procurement activity. Ahead of contract award, the programme will seek further project authority to deliver, implement and operate Phase 1 systems. This further authority request is planned for May – July 2017.

4.18 Key milestones:

Milestone	Forecast Date
Programme and Investment Committee - approve project authority to implement and operate Phase 1	July 2017
Contract award of UTC SCOOT Partnering Arrangement	July 2017
Contract award for Incident Management System	July 2017

4.19 Key delivery risks have been assessed by undertaking a quantified assessment and through review of lessons learned from similar projects such as the London Streets Tunnels Operation Centre (LSTOC), London Road User Charging Re-Let and LondonWorks.

Market Engagement

4.20 The SITS programme team have undertaken significant market engagement, including an initial industry day in January 2015, visits to Transport for Greater Manchester, Highways England and British Airways, a detailed market sounding questionnaire in November 2015, along with one to one sessions with five suppliers in December 2015. A key conclusion from this engagement is that there is a strong appetite within the marketplace to bid for the SITS programme.

4.21 The programme team has also held engagements with SCOOT IPR owners to validate appetite for the intended procurement approach.

4.22 TfL Commercial has also adopted lessons learned from other successful procurements it has run, such as TfL's advertising re-tender, when shaping their thinking around IPR, commercial exploitation and contract structure.

Proposed SITS Timetable

4.23 A summary of the proposed timetable for the SITS Programme is set out below.

January to July 2017	Undertake procurement of Phase 1: UTC SCOOT and incident management system as detailed in section 4.
May to July 2017	Seek Programme and Project Authority for contract award, implementation and operation of Phase 1: UTC SCOOT, incident management system and associated data.
July 2017 to September 2019	Implement Phase 1: Replace UTC SCOOT and incident management system and associated data.
Late 2017	Phase 2: Approvals process for Predictive Capability and Data & Analytics.

5 Financial Implications

5.1 The costs included in this project authority request are those required to undertake the procurement of UTC SCOOT and replacement Incident Management System and develop data on a pilot basis. The additional Programme and Project Authority required is £3.6m as detailed in the table below:

Costs to undertake procurement for Phase 1 (this request) (£k)	
Base Cost	3,670
Risk	930 (25% of base cost)
Total	4,600
Remaining Programme and Project Authority	960
Programme and Project Authority Required	**3,640**

5.2 This additional authority request is based on the estimated costs and suitable risk provision for running the procurement process and the programme team to the end of August 2017.

5.3 All other financial implications, including projected costs for Phases 1 and 2, are set out in the paper on Part 2 of the agenda.

6 Assurance

6.1 TfL Project Assurance conducted an Integrated Assurance Review (IAR) which reported in May 2016. A review update was conducted in September 2016. The recommendations have been addressed or are planned as detailed in the management response. It was recommended that incremental costs, benefits and benefit to cost ratios were provided; the incremental benefits are included in paragraph 4.16 of this paper and incremental costs and benefit to cost ratios are included in the paper on Part 2 of the agenda. It was also recommended that the final procurement documentation be peer reviewed ahead of the

procurement; suitable resources to undertake this review will be identified. There were no critical issues identified through the IAR.

6.2 IIPAG participated in the May 2016 IAR and also the review update in September 2016. Considerations discussed at the review meeting were integration risk, demonstration of incremental benefits and how the challenges concerning SCOOT IPR had been addressed. Subject to available funding, IIPAG support the delivery of SITS in full. No recommendations or critical issues were raised.

List of appendices to this paper:

None. A paper containing supplementary information has been circulated to Members with Part 2 of the agenda.

List of background papers:

SITS project authority submission TfL Board 24 September 2015
Integrated Assurance Review and management response.

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