

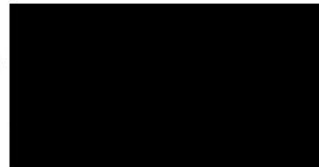


# New Tube for London Sponsor's Remit

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**Approved by** I confirm that this deliverable meets the requirements of the relevant Pathway Product Description and that all consultation comments have been addressed to the satisfaction of consultees.

**Christian Fowler**  
Head of Line Upgrades Sponsorship



21-Oct-16

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## Document History

Revision	Date	Summary of changes
Version 1.0	26/02/2016	First Approved Version
Version 2.0	21/10/2016	Updates following impact assessment outcome to Version 1.0 by the NTfL Programme (refer to Sponsor's Instruction #10).



# Transport for London

## New Tube for London – Sponsor’s Remit

### Table of Contents

<b>1</b>	<b>Programme Definition and Scope</b>	<b>5</b>
1.1	Purpose of this Document	5
1.2	Introduction	5
1.3	Governance	7
1.4	Objectives of the NTfL Programme	7
1.5	Key Exclusions	7
1.6	Key Decisions and Assumptions	7
1.7	Abbreviations	8
1.8	Definitions	8
1.9	Requirements Suite	10
1.9.1	Line Specific Sponsor's Programme Requirements	10
1.9.2	Concept Documentation	10
1.9.3	Strategies and Plans	10
1.10	Other References	11
1.11	Programme Interfaces	12
<b>2</b>	<b>Programme Wide Requirements</b>	<b>14</b>
2.1	NTfL System	14
2.2	Budget	15
2.3	Integration	15
2.4	Sponsor and Programme Communications	16
2.5	NTfL Enabling and Renewals Requirements	18
2.5.1	Train Maintenance and Stabling	18
2.5.2	Engineering Vehicles and Heritage Trains	19
2.5.3	Platform Cooling	21
2.5.4	DC Traction	23
2.6	Design and Implementation Principles	23
2.6.1	General	23
2.6.2	Whole Life Cost	26
2.6.3	Sustainability	28
2.7	Recovery and Reuse of Assets	29
2.8	Operations and Maintenance	30
2.8.1	Command and Control	30
2.8.2	Maintenance	31
2.8.3	Manuals and Training	32



# Transport for London

## New Tube for London – Sponsor’s Remit

---

2.9 Assurance	33
2.10 Customer Acceptance	34
<b>3 List of Consultees</b>	<b>35</b>
<b>4 Future Updates</b>	<b>37</b>



# 1 Programme Definition and Scope

## 1.1 Purpose of this Document

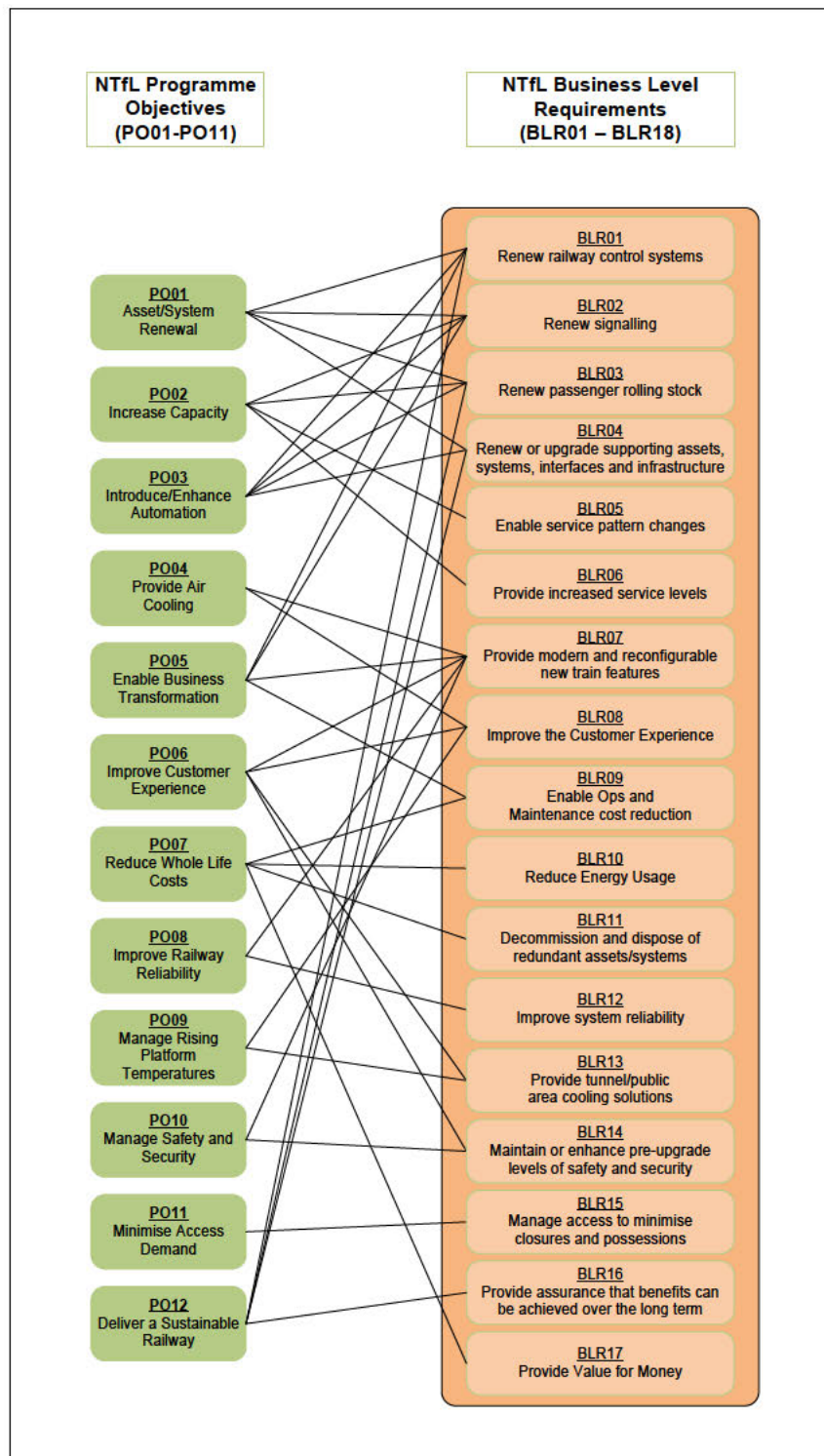
This document dictates what must be delivered by the New Tube for London (NTfL) Programme (hereafter referred to as *the Programme*); this includes any supporting deliverables required by the *Sponsor*.

This document also dictates any processes that must be followed by *the Programme* as well as any other constraints on *the Programme*.

## 1.2 Introduction

The New Tube for London (NTfL) Programme is a key element of the TfL Business Plan. Its purpose is to upgrade and modify the Piccadilly, Central, Bakerloo and Waterloo & City lines to meet the projected passenger demand in the 2020s, 2030s and beyond. It aims to do this via the introduction of new trains and signalling systems to progressively enable more frequent and quicker services, whilst simultaneously improving the customer experience. It also provides a once in a generation opportunity to transform the historic operating and maintenance model on these lines through technology-enabled change.

To do this a set of Programme Objectives have been developed, which are described in the **NTfL Concept and Blueprint** document (see Section 1.10). These objectives are supported by a set of Business Level Requirements (BLRs) shown below:



From these BLRs, flow the delivery requirements provided within this and the NTfL line specific **Sponsor Programme Requirements (SPRs)** referenced within **Section 1.9.1**. The BLRs and the delivery requirements have all been designed to support the **NTfL Business Case** (see Section 1.10) and the predicted benefits within it. As such all delivery requirements are traceable to at least one BLR and hence to strategic outcomes and benefits in the Business Case. These requirements should be delivered by the Programme with the end-user in mind, as such the requirements outlined in this document should be read in conjunction with the documents referenced within **Section 1.9.2**.

In addition, to inform cost and schedule development, as well as some procurement activities, the Programme should also be cognisant of the following additional documentation referenced within **Section 1.9.3**.

### 1.3 Governance

This document has been remitted to the NTfL Programme Engineer who has overall accountability for converting the requirements within the *Sponsors Remit* into Delivery Scope. *The Programme* has accountability to take the Delivery Scope and provide cost, schedule and risk profiles and communicate accordingly.

Reporting on progress of delivery of scope generated from the requirements described in this and associated documents are to be presented to the NTfL Programme Board in line with corporate governance. The NTfL Programme Board has been providing shape and direction to the Programme since 2012. After each Programme Board, a log is updated recording key strategic decisions made. The development of scope should be aware of these decisions accessed on the TfL Document Management System: Reference NTfL-2344.1.1-LUL-REG-00005 (Liveliink Ref: 347555079).

*The Programme* is expected to undertake its activities in line with the **TfL Pathway Process**.

*The Programme* is expected to apply all applicable Standards (including LU Standards); *the Programme* is also expected to monitor any changes to applicable standards and manage the implementation of those changes to *the Programme*.

The content of this document is subject to Change Control following the first approved version. Any updates to this document or its references will be formally communicated to *the Programme* by *the Sponsor*.

### 1.4 Objectives of the NTfL Programme

The high level objectives for the NTfL Programme are detailed within the **NTfL Concept and Blueprint** document (see Section 1.10).

### 1.5 Key Exclusions

The following items are excluded from the NTfL Scope:

GOA4 operation is not required on the interoperable section of the Piccadilly line with the Metropolitan Line due to the incompatibility of the infrastructure that simultaneously serves the S-Stock and NTfL Trains.

GOA4 operation is not required across the whole of the Bakerloo line due to the interoperable section with Network Rail. The Bakerloo Line will be GOA2 only.

Intermediate GOA1 or GOA2 migration stages are not required for the Waterloo and City line.

### 1.6 Key Decisions and Assumptions

In order to develop the requirements provided in this document into scope for delivery, it may be necessary to refer to the register of core decisions that have been agreed or ratified at NTfL Programme Board since the project’s inception. Similarly, key assumptions impacting *the Programme* that should be used when designing solutions to meet the requirements tabled in this document should also be considered. As the Programme Board will continue throughout the delivery phase, this should be considered as a ‘live’ register, with the potential to change. As such, the ‘**Sponsor Assumptions and Decisions Register**’ arising from the NTfL Programme Board, can be accessed on the TfL Document Management System: Reference NTfL-2344.1.1-LUL-REG-00005.





# Transport for London

## New Tube for London – Sponsor’s Remit

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### 1.7 Abbreviations

CAM - Customer Acceptance Manager  
CAT - Customer Acceptance Testing  
CEEQUAL - Civil Engineering Environmental Quality [Assessment and Award Scheme]  
CPD - Capital Programmes Directorate  
CSS - Customer Service Scores  
DRACCT - Directors' Risk, Assurance and Change Control Team  
GOA1 - Grade of Automation 1  
GOA2 - Grade of Automation 2  
GOA4 - Grade of Automation 4  
ICT - Information and Communications Technology  
LU - London Underground  
LUQRA - London Underground Qualitative Risk Assessment  
MTS - Multi-train Simulator  
NTfL - New Tube for London  
OCC - Operational Control Centre  
ORRR - Office of Road and Railway Regulation  
PICU - Piccadilly Line Interim Control Upgrade  
RTM - Remote Track Monitoring  
SPR - Sponsor's Programme Requirements  
TfL - Transport for London  
TPAC - Tunnel and Public Area Cooling  
TVM - Tunnel Ventilation Modelling

### 1.8 Definitions

Terms defined below are denoted within this document using *italics*:

***Concept Documentation:***

Concept documentation as referenced within the **NTfL Concept and Blueprint** document.

***Engineering Vehicles:***

A specialist locomotive or self-propelled vehicle used to undertake or facilitate infrastructure maintenance activities.

***Grade of Automation [#] (GOA[#]):***

Grade of Automation. This is one of five grades (0 to 4) those of which are applicable to NTfL are defined in The Operations and Maintenance Concept (NTfL-2344.1.1-LUL-RPT-00066).





# Transport for London

## New Tube for London – Sponsor’s Remit

---

### **Information and Communications Technology (ICT):**

A suite of data networks and technology that supports/facilitates a System's capabilities; this includes but is not limited to:

- Operational comms
- Security systems
- Data storage and networks
- Customer information systems (audio and visual).

### **NTfL Lines:**

- The Piccadilly line
- The Waterloo and City line
- The Central line
- The Bakerloo line

### **NTfL System:**

The *System* that shall be provided by the *Programme* as part of this *Sponsor’s Remit*.

### **NTfL Trains:**

The new passenger rolling stock that will be procured for the *NTfL Lines*. Note that specific requirements for these trains for each line are detailed within the respective *Sponsor’s Programme Requirements*.

### **[Where] Practicable:**

If "*where practicable*" has been used within a requirement statement, this is a requirement with an acknowledgement by *the Sponsor* that there is a possibility that the cost of implementation versus the benefit may be disproportional. Until a derogation is provided by *the Sponsor*, *the Programme* must meet the respective requirement.

These are still requirements on *the Programme* to deliver, but do not have a critical impact on the output; therefore where it is deemed by *the Programme* that the cost of meeting the requirement is disproportional to the benefits, *the Sponsor* shall be notified via an agreed process with a justification for why it is not in *the Programme’s* best interest to deliver, or deliver fully. *The Sponsor* will decide the most appropriate course of action based on the information provided by *the Programme*.

### **Sponsor’s Programme Requirements (SPR)**

*Sponsor’s Programme Requirements (SPR)* documents contain key output capability requirements for each of the *NTfL Lines*. The *SPR* documents are referenced within **Section 1.9.1**.

### **Sponsor:**

The Client Organisation (including its nominated representatives) to which the outputs defined herein shall be delivered to by *the Programme*.

### **Sponsors Remit:**

This document including the Requirements Suite documentation referenced in **Section 1.9**.

### **System:**

A System is a combination of assets, technology, people and processes that delivers a defined capability to a defined quality.

### **The Programme:**

*The (NTfL) Programme* is responsible for the delivery of the outputs within the defined constraints and to the quality specified herein. The Programme includes all sub-projects including any teams that are sub-contracted by the Programme.

### **User Representative:**

The appointed representative of the end users with respect to Operations and Maintenance.



# Transport for London

## New Tube for London – Sponsor's Remit

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### 1.9 Requirements Suite

This *Sponsor's Remit* comprises of the following documentation which is collectively known as the Requirements Suite:

#### 1.9.1 Line Specific Sponsor's Programme Requirements

##### **Sponsor's Programme Requirements (SPR)**

###### **Piccadilly Line**

Document Reference: NTfL-2344.1.1-LUL-RPT-00057

Livelihood Nickname: 349482682

##### **Sponsor's Programme Requirements (SPR)**

###### **Waterloo and City Line**

Document Reference: NTfL-2344.1.1-LUL-RPT-00059

Livelihood Nickname: 349485768

##### **Sponsor's Programme Requirements (SPR)**

###### **Central Line**

Document Reference: NTfL-2344.1.1-LUL-RPT-00060

Livelihood Nickname: 349482683

##### **Sponsor's Programme Requirements (SPR)**

###### **Bakerloo Line**

Document Reference: NTfL-2344.1.1-LUL-RPT-00062

Livelihood Nickname: 349486435

#### 1.9.2 Concept Documentation

##### **NTfL Operations and Maintenance Concept (OMC)**

Document Number: NTfL-2344.1.1-LUL-RPT-00066

Livelihood Nickname: 349782481

Version 3.0

This is an overarching high level OMC that consists of four 'sub' documents:

- **GOA2 Operational Concept**
- **GOA4 Operational Concept**
- **Fleet and Depots Maintenance Concept**
- **Signalling and Train Control Maintenance Concept**

##### **Customer Concept**

Document Reference: NTfL-2344.1.1-LUL-RPT-00055

Livelihood: 349056650

Version 1.0 – March 2016

##### **Track Plant and Servicing Depot Portfolio**

###### **Operational Concept for On Track Machines / Engineers' Vehicles**

Document Reference: PVEB3071.325670364

Revision 1.0 - May 2014

#### 1.9.3 Strategies and Plans

##### **Rolling Stock Aesthetic Design Brief**

Document Reference: NTfL-2344.3.4-LUL-RPT-00027



# Transport for London

## New Tube for London – Sponsor’s Remit

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Livelihood Reference: 343760761  
Issue 1.0

### **Timetable Migration Plan**

Document Reference: NTfL-2344.1.1-LUL-PLN-00011  
Livelihood Reference: 349207667

### **Stabling Migration Plan**

Document Reference: NTfL-2344.5.12-LUL-PLN-00003  
Livelihood Reference: 348874320

### **Redundant Asset Strategy**

Document Reference: NTfL-2344.1.1-LUL-PLN-00013  
Livelihood Reference: 350089192

## 1.10 Other References

### **NTfL Business Case**

DTP-UIP1973-1.1-RPT-00021  
Issued 2013

### **Piccadilly Line Business Case**

NTfL-2344-1.1-LUL-RPT-00015  
Issued October 2015

### **NTfL Programme Concept and Blueprint**

Document Number: NTfL-2344.2.2-LUL-RPT-00035-01  
Livelihood Reference: 348802987  
Version: 1.0

### **NTfL Sponsor Assumptions and Decisions Register**

Document Number: NTfL-2344.1.1-LUL-REG-00005  
Livelihood Reference: 347555079  
Live Document.

### 1.11 Programme Interfaces

This section summarises the projects that are not part of the NTfL authority but are being funded from elsewhere and may impact on delivering the NTfL business benefits. Some of the projects in this table may either directly or indirectly impact the delivery of requirements provided in this document. This list is correct at the time of writing and is based on the 2015/16 Business Plan: [http://luintranet.tfl/about\\_lu/Strategy\\_planning/12086.html](http://luintranet.tfl/about_lu/Strategy_planning/12086.html).

#### **Four Lines Modernisation (4LM) (formerly SUP)**

Sponsor: Major Programme Sponsorship; S&SD  
Delivery Unit: Capital Programmes Directorate, LU

#### **Station Congestion Relief/Station Upgrade (e.g. Holborn, Bond Street, Bank (including Bank W&C entrance), Elephant & Castle)**

Sponsor: Major Programme Sponsorship; S&SD  
Delivery Unit: Capital Programmes Directorate, LU

#### **Crossrail (Interface Works, Infrastructure Protection, CR2 Operational Planning)**

Sponsor: Major Programme Sponsorship; S&SD  
Delivery Unit: Capital Programmes Directorate, LU

#### **Step Free Access Programme**

Sponsor: Major Programme Sponsorship; S&SD  
Delivery Unit: Capital Programmes Directorate, LU

#### **Power and Cooling Upgrades**

Sponsor: Asset Investment Sponsorship; S&SD  
Delivery Unit: Capital Programmes Directorate, LU

#### **Track & Drainage Renewals**

Sponsor: Asset Investment Sponsorship; S&SD  
Delivery Unit: Capital Programmes Directorate, LU

#### **Interim Piccadilly Line Control Upgrade (PICU)**

Sponsor: Asset Investment Sponsorship; S&SD  
Delivery Unit: Capital Programmes Directorate, LU

#### **Automatic Track Monitoring System (ATMS)**

Sponsor: Asset Investment Sponsorship; S&SD  
Delivery Unit: Capital Programmes Directorate, LU

#### **Information Communications Telecoms (ICT) Transformation (e.g. Railway Information Systems, Network Infrastructure & Data Storage, Railway Operational Systems)**

Sponsor: Asset Investment Sponsorship; S&SD  
Delivery Unit: Capital Programmes Directorate, LU

#### **Predict and Prevent Maintenance Strategy Transformation**

Sponsor: Asset Investment Sponsorship; S&SD  
Delivery Unit: Asset Performance; Operations, LU

#### **Track Grinding and Tamping Programme**

Sponsor: Asset Investment Sponsorship; S&SD  
Delivery Unit: Asset Performance; Operations, LU



# Transport for London

## New Tube for London – Sponsor's Remit

---

### **Delivering a Sustainable Business**

Sponsor: HSE

Delivery Unit: S&SD, CPD & COO

### **Fit for the Future Stations Programme**

Sponsor: Customer Service Transformation, S&SD

Delivery Unit: Operations, LU

### **Night Tube**

Sponsor: Business Change; S&SD

Delivery Unit: S&SD, Operations LU

### **London Road Depot over-site development**

Sponsor: TfL Commercial Development

Delivery Unit: Not in delivery at time of writing

### **Bakerloo Line extension (South of Elephant & Castle)**

Sponsor: TfL Planning

Delivery Unit: Not in delivery at time of writing

### **C4 (Railway Control Strategy)**

Sponsor: Asset Performance; Operations, LU

Delivery Unit: Not in delivery at time of writing

### **Earls Court Re-development**

Sponsor: TfL Commercial Development

Delivery Unit: [TBD]

## 2 Programme Wide Requirements

### 2.1 NTfL System

Requirement	Rationale	Business Level Trace
<p><i>The Programme shall deliver a System (hereafter referred to as the NTfL System) that meets the Sponsor’s Programme Requirements.</i></p> <p>SR-24</p>	<p>These are key outputs of the NTfL Programme.</p> <p>Note that <i>BLR04 - Renew or upgrade supporting assets, systems, interfaces, and infrastructure</i> is captured as Programme Wide requirements within this Remit.</p>	<p>BLR 01 - Renew Railway Control Systems</p> <p>BLR 02 - Renew Signalling</p> <p>BLR 03 - Renew Passenger Rolling Stock</p> <p>BLR 05 - Enable Service Pattern Changes</p> <p>BLR 06 - Provide Increased Service Levels</p> <p>BLR 07 - Provide Modern and Reconfigurable New Train Features</p> <p>BLR 08 - Improve Customer Experience</p> <p>BLR 09 - Enable Ops and Maintenance Cost Reduction</p> <p>BLR 10 - Reduce Energy Usage</p> <p>BLR 11 - Decommission and Dispose of Redundant Assets / Systems</p> <p>BLR 12 - Improve System Reliability</p> <p>BLR 13 - Provide Tunnel / Public Area Cooling Solutions</p> <p>BLR 14 - Maintain or Enhance Pre-upgrade Levels of Safety and Security</p> <p>BLR 15 - Manage Access to Minimise Closures and Possessions</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p> <p>BLR 17 - Provide Value for Money</p>



# Transport for London

## New Tube for London – Sponsor’s Remit

Requirement	Rationale	Business Level Trace
<p><i>The Programme</i> shall develop user requirements in collaboration with the <i>User Representative</i> and provide the necessary capabilities that support the <b>Concept Documentation</b> for all <i>NTfL Lines</i>.</p> <p><b>SR-25</b></p>	<p>The Programme must provide a system that meets the Operators', Maintainers' and Customers' needs.</p>	<p>BLR 08 - Improve Customer Experience</p> <p>BLR 09 - Enable Ops and Maintenance Cost Reduction</p>
<p>The <i>Programme</i> shall develop Scope for the migration of the <i>NTfL Lines</i> from present state to final state and manage implementation.</p> <p><b>SR-59</b></p>	<p>It is deemed a least risk approach to delivering a major change to a live railway.</p>	<p>BLR 12 - Improve System Reliability</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p> <p>BLR 17 - Provide Value for Money</p>

## 2.2 Budget

Requirement	Rationale	Business Level Trace
<p><i>The Programme</i> shall deliver the upgrade within its authorised budget.</p> <p><b>SR-320</b></p>	<p>To remain within the bounds of the NTfL Business Case.</p>	<p>BLR 17 - Provide Value for Money</p>
<p><i>The Programme</i> shall provide the necessary supporting resource and information to the Sponsor should any changes to this authority be required.</p> <p><b>SR-38</b></p>	<p>To ensure that a positive business case can be protected.</p>	<p>BLR 17 - Provide Value for Money</p>

## 2.3 Integration

Requirement	Rationale	Business Level Trace
<p><i>The Programme</i> shall manage System Integration of the <i>NTfL System</i>.</p> <p><b>SR-75</b></p>	<p>It is recognised that System Integration of a Programme this size is necessary to minimise risk.</p>	<p>BLR 12 - Improve System Reliability</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p> <p>BLR 17 - Provide Value for Money</p>



# Transport for London

## New Tube for London – Sponsor’s Remit

Requirement	Rationale	Business Level Trace
<p><i>The Programme shall manage the integration of the NTfL System with the wider LU and TfL Programmes.</i></p> <p><b>SR-76</b></p>	<p>TfL has complex, multi-billion pound investment programme which should be integrated. By considering each programme (including NTfL) as a silo, there is increased risk of ‘undoing’ others work and/or having the work of NTfL undone.</p>	<p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p><b>Supplementary Information for SR-76:</b> <i>The design and introduction of all new systems shall complement other transformation programmes within TfL as listed within Section 1.11.</i></p>		

## 2.4 Sponsor and Programme Communications

Requirement	Rationale	Business Level Trace
<p><i>The Programme shall develop, implement and manage a process for the Sponsor to issue requirements changes to this Sponsor’s Remit and/or its attachments.</i></p> <p><b>SR-90</b></p>	<p>This allows scope to be added or removed to provide improved value for money and business case.</p>	<p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p> <p>BLR 17 - Provide Value for Money</p>
<p><b>Supplementary Information for SR-90:</b> <i>This shall include a review, impact assessment and approval process.</i></p>		
<p><i>The Programme shall notify the Sponsor immediately via an agreed process if any of the requirements within the Sponsor’s Remit or any of the Sponsor’s Programme Requirements cannot be met by the Programme.</i></p> <p><b>SR-131</b></p>	<p>This allows scope to be added or removed to provide improved value for money and business case.</p>	<p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p> <p>BLR 17 - Provide Value for Money</p>
<p><i>The Programme shall notify the Sponsor immediately via an agreed process if any of the requirements within this Sponsor’s Remit and/or its attachments have not been understood, are conflicting, or are ambiguous.</i></p> <p><b>SR-92</b></p>	<p>Clarity on requirements aims to help with focus on programme delivery to cost and time. The Sponsor can assist where there may be ambiguity of intent or costs to deliver emerge to be inconsistent with the value to be gained.</p>	<p>BLR 17 - Provide Value for Money</p>

# Transport for London

## New Tube for London – Sponsor’s Remit

Requirement	Rationale	Business Level Trace
<p><i>The Programme shall notify the Sponsor immediately via an agreed process if the Programme believes that any of requirements within this Sponsor’s Remit offers a disproportional benefit to the cost of implementation and/or maintenance.</i></p> <p><b>SR-93</b></p>	<p>This allows scope to be added or removed to provide improved value for money and business case.</p>	<p>BLR 17 - Provide Value for Money</p>
<p><i>The Programme shall notify the Sponsor immediately via an agreed process if the Programme believes the scope of delivery is unclear or ambiguous with respect to interfaces with other pan-TfL programmes or projects.</i></p> <p><b>SR-94</b></p>	<p>Removal of uncertainty aims to help with focus on programme delivery to cost and time. The Sponsor can assist where there may be accountability ambiguity with another programme.</p>	<p>BLR 17 - Provide Value for Money</p>
<p><i>The Programme shall notify the Sponsor immediately via an agreed process if there are any opportunities to renew life expired or non-compliant assets as part of the Programme if it would be more cost effective than renewing as part of a free-standing project.</i></p> <p><b>SR-95</b></p>	<p>This allows scope to potentially be added where there is a value for money case for the wider LU business.</p>	<p>BLR 17 - Provide Value for Money</p>
<p><b>Supplementary Information for SR-95:</b> <i>The Programme is not expected to <u>actively</u> undertake surveys or other work to identify life expired or non-compliant assets.</i></p>		



### 2.5 NTfL Enabling and Renewals Requirements

#### 2.5.1 Train Maintenance and Stabling

Requirement	Rationale	Business Level Trace
<p><i>The Programme</i> shall provide any updates to train maintenance facilities that are necessary to undertake the maintenance activities of the <i>NTfL Trains</i> for each of the <i>NTfL Lines</i> for the duration of their specified design lives.</p> <p><b>SR-177</b></p>	<p>Adequate train maintenance is paramount to delivering a safe and reliable service, as expected by the customer and accounted for within the business case.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 12 - Improve System Reliability</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p><b>Supplementary Information for SR-177:</b> <i>This includes planned and reactive maintenance as well as the mid-life refurbishment.</i></p>		
<p><i>The Programme</i> shall not impede the ability for legacy train maintenance to continue during the introduction of the <i>NTfL Trains</i>.</p> <p><b>SR-243</b></p>	<p>Adequate train maintenance is paramount to delivering a safe and reliable service, as expected by the customer and accounted for within the business case.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 12 - Improve System Reliability</p>
<p><b>Supplementary Information for SR-243:</b> <i>This is not applicable to the legacy Waterloo and City Line trains.</i></p>		
<p><i>The Programme</i> shall provide sufficient stabling capacity to support the total number of <i>NTfL Trains</i> for the respective <i>NTfL Lines</i>.</p> <p><b>SR-179</b></p>	<p>Stabling required to support the increased fleet numbers and operational need.</p> <p>Stabling Migration Plan: Document Reference: NTfL-2344.5.12-LUL-PLN-00003.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 06 - Provide Increased Service Levels</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p>Where aspects of Train Maintenance Facilities do not meet current standards (LU or otherwise) <i>the Programme</i> shall undertake the works necessary to bring those facilities in line with the respective standards.</p> <p><b>SR-242</b></p>	<p>Depots buildings and infrastructure are in general poor condition, the opportunity should be taken to rectify this.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 14 - Maintain or Enhance Pre-upgrade Levels of Safety and Security</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>

### 2.5.2 Engineering Vehicles and Heritage Trains

Where references to the **Engineering Vehicles** are made, the forecast fleet with availability and compatibility shall be as per the table below (SR-317):

Engineering Vehicles	Fleet Size	Available from	Compatibility			
			Picc	Bak	Cen	W&C
Battery Loco (1)	29	Today	29	29	18	0
Schoma Loco	14	Today	14	14	0	0
07 Tamper	1	Today	1	1	1	0
08 Tamper	1	Today	1	1	1	0
B45 Tamper	2	Today	2	0	2	0
Overnight BTR machine	3	2020	3	0	3	0
Asset Inspection Train / Track Recording Vehicle	1	2017	1	1	1	0
Rail re-profiling machines	3	2020	3	3	3	0
Rail Adhesion trains (2)	4	Today	2	0	2	0

Early assessment of physical space on the **Engineering Vehicles** within this table has concluded that there are or will be constraints for some vehicle types such that new signalling equipment cannot be fitted. An unmitigated result of this would have serious implications for the ongoing operations and maintenance of the deep tube network.

Whilst the outcome requirements in this section remain valid, deliverability for those vehicles identified as space constrained will undergo a Sponsor-funded study to be concluded in advance of the Signals and Control Systems contract award. In the meantime, the requirements in this section can be considered as ‘pending’ until the feasibility study concludes. Once the outcome is known the requirements in this section will be confirmed. In the interim period, the Programme should assume that all **Engineering Vehicle** types can be fitted with Signals and Control Systems equipment.

#### Notes regarding Engineering Vehicles and Heritage Trains:

- (1) Although the battery loco fleet may be replaced, the fleet size is expected to remain at 29.
- (2) Strategy for Picc/Central line rail adhesion trains under NTfL is not yet clear. This table assumes no change from today ie converted legacy 62TS Sandite trains for deep tube application.

ATP installations should be assumed to be on the principle of a multiple signalling backbone to minimise the level of complexity and reduce the duplication of on-board wiring/systems.

At the NTfL Programme Board (No 60) held on 10<sup>th</sup> August 2016, it was confirmed that **heritage trains** will remain out of scope for ATP fitment.

Heritage Vehicle operation is constrained to the 23km of fast Metropolitan line between Harrow on the Hill and Amersham (as traditional signalling and train-stop protection will remain to allow Chiltern trains to operate). Therefore retention of access for heritage vehicles located at Acton Museum and Ruislip depot such that they can transfer to the Metropolitan line is required. Stabling for heritage vehicles is to be retained at Ruislip Depot in conditions comparable to pre-upgrade, i.e. covered stabling where it currently exists.



Requirement	Rationale	Business Level Trace
<p><i>The Programme shall provide the necessary updates to Engineering Vehicles to allow them to continue to be deployed and operated safely on the NTFL Lines at end state and during migration.</i></p> <p><b>SR-119</b></p>	<p>Engineering Vehicles are needed to maintain safety and reliability levels across the LU Network.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 12 - Improve System Reliability</p> <p>BLR 14 - Maintain or Enhance Pre-upgrade Levels of Safety and Security</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p><b>Supplementary Information for SR-119:</b> <i>This may involve installing new Automatic Train Protection (ATP) equipment (possibly alongside 4LM and other ATP systems) on Engineering Vehicles and ensuring that paths between respective depots and other lines are retained.</i></p>		
<p><i>The Programme shall ensure that (manned) Engineering Vehicles retain the ability to safely operate in a GOA4 (un-manned) environment where applicable.</i></p> <p><b>SR-258</b></p>	<p>The mix of unattended stock moves in GOA4 with an attended Engineering Vehicle is foreseen.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 12 - Improve System Reliability</p> <p>BLR 14 - Maintain or Enhance Pre-upgrade Levels of Safety and Security</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p><b>Supplementary Information for SR-258:</b> <i>Where this is a train maintenance environment, train maintenance operational capability must be safeguarded.</i></p>		
<p>The capability for overnight stabling of Engineering Vehicles on the NTFL lines shall be retained.</p> <p><b>SR-293</b></p>	<p>To support the Engineering Vehicle capability.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 12 - Improve System Reliability</p> <p>BLR 14 - Maintain or Enhance Pre-upgrade Levels of Safety and Security</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p><b>Supplementary Information for SR-293:</b> <i>This includes the ability to stable at platforms.</i></p>		

# Transport for London

## New Tube for London – Sponsor’s Remit

Requirement	Rationale	Business Level Trace
<p>NTfL Signalling/Automatic Train Protection (ATP) systems installed shall be compatible with, and not interfere with, the operation of existing legacy ATP equipment fitted for operation over other lines.</p> <p><b>SR-294</b></p>	<p>As a proportion of the Engineering Vehicles are not dedicated to a specific line, they are required to operate under several signalling regimes.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 12 - Improve System Reliability</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p><i>The Programme</i> shall make suitable provision with suppliers to facilitate the fitment of ATP equipment to future <i>Engineering Vehicles</i> (at LU's expense) should the need arise.</p> <p><b>SR-335</b></p>	<p>A mechanism is needed to allow new vehicle projects to estimate the costs of ATP fitment with certainty (eg for a future Tunnel Cleaning Train or other On-Track Vehicles).</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p>The <i>Engineering Vehicles</i> shall be capable of operation during GOA4 traffic hours including the undertaking of line transfers as defined within the <b>Engineering Vehicles Concept</b>.</p> <p><b>SR-295</b></p>	<p>To minimise the impact to the business of a loss of railway functionality.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 12 - Improve System Reliability</p> <p>BLR 14 - Maintain or Enhance Pre-upgrade Levels of Safety and Security</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>

### 2.5.3 Platform Cooling

Requirement	Rationale	Business Level Trace
<p>Where the average evening peak platform temperature is predicted by the TVM to exceed 30°C, <i>the Programme</i> shall present TPAC infrastructure options to remove residual heat, based upon a local safety risk assessment, to <i>the Sponsor</i> for consideration.</p> <p><b>SR-264</b></p>	<p>Managing rising tunnel temperatures is an agreed programme objective; however, value for money needs to be considered in this case.</p>	<p>BLR 08 - Improve Customer Experience</p> <p>BLR 13 - Provide Tunnel / Public Area Cooling Solutions</p> <p>BLR 17 - Provide Value for Money</p>
<p><b>Supplementary Information for 264:</b> <i>Open air platforms are excluded from these requirements.</i></p>		
<p><b>Supplementary Information for 264:</b> <i>The Tunnel Ventilation Model (TVM) is owned and maintained by the Systems Performance Engineering team within CPD.</i></p>		



# Transport for London

## New Tube for London – Sponsor's Remit

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Requirement	Rationale	Business Level Trace
<i>Supplementary Information for 264: The predicted UKCP09 external design temperature to be employed in the TVM is the '2030 Med 50' value of 27.3°C.</i>		



### 2.5.4 DC Traction

Requirement	Rationale	Business Level Trace
<p><i>The Programme</i> shall replace all LU owned lead and aluminium covered DC traction feeder cables.</p> <p><b>SR-285</b></p>	<p>These cables are in poor condition across the NTfL network. The opportunity to replace them whilst upgrading the DC supply should be taken.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 12 - Improve System Reliability</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p> <p>BLR 17 - Provide Value for Money</p>
<p><i>Supplementary Information for SR-286: Network Rail may own some DC traction feeder cables on the interoperable section of the Bakerloo line.</i></p>		
<p><i>The Programme</i> shall update DC Traction Systems where necessary such that they fail in a safe manner in the event of a failure (including overload).</p> <p><b>SR-299</b></p>	<p>A number of existing circuit breakers are in poor condition across the NTfL network.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 12 - Improve System Reliability</p> <p>BLR 14 - Maintain or Enhance Pre-upgrade Levels of Safety and Security</p>

## 2.6 Design and Implementation Principles

### 2.6.1 General

Requirement	Rationale	Business Level Trace
<p><i>The Programme</i> shall ensure that the safety risk of the railway during migration or after end state shall not be any worse compared with the Pre-upgrade LU Corporate Qualitative Risk Assessment (LUQRA).</p> <p><b>SR-81</b></p>	<p>Requirement of the ORRR.</p> <p>LUQRA Update 2014.02 - HSE/SRA/14/08 as of Feb 2016.</p>	<p>BLR 14 - Maintain or Enhance Pre-upgrade Levels of Safety and Security</p>
<p><i>The Programme</i> shall deliver the same <i>Systems</i> across the <i>NTfL Lines</i> where practicable.</p> <p><b>SR-97</b></p>	<p>Uniformity of assets and systems maximises maintenance and operational efficiency in terms of processes, organisational structure, training needs and spares holdings etc.</p>	<p>BLR 09 - Enable Ops and Maintenance Cost Reduction</p> <p>BLR 17 - Provide Value for Money</p>

# Transport for London

## New Tube for London – Sponsor’s Remit

Requirement	Rationale	Business Level Trace
<b>Supplementary Information for SR-97:</b> For the NTfL Train this includes standard items across all lines such as traction packages, brake systems, door modules, gangways and cab-controls.		
<p>The Programme shall deliver System(s) that can be operated and maintained in the same way across the NTfL Lines where practicable.</p> <p><b>SR-98</b></p>	<p>Uniformity of assets and systems maximises maintenance and operational efficiency in terms of processes, organisational structure, training needs and spares holdings etc.</p>	<p>BLR 09 - Enable Ops and Maintenance Cost Reduction</p> <p>BLR 17 - Provide Value for Money</p>
<p>The Programme shall follow the guidance provided in the <b>Aesthetic Design Brief – NTfL-2344.3.4-LUL-RPT-00027</b> with respect to the NTfL Train design.</p> <p><b>SR-100</b></p>	<p>Aesthetic Design Brief provides aspirations to maintain NTfL's Design Vision.</p>	<p>BLR 03 - Renew Passenger Rolling Stock</p> <p>BLR 07 - Provide Modern and Reconfigurable New Train Features</p> <p>BLR 08 - Improve Customer Experience</p>
<p>The Programme shall deliver a System to preserve the operational life of train wheelsets and running rails.</p> <p><b>SR-256</b></p>	<p>Rolling Contact Fatigue (RCF) can lead to catastrophic failure of either the wheelset or the running rail. The ability to manage the wheel-rail interface is essential to supporting the operation of a safe railway.</p>	<p>BLR 14 - Maintain or Enhance Pre-upgrade Levels of Safety and Security</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p>The Programme shall prioritise functional and performance requirements above those relating to aesthetics where conflicts arise between them ensuring that the design intent is upheld where practicable.</p> <p><b>SR-111</b></p>	<p>The rolling stock Aesthetic Design Brief (NTfL-2344.3.4-LUL-RPT-00027) provides guidance that may need to be compromised to deliver the required functions of the train. This example could be expanded to our systems.</p>	<p>BLR 17 - Provide Value for Money</p>
<p>The Programme shall ensure that materials procured by the Programme are climate and season change resistant where applicable.</p> <p><b>SR-102</b></p>	<p>Provides value for money over the long term and promotes whole life cost.</p>	<p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p> <p>BLR 17 - Provide Value for Money</p>
<p>The Programme shall seek opportunities to deliver capabilities and benefits earlier than specified and report back to the Sponsor for consideration.</p> <p><b>SR-103</b></p>	<p>Aims to find opportunities to improve the Business Case.</p>	<p>BLR 17 - Provide Value for Money</p>



# Transport for London

## New Tube for London – Sponsor’s Remit

Requirement	Rationale	Business Level Trace
<p><b>Supplementary Information for SR-103:</b> For example, it is desirable to deliver new rolling stock as early as possible to realise capacity benefits earlier.</p>		
<p>The Programme shall manage access requirements such that railway closures and possessions are minimised without disproportionately increasing delivery costs.</p> <p><b>SR-189</b></p>	<p>The disruption caused by railway closures (even if planned) will damage reputation. However, it is recognised that some closures may be needed for certain activities, and/or delivery costs can increase due to prolongation impacts.</p>	<p>BLR 15 - Manage Access to Minimise Closures and Possessions</p>
<p>The Programme shall maintain a watch on emerging PTI technologies that can enable an interoperable GOA4 service with other non-automated lines and inform the Sponsor if a safe, economical and capable solution is available for consideration.</p> <p><b>SR-329</b></p>	<p>Such a solution may also provide a major cost reduction for a wider application of GOA4 and substantially improve the business case.</p>	<p>BLR 17 - Provide Value for Money</p>
<p><b>Supplementary Information for SR-329:</b> It is the aspiration of the Sponsor to operate GOA4 services along the interoperable section of the Metropolitan line in the future; at present it is understood that it is not feasible to do this due to constraints of current PTI technology. This technology may also be transferrable to other NTfL platforms to provide a more economical PTI solution generally and/or to enable a GOA4 service across the Bakerloo Line.</p>		
<p>The Programme shall ensure that the required service levels for the respective NTfL Lines can reliably be delivered in all expected climate and weather conditions.</p> <p><b>SR-343</b></p>	<p>Leaf fall and ice snow conditions are known service reliability issues.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 12 - Improve System Reliability</p>
<p>The Programme shall ensure that designs for the respective NTfL Lines either preserve or enhance performance delivered at the previous Key Benefit Stage.</p> <p><b>SR-344</b></p>	<p>This is to prevent performance dips between Key Benefit Stages.</p>	<p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>

### 2.6.2 Whole Life Cost

Requirement	Rationale	Business Level Trace
<p>When designing for capacity uplifts <i>the Programme</i> shall progress opportunities to optimise/rationalise infrastructure such as to reduce whole life cost provided that such rationalisations do not remove capabilities needed by the Operators or Maintainers.</p> <p><b>SR-233</b></p>	<p>By optimising and rationalising infrastructure, operational and maintenance costs should be reduced whilst improving reliability.</p>	<p>BLR 04 - Renew or Upgrade Supporting Assets, Systems, Interfaces and Infrastructure</p> <p>BLR 09 - Enable Ops and Maintenance Cost Reduction</p> <p>BLR 12 - Improve System Reliability</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p><i>The Programme</i> shall select Commercial Off the Shelf (COTS) products / components of a proven product range <i>where practicable</i> and economical.</p> <p><b>SR-99</b></p>	<p>Standardisation provides whole life cost benefits such as spares rationalisation, operator consistency, reduction in maintenance skillsets and training demand.</p> <p>COTS equipment drives a competitive market and lower cost to the business.</p>	<p>BLR 09 - Enable Ops and Maintenance Cost Reduction</p> <p>BLR 17 - Provide Value for Money</p>
<p><i>The Programme</i> shall select equipment that is consistent with LU’s existing equipment inventory <i>where practicable</i> and where economical.</p> <p><b>SR-191</b></p>	<p>Uniformity of assets and systems maximises maintenance and operational efficiency in terms of processes, organisational structure, training needs and spares holdings etc.</p>	<p>BLR 09 - Enable Ops and Maintenance Cost Reduction</p> <p>BLR 17 - Provide Value for Money</p>
<p>Where <i>the Programme</i> is constructing new structures, they shall be low carbon and net energy neutral.</p> <p><b>SR-333</b></p>	<p>It is recognised that the demolition and disposal of building material adds to the carbon footprint of the Programme that needs to be offset.</p> <p>TfL aim to reduce energy costs.</p>	<p>BLR 10 - Reduce Energy Usage</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>

# Transport for London

## New Tube for London – Sponsor’s Remit

Requirement	Rationale	Business Level Trace
<p>The Programme shall provide technology based capability to increase third party revenue streams (e.g. digital advertising on the new train fleets).</p> <p>SR-345</p>	<p>Advertising revenues on legacy trains are derived from sponsored, removable ‘car cards’ with a labour-intensive maintenance regime. The opportunity now exists to digital display screen technology to provide a more dynamic and flexible advertising medium with ease of software updates to expand revenues and reduce whole life cost.</p>	<p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p> <p>BLR 17 - Provide Value for Money</p>



# Transport for London

## New Tube for London – Sponsor’s Remit

### 2.6.3 Sustainability

Requirement	Rationale	Business Level Trace
<p>The Programme shall achieve a minimum 'Whole Team' CEEQUAL Award level of 'Very Good' for civil engineering projects where scope allows.</p> <p><b>SR-105</b></p>	<p>TfL Management System: CEEQUAL - Detailed information for TfL and our Contractors - G1921 - Issue A1 (Nov 2015)</p>	<p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p><b>Supplementary information for SR-105:</b> CEEQUAL (Civil Engineering Environmental Quality Scheme) applies when either the estimated total civils cost within a project exceeds £50m or the contractor’s estimated civils costs exceed £25m.</p>		
<p>Where applicable, The Programme shall undertake a CEEQUAL pre-assessment scoping exercise using the CEEQUAL online assessment tool and report back the findings to the Sponsor.</p> <p><b>SR-226</b></p>	<p>TfL Management System: CEEQUAL - Detailed information for TfL and our Contractors - G1921 - Issue A1 (Nov 2015)</p> <p>This enables the Programme to understand the potential level of award that is achievable given the nature of the scheme.</p>	<p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p><b>Supplementary information for SR-226:</b> The CEEQUAL online assessment tool can be found at <a href="http://www.ceequal.com/online_assessment_tool.html">http://www.ceequal.com/online_assessment_tool.html</a>.</p>		
<p>The Programme shall incorporate energy efficient measures into the design of new train maintenance facilities where practicable.</p> <p><b>SR-183</b></p>	<p>TfL aims to be sustainable and financially self supporting; reducing energy costs contributes towards this.</p>	<p>BLR 10 - Reduce Energy Usage</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p><b>Supplementary information for SR-183:</b> This includes solutions such as renewable energy sources such as photovoltaic panels.</p>		
<p>The Programme shall use the LU Comprehensive Flood Risk Assessment to inform the design of the NTfL System.</p> <p><b>SR-84</b></p>	<p>This aims to promote a whole life approach to systems operation in light of forecast extreme weather including flooding.</p>	<p>BLR 17 - Provide Value for Money</p>

### 2.7 Recovery and Reuse of Assets

Requirement	Rationale	Business Level Trace
<p><i>The Programme shall decommission any asset made redundant by the Programme such as to eliminate any unsafe conditions.</i></p> <p><b>SR-85</b></p>	<p>This aims to balance whole life cost with risk. Even if an asset is decommissioned it may still have a maintenance schedule e.g. a signal gantry may not house any operational signalling equipment (post NTfL), and hence be redundant, but it may be disproportionately costly to remove versus the cost of periodic structural inspection related maintenance.</p>	<p>BLR 11 - Decommission and Dispose of Redundant Assets / Systems</p> <p>BLR 14 - Maintain or Enhance Pre-upgrade Levels of Safety and Security</p>
<p><i>The Programme shall present an appraisal of redundant assets/system removal or retention costs and associated safety impacts, highlighting the most cost effective option and making a recommendation to the asset maintainer and the Sponsor prior to delivery.</i></p> <p><b>SR-248</b></p>	<p>To ensure that the best option can be pursued.</p>	<p>BLR 17 - Provide Value for Money</p>
<p><i>Supplementary information for SR-248: Where the recommended option is not the most cost effective, rationale shall also be presented.</i></p>		
<p><i>Supplementary information for SR-248: Where the recommended option is to retain redundant assets in situ, the Programme shall present the lifetime resource and cost implications.</i></p>		
<p><i>Supplementary information for SR-248: This appraisal is recommended to be undertaken in collaboration with the maintenance organisation.</i></p>		
<p>Where identified redundant assets are to be removed, an outline plan shall be produced by the Programme indicating the methodology, cost and timing of the proposed recovery.</p> <p><b>SR-247</b></p>	<p>This allows plans to be put in place to stop maintenance activities.</p>	<p>BLR 09 - Enable Ops and Maintenance Cost Reduction</p> <p>BLR 17 - Provide Value for Money</p>
<p><i>The Programme shall offer redundant assets, that are planned to be recovered, back to the business.</i></p> <p><b>SR-251</b></p>	<p>To compliment spares where there is a risk of obsolescence on other LU lines.</p>	<p>BLR 09 - Enable Ops and Maintenance Cost Reduction</p>



Requirement	Rationale	Business Level Trace
Where redundant assets are to be removed <i>the Programme</i> shall determine the residual value of redundant assets and recover net revenue for the business <i>where practicable</i> .  <b>SR-252</b>	TfL aims to be financially self-supporting; reducing whole life cost across the organisation contributes towards this.	BLR 17 - Provide Value for Money

## 2.8 Operations and Maintenance

### 2.8.1 Command and Control

*Information: The location of the control room(s) will be determined by the Operations Team and formally communicated to the Programme via the Sponsor. The Programme may need to liaise with the Operations Team and the Sponsor to facilitate discussions regarding location options.*

Requirement	Rationale	Business Level Trace
The <i>NTfL lines</i> shall be operated from a single Operational Control Centre (OCC).  <b>SR-290</b>	This supports a whole life system approach to control of all NTfL lines.	BLR 01 - Renew Railway Control Systems  BLR 09 - Enable Ops and Maintenance Cost Reduction  BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term  BLR 17 - Provide Value for Money
<i>The Programme</i> shall provide the required functionality necessary for LU staff to operate the <i>NTfL System</i> in line with the <b>Concept Documentation</b> .  <b>SR-114</b>	To support Operations.	BLR 09 - Enable Ops and Maintenance Cost Reduction  BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term  BLR 17 - Provide Value for Money
<i>The Programme</i> shall provide a capability to safely operate the lines controlled from the NTfL OCC in the event of it becoming unavailable.  <b>SR-291</b>	To support Operations in the event of loss of the OCC.	BLR 14 - Maintain or Enhance Pre-upgrade Levels of Safety and Security

# Transport for London

## New Tube for London – Sponsor’s Remit

Requirement	Rationale	Business Level Trace
<p><i>The Programme</i> shall put in place obsolescence plans for each line such that new control centre equipment can be expected to be operational for not less than <b>40 (forty) years</b> following the commissioning of new signalling on the last NTfL line.</p> <p><b>SR-255</b></p>	Supports the benefit timeframe within the Business Case.	BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term
<p>Obsolescence plans shall be put in place such that the design life of <i>ICT</i> equipment needed to support GOA4 operation is not less than <b>40 (forty) years</b> from the last commissioned GOA4 line.</p> <p><b>SR-316</b></p>	Supports the benefit timeframe within the Business Case.	BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term
<p>Command and control systems within the OCC for the <i>NTfL Lines</i> shall be capable of being relocated to another facility with no service impact at a time during the anticipated 40 year life of the assets.</p> <p><b>SR-292</b></p>	Complements the potential C4 strategy owned by COO.	BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term

### 2.8.2 Maintenance

Requirement	Rationale	Business Level Trace
<p><i>The Programme</i> shall inform LU Maintenance of any updates that need to be made to the asset data within TfL Maintenance Management Systems in a format and within a timescale to be agreed with the Maintainers.</p> <p><b>SR-121</b></p>	Amending Ellipse/Maximo will stop maintenance scheduled tasks being auto-generated, and hence stop unnecessary maintenance being performed. This will save labour and material cost, and allow greater focus on ‘live’ assets/systems.	BLR 09 - Enable Ops and Maintenance Cost Reduction BLR 17 - Provide Value for Money
<p><b>Supplementary Information for SR-121:</b> Maintenance Management systems include systems such as <i>Ellipse</i> and <i>Maximo</i>.</p>		



# Transport for London

## New Tube for London – Sponsor’s Remit

Requirement	Rationale	Business Level Trace
<p><i>The Programme</i> shall ensure the availability of spares and the capability for maintaining assets for the defined design lives of new <i>NTfL Systems</i>.</p> <p>SR-122</p>	<p>Initial spares holdings for new assets/systems introduced to LUL are a capital expense. These should be agreed via maintenance readiness plans, and supplied to COO prior to handover.</p> <p>For assets/systems such as PEDs, whole life maintenance of may require overhaul for which equipment to replace them may be required, however it may be a better whole life cost arrangement to outsource this.</p>	<p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>

### 2.8.3 Manuals and Training

Requirement	Rationale	Business Level Trace
<p>The <i>Programme</i> shall provide all necessary Operations and Maintenance manuals (in a format to be agreed with the COO User Acceptance Manager) to the staff who will be operating and/or maintaining the assets provided as part of the <i>NTfL System</i>.</p> <p>SR-123</p>	<p>O&amp;M documentation will enable the correct processes and systems to be put in place to uphold the warranty period, and maintain the intended System performance.</p>	<p>BLR 09 - Enable Ops and Maintenance Cost Reduction</p>
<p>The <i>Programme</i> shall agree the format of all necessary <i>NTfL System</i> training material with the relevant operators and maintainers and subsequently provide that material to the relevant staff.</p> <p>SR-124</p>	<p>This is intended to maximise beneficial use of any new equipment.</p>	<p>BLR 09 - Enable Ops and Maintenance Cost Reduction</p>
<p><b>Supplementary Information for SR-124:</b> This includes provision of training facilities.</p>		

### 2.9 Assurance

Note that the Programme Level assurance process for the NTfL Programme is still subject to discussions between *the Programme* and *the Sponsor*. The points in time (or 'Gates') at which assurance is to be provided and the format thereof is still to be determined.

Responsibility for the acceptance that NTfL requirements have been met at the agreed 'Gates' resides with the Programme Lead Sponsor, on behalf of the Director of Major Programme Sponsorship.

Requirement	Rationale	Business Level Trace
<p><i>The Programme</i> shall undertake system performance and reliability modelling work to demonstrate that the proposed design continues to meet the performance requirements defined.</p> <p><b>SR-142</b></p>	<p>Capacity increase is the most significant contributor to programme benefits, hence assurance that railway performance can be achieved is required before final designs and installation, to avoid re-work and/or non-achievement of the business benefits.</p>	<p>BLR 05 - Enable Service Pattern Changes</p> <p>BLR 06 - Provide Increased Service Levels</p> <p>BLR 12 - Improve System Reliability</p> <p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p>
<p>The <i>Programme</i> shall ensure that all changes or upgrades that need to be made to the LU power network and DC traction systems as part of the <i>Programme</i> are appropriately modelled using a Multi-Train Simulator (MTS) prior to implementation.</p> <p><b>SR-143</b></p>	<p>This ensures that power works align to and contribute towards the overall LU network power whole life cost solution, expected to include a mix of HV and LV infrastructure.</p>	<p>BLR 16 - Provide Assurance that Benefits can be Achieved over the Long Term</p> <p>BLR 17 - Provide Value for Money</p>
<p>In conjunction with the Systems Performance Engineering team, <i>the Programme</i> shall produce a forecast of the parameters required for timetabling purposes and present them to the Sponsor at a minimum <b>every six months</b> and at each key delivery stage.</p> <p><b>SR-281</b></p>	<p>This provides confidence that the timetable can be developed and delivered, ensuring the capacity uplifts.</p>	<p>BLR 05 - Enable Service Pattern Changes</p> <p>BLR 06 - Provide Increased Service Levels</p>
<p><b>Supplementary Information for SR-281:</b> <i>These parameters may include (as examples): Junction confliction matrices, run-time to trigger points, run-time to release points.</i></p>		
<p>In conjunction with the Systems Performance Engineering team, <i>the Programme</i> shall develop and maintain a dynamic model of the Operational NTfL Railway.</p> <p><b>SR-282</b></p>	<p>This provides confidence that capacity and performance capability can be achieved.</p>	<p>N/A</p> <p>BLR 05 - Enable Service Pattern Changes</p> <p>BLR 06 - Provide Increased Service Levels</p>
<p><b>Supplementary Information for SR-282:</b> <i>The Operational NTfL Railway includes track, train, signalling, power and timetables.</i></p>		



# Transport for London

## New Tube for London – Sponsor’s Remit

Requirement	Rationale	Business Level Trace
<p><i>The Programme</i> shall maintain a register of the Performance Risks and Assumptions that could threaten the delivery of the railway performance.</p> <p><b>SR-257</b></p>	<p>Management of identified risks will provide confidence that the railway performance can be delivered.</p>	<p>BLR 05 - Enable Service Pattern Changes</p> <p>BLR 06 - Provide Increased Service Levels</p>

### 2.10 Customer Acceptance

Requirement	Rationale	Business Level Trace
<p>Whilst satisfying the Customer Concept, <i>the Programme</i> shall consult with the Customer Acceptance Manager (CAM) to confirm existing or further customer research needs.</p> <p><b>SR-287</b></p>	<p>The CAM represents the customer's interests and requires a level of assurance that their needs are catered for and can advise on customer research.</p>	<p>BLR 08 - Improve Customer Experience</p>
<p><i>The Programme</i> shall deliver output from Customer Acceptance Testing (CAT) on the content and delivery of customer information through the CIS on new NTfL trains, where practicable and economical.</p> <p><b>SR-304</b></p>	<p>To ensure the Customers' needs are catered for.</p>	<p>BLR 08 - Improve Customer Experience</p>
<p><i>The Programme</i> shall deliver output from CAT relating to the design, finishes and functionality (e.g. seat comfort) of the new NTfL trains, where practicable and economical.</p> <p><b>SR-306</b></p>	<p>To ensure the Customers' needs are catered for.</p>	<p>BLR 08 - Improve Customer Experience</p>
<p><i>The Programme</i> shall deliver output from CAT of the customer experience delivered by the design, finishes and functionality of the GOA4 related PTI management systems, where practicable and economical.</p> <p><b>SR-307</b></p>	<p>To ensure the Customers' needs are catered for.</p>	<p>BLR 08 - Improve Customer Experience</p>
<p><b>Supplementary Information for SR-304, 306 and 307:</b> <i>Where the cost of delivering CAT output is considered disproportionate to the benefit, the Sponsor shall be informed for a prompt final decision on how to proceed.</i></p>		

### 3 List of Consultees

The following table indicates consultees on the Draft versions of the Sponsor Programme Requirements leading up to the first approved version of this Sponsor’s Remit:

Name	Directorate / Organisation & Job Title
Alastair Baily	COO, NTfL Operations Representative
Andrew Tunnicliffe	CPD, Professional Head of Systems Software
Chris Ashcroft	CPD, Senior Project Manager
Chris Burke	CPD, Training and Operational Readiness Manager
Dave Hughes	S&SD, Transport Strategy Manager
David Rea	Programme Delivery Partner
Duncan Weir	COO, Head of Operational Upgrades & Asset Development
Elliot Ali	CPD, NTfL, Programme Delivery Engineer
Francesco Formica	CPD, Systems Integration Engineer
Gabriel Smith	CPD, Lead Systems Performance Engineer
Graeme Pate	CPD, Systems Integration Engineer
Grant Richardson	CPD, Senior Project Engineer
Imtithal Aziz	CPD, Systems Engineer
Ivan Gwynn	S&SD, Principal Sponsor
Jeff Done	CPD, Delivery Manager
Joanne Pettigrew	CPD, Project Manager
Kate O’Brien	S&SD, Principal Sponsor
Ken Lamacraft	CPD, Lead Systems Performance Engineer
Kevin Moore	S&SD, Lead Sponsor
Lee Gladstone	CPD, Senior Project Manager (Track Plant and Depot Portfolio)
Luke Fischer	CPD, Systems Integration Engineer
Mark Foster	CPD, Senior Project Manager
Martin Bayliss	HSE, Engineering Safety Manager
Michael Cowland	COO, Operational Development Manager
Mohamed Masood	CPD, Systems Integration Engineer
Nigel Hodgson	S&SD, Principal Sponsor
Patrick Bradley	CPD, Programme Engineering Manager
Paul Carpenter	CPD, Systems Assurance Engineer
Paul Thomas	CPD, Head of Engineering
Peter Terribili	CPD, Lead Project Engineer
Simon Chung	CPD, Principle Systems Performance Engineering Manager
Simon Ford	CPD, Programme Delivery Engineer
Stephen Porter	CPD, Rolling Stock Project Engineer



# Transport for London

## New Tube for London – Sponsor’s Remit

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Name	Directorate / Organisation & Job Title
Stefan Krcmar	CPD, Lead Project Engineer, Infrastructure
Steve Fielding	CPD, Principal Systems Engineer
Steve Wilson	CPD, RAMS Engineer
Will Dennis	CPD, Project Manager, Power & Cooling Upgrades



### 4 Future Updates

It is recognised that the Engineering Vehicle fleet baseline may change in the future (e.g. the inclusion of a Rail Adhesion Train). Should the Engineering Vehicle Operational Concept change in the future this Remit may need to change (via formal change control) accordingly.

There is intention that Pathway will introduce formal guidance around redundant asset recovery and disposal. When this is available, the requirements cited in this document may be reviewed to align with corporate guidance. This may negate the need for some related requirements to be explicit in this document.

The section on Engineering Vehicles (2.5.2) is subject to a study to evaluate space constrained vehicles to confirm any mitigations needed to prove the deliverability of the outcome requirements in this section.