SCHEDULE 2.1

RTO SYSTEM REQUIREMENTS

VERSION CONTROL

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SCHEDULE 2.1 – RTO SYSTEM REQUIREMENTS

1. PURPOSE

1.1 This Schedule contains the RTO System Requirements for the purpose of this Agreement as follows:

1.1.1 the functional RTO System Requirements are set out in Appendix 1; and

1.1.2 the non-functional RTO System Requirements are set out in Appendix 2.

1.2 Capitalised terms used in this Schedule shall have the meaning set out in Appendix 3 or otherwise in Schedule 1 (Definitions).

2. MUST / SHOULD / COULD CATEGORISATION

2.1 In Appendices 1 and 2 the RTO System Requirements have been categorised using the 'MoSCoW' technique as follows:

2.1.1 **MUST**: The Supplier must comply in all respects with the 'MUST' requirements with effect from the Operational Commencement Date.

2.1.2 **SHOULD**: The Supplier must comply in all respects with the 'SHOULD' requirements with effect from the Operational Commencement Date, but due to dependencies on other systems within the SITS Programme TTL has accepted different functional delivery methods for some of these requirements for specified periods. Where applicable this is captured within the column headed 'Operational Commentary' in the tables in Appendices 1 and 2.

2.1.3 **COULD**: The 'COULD' requirements are longer term aspirational requirements that will primarily be delivered as part of the Product Roadmap in accordance with the column headed 'Operational Commentary' in the tables in Appendices 1 and 2 (at which point the relevant requirements shall be deemed to be 'MUST' requirements). The Supplier shall design the RTO System so that these requirements are capable of being delivered as part of Roadmap Projects or Innovation Projects.

APPENDIX 1 – FUNCTIONAL RTO SYSTEM REQUIREMENTS

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
Authentication				
1	SITS-REQ-28	Shall allow Administrators to control User access to each RTO System functionality, application, component or interface by assigning privileges to Users that shall include, at a minimum, the following levels: • Create; • Read only; • Edit; • Delete; and • Administrator.	MUST	
2	SITS-REQ-96	Shall (i) accommodate up to 400 Users and support up to 100 concurrent Users with the ability to temporarily support up to 400 concurrent Users when reasonably requested by TTL from time to time to manage significant major incidents or events in London; and (ii) be scalable to support numbers of Users in excess of 400.	MUST	
3	SITS-REQ-512	Shall allow Administrators to restrict the Users' view of, and access to, the RTO System by geographical area.	MUST	
4	SITS-REQ-699	Shall allow Administrators to create, update and delete User Groups to the 'Single Sign On' User accounts.	MUST	
5	SITS-REQ-770	Shall ensure Users can remotely access the RTO System from any location in the UK via the TTL IT network. When accessing via remote login, the User must have available all the same functionality as if they were logged in directly from any TTL building.	MUST	
Fault Management				
6	SITS-REQ-101	Shall in accordance with the SITS Interface Catalogue interface with the Fault Management System to manage faulty asset related Alarms.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
7	SITS-REQ-104	Shall identify and categorise all fault conditions on all Components and all relevant equipment associated with the collection of traffic signal and traffic sensor data and publish this information in such form and at such frequency as TTL may require from time to time.	MUST	
8	SITS-REQ-392	Shall continue to optimise in the absence of fully operational On Street Equipment detectors and sensors by using alternate information.	SHOULD	While Baseline SCOOT is operational, ASTRID will be used to provide this functionality Following the implementation Future SCOOT – Release 3, the Network Performance tool will provide this functionality
Integration Platform				
9	SITS-REQ-115	Shall interface with the relevant systems specified in accordance with the SITS Interface Catalogue to enable Users to view each Scenario location and status.	MUST	
10	SITS-REQ-356	Shall provide information on the performance, activity and configuration of the RTO System in such form and at such frequency as TTL may require from time to time.	MUST	
11	SITS-REQ-402	Shall have an interface in accordance with the SITS Interface Catalogue which supports the collection and storage of time-varying data, such as data from the RTO System, for later retrieval and analysis. The storage of the data must reflect the resolution at which the data is generated and it must not be assumed that all data is produced at the same frequency.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
12	SITS-REQ-552	Shall provide the following data (in such form and at such frequency as TTL may require from time to time) to be consumed by TTL's modelling and analysis tools: • Traffic Flows; • Stops; • Delays; • Speed; • Detector Occupancy; • Queue Lengths; • Traffic Signal Control Plans; • Traffic Signal Control Plan changes; • The green duration of all phases at each signal site; • The cycle time operating at each signal site; • The offset between signal sites; • The Interstage between traffic Stages; and • Bus Lane Usage.	MUST Except: SHOULD for Bus Lane Usage	SHOULD – Bus Lane Usage Existing bus lane usage information available from Baseline SCOOT will remain Following the implementation of Future SCOOT – Release 3, this functionality will be expanded to accommodate other forms of detection
13	SITS-REQ-31	Shall in accordance with the SITS Interface Catalogue allow the Predictive System to interface directly with the RTO System.	COULD	TBC Potential Roadmap Project / Innovation Project
14	SITS-REQ-377	Shall integrate all relevant external information sources, such as the Predictive System, in order to make informed traffic control parameter and Signal Timing changes.	SHOULD	Network performance data available from Baseline SCOOT will be made available via the User Interface and provided to the Interoperable Middleware Further information sources will be integrated as they become available through the Roadmap Projects and Innovation Projects as applicable

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
15	SITS-REQ-577	Shall configure Signal Timing changes at portable temporary traffic signalling equipment that is not normally under the control of the RTO System.	MUST	
16	SITS-REQ-25	Shall in accordance with the SITS Interface Catalogue have an interface(s), via the Interoperable Middleware, to all relevant external systems that utilise the RTO System data.	COULD	TBC Potential Roadmap Project / Innovation Project
17	SITS-REQ-116	Shall in accordance with the SITS Interface Catalogue interface with the Predictive System for the purposes of notification and information exchange of changes to Signal Timings.	COULD	TBC Potential Roadmap Project / Innovation Project
18	SITS-REQ-148	Shall receive the recommended Applied Scenario and/or Signal Control Strategy from the Predictive System and implement it with the ability for a User to manually stop the running of the suggestions as necessary.	COULD	TBC Potential Roadmap Project / Innovation Project
19	SITS-REQ-790	Shall in accordance with the SITS Interface Catalogue provide a direct interface from Fast-RTO to VISSIM.	MUST	
Logging				
20	SITS-REQ-382	Shall maintain an audit trail of all configuration changes made to the RTO System and any changes applied to the On Street Equipment through the RTO System. It must be possible to report on and export the audit trail in such form and at such frequency as TTL may require from time to time. Core information that must be recorded shall include, as a minimum, the following: • RTO System changes initiated by the Users; • RTO System actioned requests made by the Users to the RTO System; • Data requests made by the RTO System to external systems; • Data requests made by external systems to the RTO System; and • Alarms/alerts/warnings/notifications recorded by the RTO System or provided to the RTO System by external systems/interfaces.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
21	SITS-REQ-81	Shall have a configurable graphical and textual view showing details of all daily User and system generated events that have been logged by the RTO System. Core information that must be displayed shall include the following: • date-time stamp; • source of the event (whether it is a User or system generated event); • User details; • details of the event; • outcome of the event; • equipment identifier; and • equipment status.	MUST	
22	SITS-REQ-26	Shall automatically store an Unalterable record of all User and system initiated actions and events affecting the System that can be searched, viewed and reported on for auditing purposes. The information being recorded shall include User identifiers (of both people and systems), the type of action or event, the date-time of the action or event and whether the action or event results in a create, read, update or deletion of the affected entities. The types of actions or events must include: • making configuration changes such as adding equipment to a Traffic Control Group; • User access privilege changes; • User access violations; and • User and System initiated changes, e.g. System initiates changes that alter the planned Signal Timings for a Traffic Control Group.	MUST	
23	SITS-REQ-42	Shall provide feedback to Users of any instructions communicated to the OTU. All input data and communications to and from the OTU must be searchable and viewable through an audit facility.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
24	SITS-REQ-78	Shall enable fully audited User interactions with the System through a command line interface. The audit record must record the User identifier, date-time of the interaction and the type of interaction.	MUST	
Message Handler				
25	SITS-REQ-89	Shall have mechanisms in place to take appropriate action if the RTO System or the Components attempt to violate predefined safety critical parameters/configurations and if the network latency exceeds maximum configured values.	MUST	
26	SITS-REQ-99	Shall allow for the automatic notification of Alarms to Users aligned with business rules specified by TTL from time to time. The business rules will be set up by Users and will allow for the: • types of Alarms to notify; • notification protocol; • recipient(s); and • time frame for the automatic notification(s).	MUST	
27	SITS-REQ-102	Shall allow Users to inhibit the reporting of individual, multiple or all fault related Alarms from the RTO System into the Fault Management System. It must be able to apply the inhibit: • directly to a single piece of equipment; • to multiple pieces of equipment; and • spatially, i.e. a geographical area.	MUST	
28	SITS-REQ-558	Shall allow Users to identify and select the type of Alarms that are reported to the Fault Management System.	MUST	
29	SITS-REQ-87	Shall ensure that the operation of the Components is consistent with the configuration data maintained for the Components. Depending on severity, an escalating series of alerts and remedial measures shall be applied to ensure that the RTO System continues to operate safely.	MUST	
30	SITS-REQ-91	Shall generate alerts if the calculated statistical measures for the Modal Data or performance data, such as Occupancy rates and traffic counts, breach predefined thresholds defined by TTL.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
On Street Equipment Sensors				
32	SITS-REQ-363	Shall use data from On Street Equipment sensors, information from the Predictive System, information from the Data Warehouse and the Data Analytics solution to enact a priority that is suitable to the Mode(s) and Road Network conditions.	MUST for On Street Equipment sensor data COULD for Data Warehouse, Predictive System and Data Analytics	COULD Data Warehouse, Predictive System and Data Analytics TBC Potential Roadmap Project / Innovation Project
33	SITS-REQ-375	Shall use the Real Time data from the On Street Equipment sensors and detectors to create profiles of the current Modal demand and use this with modelled data to inform the RTO System.	MUST	
Optimiser				
34	SITS-REQ-349	Shall control the flow of traffic into and within Sensitive Areas to prevent: • the formation of long queues; • Congestion; and • Flow exceeding TTL's predefined traffic condition thresholds.	MUST	
35	SITS-REQ-350	Shall redistribute queuing vehicles to other roads more suitable for storing traffic and adjust Signal Timings at one or many Junctions to achieve the redistribution goal.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
36	SITS-REQ-351	Shall, whenever a problem is detected, Progressively initiate action in another part of the Road Network (e.g. if a problem is detected at a gyratory the action could be to restrict the traffic such that there is a lower flow input on the gyratory). Once performance measures in the Sensitive Area return to normal the RTO System shall Progressively return the Road Network back to normal operation.	MUST	
37	SITS-REQ-352	Shall have the capability to gradually apply a conceptual 'valve' to any control point on the Road Network Progressively when implementing actions or returning Signal Timings to normal baseline operation as required. This action must take into consideration Road Network parameters and any Scenario that may be in place.	MUST	
38	SITS-REQ-355	Shall have an adjustable hierarchy of Modal priorities that are available to the RTO System in order to allow, at a Node level, optimisation to occur for one Mode over another.	MUST	
39	SITS-REQ-357	Shall utilise Modal Data from the sensors and Data Warehouse for the purpose of optimising Signal Timings.	MUST for On Street Equipment sensor data COULD for Data Warehouse	COULD – Data Warehouse TBC Potential Roadmap Project / Innovation Project
40	SITS-REQ-584	Shall use positional information where available to accurately detect, track and assist Modes or a specific vehichle(s) selected by TTL, at a Junction or along a route, to allow Modes/vehicle(s) to be given priority and optimised for in the Signal Timings.	MUST for bus COULD for any other Mode	COULD – any other Mode TBC Potential Roadmap Project / Innovation Project
41	SITS-REQ-360	Shall apply prioritisation within the defined constraints on the Road Network such as target saturation. Any applied prioritisation must have minimal impact on other Modal users of the Road Network.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
42	SITS-REQ-364	Shall, whenever TTL requires, apply Local Extensions and Central Extensions to achieve bus priority.	MUST	
43	SITS-REQ-365	Shall, in addition to making changes to Signal Timings, also work with the predefined Stage order by selecting the best Stage to execute in order to make efficient use of the Junction control for the purpose of prioritising a Mode.	MUST	
44	SITS-REQ-366	Shall ensure any Signal Timing change for Modal optimisation is not then altered by the traffic optimiser element of the RTO System to the detriment of the prioritised mode.	MUST	
45	SITS-REQ-367	Shall only apply the optimising priority for as long as is necessary. Once the objective has been achieved the RTO System must re-evaluate the Road Network and take appropriate action to recover to TTL's predefined traffic condition thresholds.	MUST	
46	SITS-REQ-369	Shall define a precedence hierarchy for actions taken to prioritise Modes.	MUST	
47	SITS-REQ-370	Shall apply prioritising techniques for the Mode to enact suitable Signal Timing changes that benefit the performance of the Mode and minimise the effect on other Modes.	MUST	
48	SITS-REQ-374	Shall continuously model Modal performance in Real Time based on a conceptual view of the Road Network using Real Time Modal demand/performance data.	MUST	
49	SITS-REQ-378	Shall make changes to the Signal Timings to match prevailing traffic conditions by adjusting one or more of the following parameters in a systematic manner to minimise any significant changes to the traffic flow of all Modes: • Split; • Cycle; and/or • Offset.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
50	SITS-REQ-381	Shall use the modelled queue data for the various Modes to enable TTL to reduce: • Congestion, Delays and Stops; • likelihood of queue blocking at the upstream Junction; and • overcrowding of pedestrian, cycle or freight facilities.	MUST Except: COULD for freight facilities	COULD – freight facilities Future SCOOT – Release 3
51	SITS-REQ-384	Shall allow for precision adjustments. As an example it may be necessary to apply some bias i.e. a more favourable optimisation to the Signal Timings along an arterial road to provide a better flow of traffic.	MUST	
52	SITS-REQ-385	Shall ensure that multiple optimisers can work independently but have an awareness of each other such that they operate and make changes to traffic control parameters without conflicting with one another.	MUST	
157	SITS-REQ-791	Shall provide Absolute Priority for a Mode or selected vehicle such as a Hurry Call.	MUST	
53	SITS-REQ-390	Shall control the operation (including temporary suspension where applicable) of the traffic optimiser element of the RTO System for each Absolute Priority.	MUST	
54	SITS-REQ-391	Shall allow a User to override priorities, in favour of User specified weightings, to influence the RTO System to provide a desired outcome.	MUST	
55	SITS-REQ-396	Shall, whenever TTL requires, optimise the traffic Signal Timings with the view to minimising vehicle exhaust Emissions and air quality.	MUST for exhaust Emissions COULD for air quality	COULD – air quality Future SCOOT – Releases 1 and 2
56	SITS-REQ-397	Shall turn the optimisation of traffic for vehicle exhaust Emissions on and off as is necessary. It must be possible to trigger the on/off control either manually or automatically. As an example the trigger to optimise may be from an air quality monitoring device.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
57	SITS-REQ-398	Shall provide Emission estimates based on current Road Network conditions using On Street Equipment and other external base data including but not limited to Vehicle Type and fuel type.	MUST	
58	SITS-REQ-557	Shall adjust the optimisation parameters according to the data that is available, whether it is from On Street Equipment sensors and detectors, or the Predictive System.	MUST Except: COULD for the Predictive System	COULD – Predictive System TBC Potential Roadmap Project / Innovation Project
59	SITS-REQ-586	Shall, whenever TTL requires, optimise in-service bus movements along the Road Network based on the following criteria: • Lateness; • Headway; • Occupancy; • Stops; and • Delays.	MUST	
60	SITS-REQ-587	Shall, whenever TTL requires, optimise pedestrian movements based on the following criteria: • Count; • Occupancy; • Waiting time • Delay; • Journey Time; and • Vulnerable Users.	MUST Except: COULD for Delay and Journey Time	COULD – Delay and Journey Time Future SCOOT – Release 3
61	SITS-REQ-588	Shall, whenever TTL requires, optimise cycle flows based on the following criteria: • Presence; • Flow; • Stops; and • Delays.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
62	SITS-REQ-589	Shall, whenever TTL requires, optimise coach movements based on the following criteria: • Occupancy; • Stops; and • Delays.	MUST	
63	SITS-REQ-590	Shall, whenever TTL requires, optimise Taxi flows based on the following criteria: • Occupancy; • Flow; • Stops; and • Delays.	MUST	
64	SITS-REQ-591	Shall, whenever TTL requires, optimise vehicle traffic flows based on the following criteria: • Occupancy; • Flow; • Stops; and • Delays.	MUST	
65	SITS-REQ-592	Shall, whenever TTL requires, optimise powered two-wheeler flows based on the following criteria: • Occupancy; • Flow; • Stops; and • Delays.	MUST	
66	SITS-REQ-594	Shall, whenever TTL requires, optimise vehicle modal flows based on: • Vehicle Types; and • Emissions Characteristics.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
67	SITS-REQ-368	Shall apply differential priority to all Modes and their Sub-Modes.	MUST for buses SHOULD for other Modes	SHOULD – other Modes The interim functional delivery method will be to provide the other Modes and Sub-Modes facilities from Baseline SCOOT, but this will ultimately be delivered by Future SCOOT – Release 3
68	SITS-REQ-593	Shall optimise Light Rail Transit movements along the Road Network based on the following criteria: • Lateness; • Headway; • Occupancy; • Stops; and • Delays.	SHOULD	The initial functional delivery method will be to feed light rail transit detections into Baseline SCOOT as different links to be optimised in the normal manner, but this will ultimately be delivered by Future SCOOT – Release 3
69	SITS-REQ-595	Shall optimise freight traffic flows based on the following criteria: • Freight Class; • Loaded; • Unloaded; • Stops; and • Delays.	COULD	Future SCOOT – Release 3
Predictive Analytics				
70	SITS-REQ-676	Shall add the Scenarios and their associated Signal Timings to the Data Warehouse and hold Signal Timings and Scenario names in the RTO System for use.	MUST	
71	SITS-REQ-106	Shall allow Users to define a number of Signal Timing plans and/or parameter changes per Scenario, with a minimum of ten (10) available and a configurable upper limit that shall be enacted if the on-street conditions have been satisfied.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
72	SITS-REQ-107	Shall allow Users to define a selection priority for instances where the business logic satisfies one or more Signal Timing plans.	MUST	
73	SITS-REQ-108	Shall allow Users to define a number of schedules - minimum of ten (10) available, with a configurable upper limit - to define when the RTO System shall actively monitor the Road Network for a given condition as defined by the business logic.	MUST	
74	SITS-REQ-109	Shall have a configurable facility that allows the Applied Scenarios to be activated immediately or after a configured delay, such that the Applied Scenarios are activated for more persistent conditions as opposed to transient anomalies on the Road Network. For example, a stalled vehicle may create a momentary build-up of traffic at the Junction but would not require any intervention as compared to a broken down vehicle.	MUST	
75	SITS-REQ-110	Shall once the Applied Scenario has stopped running, automatically return Signal Timings and settings back to the scheduled values Progressively to minimise disruption to the Road Network.	MUST	
76	SITS-REQ-113	Shall handle anomalies in the data input, such as missing data or suspect data, used to trigger an Applied Scenario. It must be possible to inhibit the operation of a particular Applied Scenario if there is insufficient data to trigger an Applied Scenario reliably.	MUST	
77	SITS-REQ-674	Shall make Signal Timing changes according to the following system hierarchy: 1. the Predictive System 2. the RTO System where the Predictive System is the highest in the system hierarchy, so that any suggested Signal Timing changes from the Predictive System shall take precedence over any changes suggested by the RTO System. Each system must be able to work independently of each other and without the parent hierarchy system if required.	MUST COULD for Predictive System	COULD – Predictive System TBC Potential Roadmap Project / Innovation Project

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
Scheduler				
78	SITS-REQ-353	Shall allow for manual administration, configuration, testing, tuning and monitoring of the RTO System. The configuration must be possible via any one of the following: • a schedule process such as a Timetable; • a command line interface; • a configuration tool that has a graphical user interface; or • an API for external applications to view the RTO System data.	MUST	
Traffic Equipment				
79	SITS-REQ-43	Shall allow for the configuration, viewing and deployment of OTU firmware; must be able to view a full history of previous firmware versions and associated audit information.	MUST	
80	SITS-REQ-86	Shall monitor the control status of equipment in a Traffic Control Group which indicates, for example, if the equipment is under local control, has a fault or is under the control of the RTO System.	MUST	
81	SITS-REQ-47	Shall configure Signal Timings for Traffic Control Groups so that traffic signalling equipment can be controlled individually or collectively by these Signal Timings.	MUST	
82	SITS-REQ-48	Shall enable Signal Timings to be configured for any Traffic Control Group that is under the control of the RTO System, regardless of the Mode of Control.	MUST	
83	SITS-REQ-49	Shall enable Signal Timings to be scheduled for each Operational Day, as well as for special occasions and events so that the Stages of the traffic and pedestrian controllers can operate to take account of different traffic flows at different times of the day. These Signal Timings shall be invoked at a particular time of day for a specified duration.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
84	SITS-REQ-50	Shall enable Signal Timings to be configured on a second-by-second basis.	MUST	
85	SITS-REQ-79	Shall interface/configure the UTMC-compliant and non-UTMC compliant Components (as specified below). These include Components that are under the temporary control of the RTO System. The UTMC-compliant Components are: • Time source to synchronise and co-ordinate the operation of the Components; • Data transmission system; • Traffic signal controllers; • Pelican crossings; and • Special Facilities. The non-UTMC compliant Components are: • Detectors; and • Special Facilities.	MUST	
86	SITS-REQ-82	Shall impose manual or automatic changes to Signal Control Strategies for any Traffic Control Group, such that the new Signal Timings operate in a co-ordinated manner across the Traffic Control Group and any safety critical linking is maintained during the implementation of new timings. Any disruption to the Road Network shall be minimised and restricted to the area surrounding the affected Traffic Control Group.	MUST COULD for Predictive System	COULD – Predictive System TBC Potential Roadmap Project / Innovation Project
87	SITS-REQ-83	Shall synchronise to a master time source at a minimum of once a day. The RTO System shall also synchronise traffic signal controllers to this master source, at a minimum of once each day, so that the Signal Timings are consistent across the Components and any connected equipment and interfaces to external systems.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
88	SITS-REQ-85	Shall perform both manual tests and automatic scheduled tests on the health of the RTO System and traffic related equipment. Auditable logs of these tests shall be maintained and any faults shall be raised, if necessary, with the Fault Management System for further investigation. These tests shall include the following: • Intergreen /Minimum green test: a sequence that checks the stage intergreens and minimum greens for traffic signal controllers; • Vehicle precedence periods: a test performed on each Pelican to check the duration of the vehicle precedence period (road green) and the non-road green; and • Demand dependency.	MUST	
89	SITS-REQ-578	Shall enable the RTO System to automatically apply different Signal Control Strategies and/or Applied Scenarios on the Road Network.	MUST	
90	SITS-REQ-46	Shall enable Users to create, modify, view, deploy and delete Signal Timings that allow the RTO System to control traffic signalling equipment.	MUST	
91	SITS-REQ-97	Shall facilitate the creation and maintenance of RTO System data by enforcing data validation and data integrity rules so that there is a reduced risk of the Components operating in error.	MUST	
92	SITS-REQ-689	Shall configure new sub-types of Component for the RTO System.	MUST	
User Interface				
93	SITS-REQ-35	Shall allow multiple Users to configure the Components and enforce the transactional integrity of multiple updates by preventing any conflicting or overlapping changes.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
94	SITS-REQ-570	Shall facilitate the creation and maintenance of RTO System data by having a clear, release checking process to manage how changes to the RTO System data will be implemented, including Live Updates (along with a set of conditions agreed by TTL to manage any exceptions to the Live Update process, such as technical infeasibility).	MUST	
95	SITS-REQ-100	Shall have a user interface that allows Users to directly connect to the On Street Equipment for further diagnostics of Alarms.	MUST	
96	SITS-REQ-69	Shall have a graphical user interface for configuring, monitoring, viewing and printing of real-time and offline traffic sensor data.	MUST	
97	SITS-REQ-71	Shall enable Users to issue commands allowing them to view all stored and dynamic data that is: • transmitted within the RTO System; or • exchanged between the RTO System and external systems.	MUST	
98	SITS-REQ-72	Shall enable Users to issue commands that enquire on the status of any Component.	MUST	
99	SITS-REQ-73	Shall enable Users to issue commands that make changes to configurable data in the RTO System and change the status of the Components.	MUST	
100	SITS-REQ-74	Shall enable Users to combine and execute multiple commands in a controlled way in order to perform a specific, repeatable and reusable function. These groupings of commands shall enable conditional logic to be implemented.	MUST	
101	SITS-REQ-75	Shall enable assigned Users to issue commands to manage the RTO System in order to: • start the RTO System; • shut down the RTO System; • restart the RTO System; and • perform checks on the health of the RTO System.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
102	SITS-REQ-76	Shall resolve concurrent interactions with the RTO System so that the transactional integrity of multiple updates is enforced by preventing any conflicting or overlapping changes.	MUST	
103	SITS-REQ-84	Shall configure traffic signalling equipment in Traffic Control Groups so that control actions can be applied to the equipment in these groups. These control actions must determine if traffic signalling equipment will: • operate according to a particular set of Signal Timings; • operate to a set of pre-defined RTO System settings; • drop to local control at a particular location; or • remain under RTO System control.	MUST	
104	SITS-REQ-103	Shall store all Alarms, Signal Timings and RTO System and User requested and implemented command data for seven (7) years from creation or, where applicable, the date of migration from TTL. The data shall be available for immediate viewing by Users for Alarm diagnostic purposes.	MUST	
105	SITS-REQ-105	Shall allow Users to define the Road Network and On Street Equipment conditions that will require the scheduled Signal Timings or active Applied Scenarios to be temporarily suspended in favour of new Signal Timing plans to be enacted for a period of time.	MUST	
106	SITS-REQ-361	Shall enable Users to define the priority optimisation at a signalled site or across a Road Network area defined by TTL.	MUST	
107	SITS-REQ-388	Shall enable Users to view and edit the parameter and structural changes via the configuration tool whilst maintaining control of the signal sites.	MUST	
108	SITS-REQ-389	Shall enable Users to view input data from external systems and devices used by the RTO System.	MUST	
109	SITS-REQ-400	Shall provide a User configurable refresh rate for all graphical and textual messages generated from the RTO System.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
110	SITS-REQ-573	Shall enable Users to implement a Signal Control Strategy that aligns to a broader traffic management strategy as well as local traffic routing strategies.	MUST	
111	SITS-REQ-92	Shall enable Users to create, edit, view or delete RTO System data.	MUST	
112	SITS-REQ-403	Shall display the raw data in different resolutions and aggregations including but not limited to trends and profiles in addition to the raw data. It must be possible to extract and print the data. The graphical user interface must allow Users to fully customise what data is displayed and allow for data manipulation.	MUST	
113	SITS-REQ-404	Shall display derived data in addition to the measured absolute data.	MUST	
114	SITS-REQ-33	Shall enable Users to configure the way the Components are operated, controlled and monitored so that the RTO System can communicate with these Components through the interchanging of data.	MUST	
115	SITS-REQ-34	Shall enable Users to configure the Components at varying system levels so that they can be controlled and monitored independently or collectively by the RTO System. These system levels shall comprise: • equipment that is classed as an OTU; • equipment that is associated to an OTU; and • individual equipment units.	MUST	
116	SITS-REQ-36	Shall facilitate the creation, modification and deletion of configuration data for each Component using a forms based graphical user interface.	MUST	
117	SITS-REQ-41	Shall have a graphical user interface that allows Users to create, list, view, delete and edit configuration files for the purpose of remotely deploying to the OTU. The configuration file controls how the OTU operates and interprets the input data.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
118	SITS-REQ-51	Shall have a capability for the configuration, viewing and monitoring of Signal Timings for Traffic Control Groups. This capability must be possible via all of the following: • graphical user interface at the individual equipment level to configure, view and monitor Signal Timings; • text-based interface (e.g. command line interface) at the individual equipment level to configure, view and monitor Signal Timings; and • interface for applications to view, configure and monitor Signal Timings, detector and fault data.	MUST	
119	SITS-REQ-80	Shall have a configurable, continuously updating graphical and textual view of data that is being transmitted between the components of the RTO System and the Predictive System in real-time on a second-by-second basis so that Users can actively monitor the RTO System.	MUST COULD for Predictive System	COULD – Predictive System TBC Potential Roadmap Project / Innovation Project
120	SITS-REQ-93	Shall enable data for different parts of the RTO System to be presented and configured in a map-based view at the level of the Traffic Control Groups, with the lowest level being individual equipment unit which shall be aggregated up to other levels in the Traffic Control Group.	MUST	
121	SITS-REQ-94	Shall present information from different components of the RTO System, that conforms to a common look and feel approved by TTL.	MUST	
122	SITS-REQ-95	Shall enable Users to customise the presentation of both current and archived data from different parts of the RTO System and external systems in order to provide a personalised User experience that supports the various functions for configuration and information display. For the purpose of this requirement the external systems are: • Predictive System; and • Data Warehouse.	MUST COULD for Data Warehouse and Predictive System	COULD – Data Warehouse and Predictive System TBC Potential Roadmap Project / Innovation Project

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
123	SITS-REQ-98	Shall provide a view of Alarms, with filterable options. All the core information pertinent to the Alarm shall be displayed in a single view. The core information shall include, but not be limited to: • Alarm identifier; • date time stamp; • Alarm description; • asset reference; • asset current status e.g. under repair; and • Alarm fault report status.	MUST	
124	SITS-REQ-112	Shall have a graphical user interface for configuration of the Scenarios and the parameters and a real time updating view of the temporal state of the Scenarios.	MUST	
125	SITS-REQ-354	Shall enable a User to create, modify and delete Signal Control Strategies and the Scenarios with the ability to drill down and configure the Signal Timing at equipment level.	MUST	
126	SITS-REQ-362	Shall have a graphical user interface for configuration of the priorities of the Modes, on-street traffic parameters and real time updating view of the measured and calculated RTO System data.	MUST	
127	SITS-REQ-386	Shall have a real time view of how the RTO System is changing the traffic control parameters available as a graphical and text display. The information must include the requested value and the actual value applied/operated.	MUST	
128	SITS-REQ-387	Shall have a graphical user interface that allows Users to configure the traffic control parameter tolerances. It must be possible to set these values at the signalled movement of a Junction, or across a cluster of Junctions.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
129	SITS-REQ-568	Shall facilitate the creation and maintenance of RTO System data by allowing Users to view related information about the Components so that there is a reduced risk of the Components operating in error. Related information could include, for example, which equipment is currently associated to an OTU at a particular traffic Junction.	MUST	
130	SITS-REQ-569	Shall facilitate the creation and maintenance of RTO System data by allowing Users to roll back configurations for each Component to a previous or historical state so that there is a reduced risk of the Component operating in error.	MUST	
131	SITS-REQ-574	Shall enable a user to view in Real Time and to distinguish between manual and automatic implementation, the Signal Control Strategies and Applied Scenarios. The real time view must show the areas in which the Signal Control Strategies and Applied Scenarios operate and the temporal state of their status.	MUST	
132	SITS-REQ-670	Shall display details of the control status of equipment in a Traffic Control Group.	MUST	
133	SITS-REQ-90	Shall enable Users to view at a one second refresh rate and report on RTO System data. This includes all data that has been generated by and received into the RTO System, in both real time and off-line.	MUST	
134	SITS-REQ-671	Shall enable Users to play back any of the RTO System data immediately, i.e. in true time representation that the data was generated and fast forward and rewind in time as required.	MUST	
135	SITS-REQ-773	Shall ensure that all User interactions with the RTO System and all alerts to the Users are made available through the Common Operational View, and independently of the Common Operational View (including where the Common Operational View is unavailable).	MUST SHOULD for Common Operational View	
Data Analytics and Fusion				

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
136	SITS-REQ-111	Shall measure the performance and benefit of each Applied Scenario and report its findings to TTL in such form and at such frequency as TTL may require from time to time. The benefits may include, for example, reduced stops and delays of implementing the Applied Scenario as opposed to Do Nothing.	SHOULD	
137	SITS-REQ-399	Shall display the modelled and/or measured Emissions data and the benefits as a result of the optimisation.	MUST	
Transport Modelling				
138	SITS-REQ-395	Shall enable Users to operate multi-modal traffic models provided by TTL with the RTO System and the Predictive System without affecting the operation, performance and integrity of the RTO System.	MUST COULD for Predictive System	COULD – Predictive System TBC Potential Roadmap Project / Innovation Project

APPENDIX 2 – NON FUNCTIONAL RTO SYSTEM REQUIREMENTS

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
Non Functional Requirements				
139	SITS-REQ-37	Shall scale to support the continual expansion of additional Components relating to the RTO System as reasonably required by TTL from time to time.	MUST	
140	SITS-REQ-88	Shall maintain an Unalterable record of control actions, system logs and all data transmitted between the Components at a data transfer rate agreed with TTL for every day of the year with facilities to enable Users to interrogate and output the data for auditing purposes. This data must be retained for a period of seven (7) years from its creation.	MUST	
141	SITS-REQ-372	Shall measure the performance and benefit of the optimisation in achieving the required objective for all Modes and provide its findings to TTL in such form and at such frequency as TTL may reasonably require from time to time.	MUST	
142	SITS-REQ-771	Shall ensure that the chosen operating system (approved by TTL) used to host the RTO System solution supports the ongoing development of the RTO System in accordance with this Agreement, uses technologies and skills that are sustainable for the lifetime of the RTO System and can adapt to changing market requirements, in each case without the need to redesign the RTO System and/or to rewrite significant parts of its code base.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
143	SITS-REQ-775	Shall provide a detailed training plan for Approval by TTL no later than the design milestone as defined in MS2B Schedule 6. The plan must: • ensure that all of the different User access levels are covered in the training; • identify roles and responsibilities, deliverables and milestones; • identify the scope of the training content, the training material and the training environment; and • be aligned with the Transition Plan.	MUST	
144	SITS-REQ-776	Shall, in accordance with the training plan, develop training material for Approval by TTL.	MUST	
145	SITS-REQ-777	Shall provide an off-line training system for the RTO System that is: • fully representational of the operation and response of the RTO System; • accessible from any TTL building; and • capable of supporting multiple parallel training sessions.	MUST	
146	SITS-REQ-778	Shall provide training to a level that allows Users to: • fully and efficiently operate the RTO System relative to their access levels; and • continue their roles with no degradation to their existing performance and efficiency.	MUST	
147	SITS-REQ-779	Shall obtain regular feedback from Users on the training provided and improve the training to take account of User feedback where such improvements are Approved by TTL.	MUST	
148	SITS-REQ-780	Shall provide additional training (including updating training material) as required by TTL including in relation to RTO System functionality associated with Roadmap Projects.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
149	SITS-REQ-781	Shall, in accordance with the training plan, provide TTL with access to sufficient training material such that TTL can be self-sufficient in training by the Achievement of MS6.	MUST	
150	SITS-REQ-782	The RTO System shall be hosted in a facility external to the TfL data centres forming part of a managed service offer from the Supplier. TfL will provide connectivity from the Supplier's hosted service to the TfL managed Wide Area Network.	MUST	
151	SITS-REQ-783	Shall provide a common entry point into all systems used to manage the Road Network. Direct access to underlying systems shall be supported using the 'Single Sign On' approach as described in the Architecture Overview. The service shall authenticate with the TfL ADFS (Active directory federation service) to facilitate a 'Single Sign On' for User access to the RTO System. The service shall support the use of SAML 2.0, OAuth 2.0 and compliant WS-Federation token protocols.	SHOULD	
152	SITS-REQ-785	The RTO System shall be designed so as to accommodate both wired and wireless forms of communication between the RTO System and the OTU. The Supplier shall ensure that its monitoring service provided in accordance with Schedule 2.2B (Service Management) monitors both forms of communication which is appropriate to the method of communication.	MUST	
153	SITS-REQ-786	Shall provide the ability for the Users to extract the configuration of all or a subset of Components in the live RTO System and associated operational data for the user to upload into the Fast-RTO installation(s).	MUST	
154	SITS-REQ-787	Shall ensure that the Fast-RTO is functionally and operationally identical to the live RTO System version.	MUST	

Ref	Jama Ref	Description	MoSCoW	Operational Commentary
155	SITS-REQ-788	Shall provide the ability to allocate User-unique access levels per Fast-RTO installation independently of the live RTO System.	MUST	
156	SITS-REQ-789	Shall provide a Fast-RTO interface to allow Users to operate, and maintain data for, each Fast-RTO installation. The interface must at minimum provide the following functionality: • Start, pause and stop • Restart the Fast-RTO with the original baseline dataset and original configuration. • Control the speed of Fast-RTO, both faster and slower than real time. • Make configuration and parameter changes to the Fast-RTO while running.	MUST	

APPENDIX 3 – RTO SYSTEM REQUIREMENTS DEFINITIONS

Unless otherwise provided or the context otherwise requires, the following expressions used in this Schedule have the meanings set out below.

Absolute Priority	The priority required to ensure that a particular Mode or policy has precedence over all other users of the Road Network at that point.
Administrator	Each User authorised by TTL to manage other User roles and to assign Users to these roles.
Alarms	Notifications generated to draw attention to such conditions as faults, changes of state of signal control, or of On Street Equipment or any event that could affect the normal operation of Signal Timings.
API	Application Programming Interface.
Application Programming Interface	A set of routines and protocols that allows for the passing of data into and the retrieving of data out of the RTO System.
Applied Scenario	A set of revised signal timing(s) and/or instructions to the RTO System with the objective to achieve a desired optimisation and outcome.
Area	Collection of Regions/Groups
ASTRID	Automatic SCOOT Traffic Information Database – this database is a historical log of data used by the SCOOT model in the optimisation process covering items such as Delay, Flow and Congestion.
Bus Lane Usage	Percentage use of the bus lanes categorised by the different Modes.
Central Extension	Where the RTO System instructs the controller to extend the green time for the purpose of prioritising a bus across the stop line.
Common Operational View	A presentation layer for SITS that will provide a single, unified display and access to all the applications, data and information accessible within SITS, to provide a single source of operational activity across the SITS network. The Common Operational View will show real-time and historical information on all flows, incidents and key movements by allowing the representation of multiple context-aware data sets and applications simultaneously on a single interface capable of rendering in spatial, tabular and list forms. The Common Operational View will be customisable per User and by User role, to support the processes and skill sets of all Users.

Component	Each On Street Equipment and system that connects and provides input into the RTO System. These are: • Junctions; • Pelicans; • Special Facilities; • OTUs; • Detectors; • inputs from other SITS components such as the Predictive System; and • data transmission medium.
Congestion	The excess Journey Time (in minutes per km) over and above the free flow journey time as defined by TTL, where free flow journey time is most commonly the overnight journey time.
Count	The number of a particular Mode of transport in a defined area or crossing a defined point.
Cycle	One complete sequence of Stages in the operation of traffic signals.
Cycle Time	The time taken by a sequence of Stages at a traffic signals site to run i.e. one Cycle.
Data Analytics	The SITS solution to be provided by another SITS supplier that will provide the ability to extract, understand, manipulate, visualise and report on data.
Data Warehouse	The SITS solution to be provided by TTL or another SITS supplier that will allow for the provision of a common data (data models, relationship) storage facility. This will provide methods for: • data accessing, sharing, reporting and management; • supplying other systems internally; and • ensuring availability of a data platform for the other product components in the SITS Programme.
Delay	The additional travel time experienced by a Mode of transport due to circumstances that impede the desirable movement of that Mode.

	It is measured as the time difference between actual travel time and free-flow travel time.
Demand Dependent Stage	A Stage that appears only when there is a remote or central need or 'demand' for that Stage. This demand is typically flagged either by Presence detectors, by push buttons or controller special facilities.
Detector	A device registering the presence of different Modes of transport.
Do Nothing	A Scenario in which no alteration of traffic control or traffic management measures is proposed.
Emissions	Discharges of a pollutant from a particular source or group of sources (e.g. factories, vehicles) into the surrounding area.
Emissions Characteristics	The Emissions (NOx, CO, CO2, etc.) profile of a Mode of transport as a function of vehicle speed and type.
Fast-RTO	An offline version of the RTO System which can be connected via an interface to traffic modelling software with the ability to run at, or slower/faster than, real time and from the same time clock as the live RTO System.
Fault Management System	TTL's asset management Oracle based system used for managing traffic control hardware (with particular focus on traffic control signal controllers) on the Road Network.
Fixed Time	A control strategy that uses pre-set green periods for each traffic stage with no adaptive capability other than stage demands.
Flow	The total number of particular Mode passing a given point or area in a given time.
Freight Class	Classification of goods carrying vehicles e.g. HGV, LGV, MGV, Wide Load.
Green Wave	An automatically imposed Signal Control Strategy designed to give unimpeded progression for priority vehicles along a specified route. The request for a Green Wave can come from a remote source i.e. directly from an on-street request, be imposed by a User or implemented by a system request. The request will impose and remove the special plans on the pre-selected Junctions and Signalised Pedestrian Crossings in a controlled sequence. Timers are used to determine how long a Green Wave will last on each Junction along the route. Once a Green Wave has completed on a Junction/ Signalised Pedestrian Crossing it will then return to its normal timetable plan. This will occur on all Junctions on a route until they are all returned to their normal timetabled Signal Timings for that time of day.

Group	Collection of equipment that is either geographically common or in a common state for the purposes of being controlled as a single entity. It is comprised of one or more Subgroups.
Headway	A measurement of the distance or time between vehicles in a transit system.
Hurry Call	A signal priority type which forces the traffic signal controller to the specified Stage as quickly as possible. This cannot violate minimum green times or intergreen periods but could, if required, miss Stages used in the normal Stage sequence.
Intergreen	The time between the disappearances of one phase green at a signal site and the appearance of conflicting phase green at the same signal site.
Interoperable Middleware	A suite of TTL products specified in the SOA Reference Architecture Document that will facilitate the integration, interoperability and exchange of information within the broad range of technology, applications and their data in the SITS programme. The Interoperable Middleware will handle discovery, transformation and access control to provide automated access to services and data, to any other service that requires it. It will also manage workflow, governance, business orchestration, service management, audit/logging and instrumentation. This will allow value to be maximised from these services and data assets. The Interoperable Middleware will also support change, provides flexibility and support innovative ways of working. The Interoperable Middleware platform will be based on a Service Oriented Architecture, provide a scalable and configurable message bus, ensure architecture best practice is adhered to, and a single collection of endpoints are used to facilitate instrumentation and knowledge of system usage.
Interstage	The period between the end of one Stage and the start of the next Stage.
Journey Time	The time taken to pass between two points in the Road Network.
Junction	A signalled site with two or more Stages. Each Stage can be controlled using a prepared Signal Timing plan.
Lateness	The concept of arrival after the expected, scheduled or usual time; unpunctuality.
Light Rail Transit	Urban public transport using rolling stock similar to a tramway, but operating at a higher capacity, and often on an exclusive right-of-way.

Live Update	Deployment of configuration changes to the RTO System with either: • no loss of system availability; or • loss of availability restricted to the affected Junction.
Loaded	In the context of the freight Mode, freight which is carrying cargo.
Local Control	The use of independent site-based control strategies for RTO System controlled traffic signals, if RTO System control is interrupted or lost.
Local Extension	When the controller implements a Stage extension when a bus is detected locally during the Stage green time, provided that the controller is receiving permission from the RTO System.
Modal Data	Any information relating to one Mode of transport.
Mode (of transport)	One of a number of transport methods that facilitate movement across the Road Network, such as: • pedestrian; • cycle; • freight; • bus: TTL and Non-TTL; • coach; • car; • private hire and licensed Hackney cab; • powered two-wheeler; and • Light Rail Transit, and "**Modal**" shall have a corresponding meaning.

Mode of Control	The operational state of the traffic signals in the RTO System of which there are four possible states: • Local control - not currently controlled by the RTO System, but normally capable of being controlled by the RTO System • Monitored - not controlled by the RTO System but the reply data is monitored. Cannot be controlled by the RTO System. • Fixed Time - a series of timing sets that can be varied by time of day i.e. AM peak, off peak, and PM peak. • SCOOT / Adaptive control - a traffic optimiser that varies the green split, offset and Cycle Time of intersections depending on traffic demands and with regards to a pre-set model.
Network of Interest or NOI	A subset of the Road Network. All 'M' and 'A' numbered roads, busy minor roads, and busy bus routes within the geographical boundaries shown in [*NOI map reference to be provided*] as updated and notified to the Supplier from time to time. It comprises around 6000 km of network in total (4613 km within the Greater London area) and is split into approximately 76,000 individual 'Integrated Transport Network' (ITN) links.
Network Performance	Replacement for ASTRID following the introduction of Future SCOOT as part of Future SCOOT – Release 3.
Node	Signalled junctions and pedestrian crossings that are under the RTO System. A Node can comprise one piece of equipment (single component Node) or many pieces of equipment (multi-junction Node). Nodes are organised into Regions.
OAuth 2.0	The open standard with this name for authorisation of applications - including application registration.
Occupancy	The percentage of time a detection zone of a Detector is occupied by a Mode of transport.
Offset	The time difference between a specific point in the Cycle at a signalled site and a reference point, for example the start / end of a stage at an adjacent signalled site. This is one of three optimisation parameters that can be changed by the RTO System.
On Street Equipment	An item of physical equipment that is installed on the Road Network (e.g. in the road (loop, ATC) or on a traffic signal pole (ANPR camera)) and which involves the capturing of information about vehicles/people on the road/pavement at the location of the equipment. Compare to virtual which is not of a fixed location (e.g. mobile, sat nav in car).
Operational Day	Each day of the week including weekends and public holidays.
OTU	Outstation Transmission Unit.

Outstation Transmission Unit	An item of equipment which interfaces the equipment to be controlled with the RTO System data transmission system.
Predictive System	A SITS solution that will provide the ability to predict future multi-modal traffic conditions in close to real time, and propose Road Network optimisation action plans to mitigate against foreseen effect before they occur. This will be achieved by identifying variations to a baseline of activity, anticipating where this will exceed tolerance, and generating models of proposed solutions complete with an anticipated measurement of their success, to propose the most appropriate plans for the situation. The Predictive System will also understand the impact of traffic management interventions and other loss of capacity across the Road Network such as road works and planned events, when calculating both the predictive case and the action plans.
Presence	The occupation of a defined area by a particular transport mode.
Progressively	The making of a small series of changes to the Signal Timings such that there is no sudden change apparent to the traffic on the Road Network.
Queue Length	The number of the vehicles queueing from the stop line.
Real Time	Data received up to the relevant transmission lag time approved by TTL (which shall vary depending on context/system).
Region	A group of interdependent Nodes operating on the same base Cycle Time in the RTO System. Region boundaries are located where links are separated such that coordination does not matter.
Road Network	All of the roads and footways within the M25 (which at the Effective Date is approximately 13,600km of roads) for the movement of goods and people using any of the Modes of transport.
RTO System	The new real-time optimiser system that (i) the Supplier shall design, develop, implement, support and exploit; and (ii) which shall replace TTL's existing SCOOT and UTC systems, in each case in accordance with this Agreement.
SAML	Security Assertion Mark-up Language (SAML) is an XML-based open standard for exchanging authentication and authorisation data between security domains, that is, between an 'Identity Provider' (IDP - a producer of assertions) and a 'Service Provider' (SP - a consumer of assertions).

SASS	System Activated Strategy Selection.
Scenario Library	A collection of reusable Scenarios that can be recommended for implementation
Scenario	A planned or unplanned event or any other disruption that requires traffic management and control measures to mitigate the impact on the Road Network. Such measures used in the mitigation could be local control, greenwave, Signal Control Strategy, strategic road closure, VMS signage etc. *Use Case Example:* • *An unplanned event where a damaged crane has fallen resulting in the closure of an important route through the Road Network for a long period of time. To address the effect on the Road Network bespoke Signal Control Strategies are created by a User for use in the LSTCC in response to the abnormal Road Network conditions. This could include managing Signal Timings immediately around the closure as well as a wider strategy to manage flow into the area. Dealing with this Scenario could also include mitigation such as strategic road closures, VMS signage etc.* • *A queue of vehicles extends back into a roundabout causing exit blocking with the roundabout at risk of locking up. To address the congestion a Signal Control Strategy or Applied Scenario is implemented.*
SCOOT	Split, Cycle and Offset Optimisation Technique.
Sensitive Area	Identified areas of the Road Network where any abnormal flow of traffic, incident or event could potentially cause a large build up of traffic around the area in a short period of time, with the possibility of impacting the Corridors and the wider network.
Signal Control Strategy	A strategy for controlling traffic signal timings, ranging from a local level (single junction) to a wide strategic level. *Use Case Example:* • *A section of the Road Network has several closely associated signals with tidal flow conditions. Users set up these signals to have a specific Signal Control Strategy for progressing the heaviest tidal flow for differing times of day. This may be through bespoke signal timing plans or RTO System setup* • *A standalone crossing near a local school. A User sets up the signal to have a specific weekday 'school rush' Signal Control Strategy to prioritise the pedestrians' movements. This may be through bespoke signal timing plans or RTO System setup*

Signal Timings	The general term typically used for the set of green Stage times and Interstages allocated to the stages at a signalled intersection.
Signalised Pedestrian Crossings	A signal controlled crossing that allows the relevant Mode the right of way to cross the road.
SITS Interface Catalogue	the interface catalogue for the SITS Programme notified by TTL to the Supplier from time to time;
Special Facilities	Items of street equipment other than traffic signals which are controlled and/or monitored by the RTO System, such as signs, special purpose detectors, barriers, etc.
Split	The division of the available green time between the Stages of a signal cycle. This is one of three optimisation parameters that can be changed for the RTO System.
Split, Cycle and Offset Optimisation Technique	The traffic optimisation product with this name licensed to TTL by the Supplier under this Agreement.
Stage	A unique arrangement of non-conflicting phases that are assigned to a collective identity in order to simplify Signal Control Strategies.
Stops	The number of occasions in which a Mode stop on a section of carriageway/footway over a fixed period.
Sub-Mode	Subset of any Mode that can be used to define or requires a different level of service compared to the overarching Mode to better manage the Road Network. This will include KPIs such as journey time, safety, vehicle emissions. For example, a severely delayed bus may be given a higher priority than a bus that is deviating a few minutes from its Timetable and no priority given to a bus ahead of its schedule.
Subgroup	Subset of a Group and can be a single piece of equipment or many. It provides a common Mode of Control for each member of that Subgroup (i.e. each member of a Subgroup will behave in the same way in control terms, all on Local Control, Fixed Time or traffic optimiser). It defines the lowest level of control allowed to standard users of the RTO System and can contain one or many Nodes.
System Activated Strategy Selection	A system used by TTL to automatically detect and manage disruptions on the Road Network. SASS procedures are prepared by traffic control engineers, based on their observations and knowledge of the Road Network and its performance for situations that cannot be planned for in advance. The engineers specify certain start and end triggers that monitor street conditions (e.g. has a vehicle been stationary on an ILD for longer than normal) and will in response invoke pre-set changes to Signal Timings to manage disruptions.

	SASS can also cancel these changes when certain conditions are detected (e.g. once traffic conditions are back to normal).
Taxi	London taxi – a licensed automobile for hire.
Timetable	A schedule of the daily traffic control events enacted by the RTO System at pre-set times of day. A schedule can be set up for each day of the week. There are also special daily schedules to cater for when a Timetable needs to be run that is different from the normally scheduled Timetable. For example, the State Opening of Parliament.
Traffic Control Groups	Arrangement of traffic signalling equipment in various logical configurations to facilitate the operation, control and monitoring of the equipment collectively or individually. These configurations are: • Individual signalling equipment; • Subgroups; • Groups; • Nodes; • Regions; and • Area.
Traffic Signal Control Plans	Traffic Signal Timing set that allocates green times in a Cycle to different Stages.
Traffic Flow	The number of vehicles passing a defined detection point at specified times of the day and year.
Unalterable	Not capable of being changed or modified by a User of the RTO System.
Unloaded	In the context of the freight Mode, freight which is not carrying cargo.
Urban Traffic Control	The TTL system developed by IM Traffic Systems and TRL through which traffic signal timings can be controlled remotely, from one or more central computers. On top of the UTC software and hardware on which it runs, the system requires real-time (second-by-second) communications with individual On Street Equipment (classically achieved through the use of public switched telephone network). This is a business critical system responsible for controlling the phase timings of approximately 80% of London's 6300 traffic signals in the most important and densely populated areas within London. It is used by Outcomes Delivery & London Streets Traffic Control Centre (LSTCC) within Road Space Management and operated by IM Traffic Systems.
Urban Traffic Management and	A UK government initiative to standardise the way different components within a traffic management system communicate with each other. Further information can be found here: www.utmc.eu

Control	
User Group	A group of Users with the same RTO System access privileges to fit business roles. These groups will enable a User to have access to the appropriate RTO System capabilities, applications, Components and interfaces suitable for their role.
User	Any individual user of the RTO System and/or the Services as TTL may authorise from time to time, which may include (without limit) the following types of users: LSTCC Coordinators/Supervisors, Corridor Managers, Road Network Performance Modellers/Engineers, Traffic Directorate users and DBAs.
UTC	Urban Traffic Control.
UTMC	Urban Traffic Management and Control.
Vehicle Type	Each of the following vehicle types: car, Taxi, bus, freight, coach.
VISSIM	The Software identified as PTV VISSIM licensed by TfL and/or TTL as described in the Architecture Overview.
Vulnerable User	A subset of any Mode which requires a different level of service compared to the standard supplied for that Mode to safely use Road Network.
WS-Federation	The security protocol and process model with this name.