

Thameslink Rolling Stock Project
Rolling Stock High Level
Specification

April 2008

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1 Introduction

- 1.1 The Thameslink Programme is a key element of the Department's strategy for rail and is a major initiative to provide additional capacity and remove passenger bottlenecks on the London commuter network. The programme will allow the operation of longer trains (up to 243m) on the Thameslink network at higher frequencies (up to 24 trains per hour) through the central London 'core' section.
- 1.2 The Department has assessed the feasibility of delivering the Thameslink key outputs and has concluded that existing designs of train are unable to deliver the overall capacity and operational need. Despite the large transaction necessary, a fleet composed of a new design of train is required.
- 1.3 The Department is aware of major technological advances being developed for generic commuter trains around the world. The acquisition of a new train fleet on this scale presents a major opportunity for suppliers to offer these advanced features in a new generation of trains designed to deliver high performance and high capacity with high energy efficiency and low track damage, consistent with the principles of the Railway Technical Strategy published by the Department in July 2007.
- 1.4 The Railway Technical Strategy published by the Department in July 2007 also establishes the principle of a "family of trains", optimised by business sector and with standardised inter-train interfaces, as the basis for future UK passenger train specification. This principle is being developed further by the industry led by Network Rail with rolling stock manufacturer participation. The Thameslink project provides a unique opportunity to develop the class leading design for the suburban and inner urban train concept. Provided that the train design is future-proof in terms of the Technical Strategy, it is the Department's intention that key aspects of the design developed now become the standard for future procurements in this area.
- 1.5 Network Rail and the Train Operators are fully engaged with this procurement and are keen to support the changes necessary in order to deliver an optimised train.
- 1.6 More details on the Thameslink Programme and its strategic aims are given within the "Summary and Overview" document.
- 1.7 The purpose of this, the Thameslink Rolling Stock High Level Specification, is to describe to Applicants and other interested parties the key features the Department currently believes are required in the new Thameslink rolling stock and, where these have yet to be finalised, to describe some of the critical tradeoffs which must be addressed within the rolling stock design in order to deliver the overall system outputs. It is not intended to be a comprehensive specification against which tenders can be prepared. The document outlines the key themes which Applicants are invited to consider whilst responding to the Accreditation Questionnaire ("AQ").
- 1.8 The requirements in this document have been developed to, support delivery of the overall service performance, capacity and safety outputs of the Thameslink Programme, with the overall aim of delivering a high quality, modern customer

service. The requirements include the operational, functional and performance issues to meet the needs of the train operator as well as the interface issues needed to ensure infrastructure compatibility and the features impacting the customer experience.

1.9 The Thameslink Rolling Stock Project itself will be based around four critical themes in terms of the capability of the trains supplied:

- the movement of high volumes of passengers, achieving a continuous 24tph with frequent, irregularly placed stops in the core on diverse routes including suburban and long distance commuter sections;
- highly reliable rolling stock which achieves “best in class” levels of service performance with extremely low levels of major service-interrupting failure in the core and the ability to operate in degraded mode in the event that faults and failures do occur;
- a major improvement in environmental impact compared with existing designs in terms of energy consumption, water consumption, waste generation etc; and
- minimisation of whole life, whole railway system costs through initiatives such as reduced energy consumption, the minimisation of the train’s impact upon the track and reduction in maintenance, cleaning and energy costs.

1.10 It is important that the train is designed taking full account of the passenger, operational and technical environment within which it will work. The train supplier will be expected to cooperate closely with both the Train Operator and Network Rail to achieve an optimum overall system design.

1.11 Requirements stated as essential may alter and other essential requirements may be added when the Invitation to Tender (“ITT”) is issued. The Train Technical Specification and Train-Infrastructure Interface Specification which will support the ITT will supersede this document. The content of this document is indicative and will not be updated.

2 Routes

2.1 The routes that will be included in the Thameslink service on completion of the Thameslink Programme will be included in the ITT. The new Thameslink trains will operate through the central London core between St Pancras International and Blackfriars, providing inner and outer urban services to destinations to the north of London on the Midland and East Coast Main Lines and via London Bridge and Elephant Castle to destinations to the south of London on the Brighton Main Line and other routes in Kent, Surrey and Sussex.

3 Technical Platform and Unit Formation

3.1 The Department does not wish to impose a prescriptive train architecture or set of train formations at this stage, recognising that Applicants may wish to propose innovative solutions, possibly including articulation. This section of the specification therefore sets out the requirements and constraints within which any solution will have to deliver.

3.2 New Thameslink trains shall have automatic coupling between units and be capable of operating in multiple when necessary to create passenger trains formed of more than one unit.

- 3.3 The train shall be designed for a maximum peak time train length within 243m. However, platform length constraints on one of the routes served (at least in the initial years following programme completion) mean that a number of trains will be restricted to a maximum length within 162m. On this route footfall is so high that a selective door opening system is considered inappropriate. If the new Thameslink trains' architecture offers a shorter overall length than the two maximum lengths referred to above, it must be demonstrated that the shorter train has equivalent carrying capacity to that which it replaced.
- 3.4 It is an essential requirement that the new Thameslink units offer the flexibility to increase the unit length at reasonable cost and without detriment to performance or reliability.
- 3.5 At off peak times, shorter trains may be appropriate on some, or all, of the routes in order to minimise overall energy consumption and maintenance cost. The Department continues to progress the development of the Train Service Specification and the ITT will establish the off-peak capacity requirements which need to be met.
- 3.6 Whilst it would be desirable from a cost point of view to have a single fleet of identical trains to operate all Thameslink services, the diversity of customer needs (e.g. short and long distance commuter, leisure and international travellers) make it necessary to consider the possibility of two variants of the train, with the same car dimensions but with different internal layouts, based on a common technical platform in order to secure operational and maintenance benefits.
- 3.7 Any variants shall have identical performance and operational characteristics. There will be full interoperability between any combination of units in trains of normal length for passenger service and for emergency and empty coaching stock moves in train formations of up to 486m in length, where infrastructure permits.

4 Weight and Vehicle-Track Interaction

- 4.1 Train mass (weight) is a critical parameter for whole system, whole life cost because it affects both track maintenance and train energy consumption. The Department and Network Rail both understand the virtuous circle that can be created between track quality and train mass and Network Rail is committed to improve track quality through its new standards for maintenance.
- 4.2 The Department and Network Rail wish to work with Bidders to establish a set of weight targets which can be set in the ITT. The Department is aiming at a target of 256 tonnes (tare) per 162m train or 384 tonnes (tare) per 243m train which is believed to be achievable.
- 4.3 To allow a significant increase in traffic without an exponential increase in track damage, it is important that track forces are minimised through optimisation of suspension and infrastructure parameters. This will increase reliability of operation since requirements for out-of-course interventions for track maintenance, renewal or imposition of TSRs/ESRs will be reduced. The impact of vehicles on the track affects two particular areas: degradation and failure of

the track system and its components (e.g. geometry/alignment degradation), and growth of wear and rolling contact fatigue (RCF).

- 4.4 To verify the achievement of these improvements, the Department is working with Network Rail, using the Vehicle Track Interaction Strategic Model (VTISM) to evaluate the impact of different vehicle concepts and characteristics on the track, and in particular that:
- The new Thameslink trains minimise degradation rates to the track system; and
 - The bogie curving performance is optimised for the route. This requires the appropriate choice of wheel profile and the minimisation of the bogie primary yaw characteristics to reduce wear and RCF whilst maintaining vehicle stability:
- 4.5 The final evaluation of whole life, whole system cost impact of bidders' train designs on the infrastructure will be carried out using the VTISM model. Further details of VTISM are available from RSSB.

5 Power Supply and Energy Consumption

- 5.1 The units shall be capable of operating on either 25kV ac overhead or 750V dc third rail, using both supplies during a single journey with simple, rapid and safe changeover in either direction. The train shall be capable of initiating changeover between power supplies at the appropriate location automatically, but manual operation should be possible in the event of failure. Inadvertent operation in the wrong location shall be prevented.
- 5.2 Power supply changeover shall be possible in motion or while stationary and performing station duties including opening and closing of passenger doors.
- 5.3 There shall be an automated means of power adjustment to ensure that the train works within line current limits on different routes.
- 5.4 The Department's Technical Strategy establishes environmental performance as a critical issue for the Thameslink trains. Energy consumption is particularly important since it directly affects carbon emissions. A target for energy efficiency will be established which relates new and current train performance. Bidders will be encouraged to use the latest high efficiency traction drive and control systems, minimising starting and rolling resistance and using intelligent energy management controls.
- 5.5 The new Thameslink trains shall be designed to minimise the net energy drawn from the 25kV ac and 750v dc power supply systems at route level by recovering a very high proportion of kinetic energy during braking, using it within the train and facilitating its re-use by other trains in the area. The train design will be expected to recognise the inability of the 750v dc power supply to return energy to the grid and the fact that much of the energy consumption will take place outside the core area, where there are fewer trains to absorb the regenerated energy. Some level of onboard energy storage may provide an optimal solution overall.
- 5.6 The new trains will also have systems which can maximise the efficiency of auxiliary systems such as heating, ventilation and air conditioning.

- 5.7 The new trains shall have intelligent stabling systems which minimise energy consumption during periods out of use, but ensure that trains can re-enter service when required.
- 5.8 It is an essential requirement that the train shall provide on-board metering of total energy consumed and that this data shall be logged on board, as well as being available for interrogation by remote systems. The data must be of suitable quality for billing purposes.
- 5.9 Research shows that there is a wide variability in energy consumption resulting from different driving techniques. Therefore, it is an essential requirement that the train shall provide real time advice to the driver on energy use and regeneration, to allow energy consumption to be minimised, consistent with maintaining on time running.

6 Gauging

- 6.1 The gauge profile of the train is a critical parameter for determining interior space, in particular affecting floor height. The Department and Network Rail wish to work with bidders to optimise the gauge profile within the critical infrastructure constraints of the Thameslink route. Network Rail is in the process of establishing a Vampire Kinematic Envelope for the Class 319 trains that currently use the route and has embarked upon a gauging exercise to determine the maximum possible vehicle Kinematic Envelope which the route can support, which will be incorporated in the ITT.

7 Performance and Journey Time

- 7.1 The overall Thameslink Programme requirements are for start to stop journey times for the central London sections encompassing the Core Stations and London Bridge (in either direction, assuming a station dwell time of 60 seconds at each station and using the May 2007 line speed profiles) not to exceed:
- Kentish Town to St. Pancras International 5.5 minutes;
 - Finsbury Park to St. Pancras International 6.5 minutes (via new infrastructure when it is commissioned);
 - Thameslink St Pancras to Blackfriars 8.0 minutes;
 - Blackfriars to London Bridge 5.5 minutes; and
 - Blackfriars to Elephant & Castle 3.5 minutes.
- 7.2 Average journey times outside the core route section shall be no worse than the December 2006 timetable, for equivalent stopping patterns using the May 2007 line speed profiles.
- 7.3 Notwithstanding the above, the acceleration and braking characteristics of the new Thameslink trains must permit the trains to achieve acceptable platform clearance times at Core Stations and provide sufficient recoverability on the critical approach sections to get trains into sequence, without adding extra recovery time. It is expected that this will require “best in class” performance in both acceleration and braking.
- 7.4 It is an essential requirement that all trains be capable of 100mph operation.

8 Normal Operation

- 8.1 The service currently operated on the Thameslink routes are Driver Only Operated (DOO). It is therefore an essential requirement that the new Thameslink trains shall have the capability to operate in Driver Only mode, both for passenger and non-passenger (empty coaching stock) moves. This includes the capability for the driver to observe in-cab displays and for direct two-way communication with the signaller through GSM-R radio. It is the Department's preferred solution that all DOO equipment will be 'on-board'. The system should be designed for compatibility with the level of ambient lighting on station platforms.
- 8.2 The new Thameslink trains shall be fitted with ERTMS Level 2 train control equipment in addition to AWS and TPWS. The preferred solution will be the integration of AWS and TPWS into a single set of cab displays using a Specific Transmission Module (STM).
- 8.3 It is likely that the train will be fitted, either from the start or in the early part of its life, with Automatic Train Operation (ATO) to achieve consistent high performance in the core section. The cab controls, equipment layout and traction, braking and door control systems shall be designed around an ATO system with full manual facilities for use outside the core and (if necessary) for initial operation.
- 8.4 A system of selective door operation, based upon RSSB's emerging standards, will be fitted which allows any or all doors on the train to be opened at stations. The system will be automatically configured such that the appropriate door or combination of doors can be opened or closed when a short platform is encountered. It is an essential requirement that the full useable platform length is utilised and it is therefore not acceptable that systems which deselect complete units within a train are offered.
- 8.5 The new Thameslink trains will have to operate in both the current train management and control environment, based on multi-aspect signalling and TPWS, and the future environment based on ETCS. GSM-R will be available from the start of service introduction and shall be fitted to all trains.

9 Reliability

- 9.1 In order to routinely deliver the customer expectations, the next generation Thameslink trains have to be highly reliable from new and throughout their life. Reliability assurance must be controlled through the EN50126/7 framework, right from the tendering through the design, manufacture, testing, introduction into service phases and then through their entire life. The trains must deliver reliability in two very important areas:
- First of all, they must have an exceptional reliability when operating in the Core area, as described in section 9.2; and
 - Secondly, they must have a world class reliability measured in the usual UK practice of "miles per casualty" across the entire network.
- 9.2 Work is currently on-going within the Thameslink Programme to determine the Reliability, Availability and Maintainability (RAM) targets and allocation for each of the system components operating in the core section including the rolling

stock. It is expected that this will result in a number of additional reliability requirements for the train, focused on avoiding delay and disruption in the core. Such requirements are likely to include demanding targets for door reliability and for higher levels of mean distance between failures for significant service disruptions, and may imply additional built-in redundancy and predictive diagnostics (see below).

9.3 In order to maintain the overall level of service performance for the Thameslink service, the train functionality shall provide for specific degraded modes. This functionality might include but not limited to the following:

- Fast system boot-up and automatic resetting capability;
- Remote subsystem isolation which allows the driver to manage failures with the minimum of delay and without leaving the cab;
- The ability to move in a degraded mode despite a major onboard failure for a set distance corresponding to the maximum between defined refuge points on the route where the train can be taken out of service;
- The capability to push a failed train out of the core section;
- The capability to move a short distance without the traction supply being present; and
- Train system monitoring and predictive diagnostics that advise the driver and ground based operations and maintenance staff on the health of the train and train related subsystems, particularly with regard to entering the core section and then passing through the core section without problem.

9.4 In addition to the special requirements for the core, the average reliability of the new Thameslink trains when measured in accordance with the National Fleet Reliability Improvement Programme (“NFRIP”) definition of “miles per technical 5-minute delay”, shall be at least equal to those currently being observed by ‘best in class’ EMUs on the Great Britain national rail network. Under NFRIP, the definition of a technical 5-minute delay is as follows:

- A Technical 5-Min Delay is counted where there is a fault on a train causing a delay of 5 or more minutes and the root cause is a technical or maintenance defect on the train. Cancellations and part cancellations also count. From Period 2 ‘03/04’ onwards, 5-Min delays have included all technical ‘No Fault Finds’;
- Included are train technical faults: on empty stock moves, on occasions where delay is exacerbated by operational error, and under adverse weather conditions; and
- Excluded are train technical faults caused: by vandalism, by proven infrastructure defects and by other 3rd parties e.g. suicide damaging a train.

9.5 Some or all of the trains shall be fitted with infrastructure monitoring systems covering the track (UGMS), the pantograph/overhead line interaction (UOMS) and train control systems. These will be specified at the ITT stage by Network Rail.

9.6 The trains shall provide real time information on operational status, including passenger loadings by vehicle and this information will be transmitted to remote receiving locations to agreed protocols as well as being stored on the train. These protocols must be compatible with communications industry standards. There shall be a communication network for transmission of data throughout the train which avoids equipment duplication wherever possible. It is envisaged that the following information, as a minimum, will be transferred via the data systems:

- Diagnostic and status information in the event of a fault or train failure;

- Status information which will provide maintenance planning information;
- Passenger Information System data;
- Energy consumption data;
- Driving performance and timing data; and
- Infrastructure monitoring data.

10 Cab Layout, Inter-unit access and Emergency Egress

- 10.1 Driving controls and layout must incorporate the best practice and the latest knowledge on human factors and should set the standard for future builds of next generation trains.
- 10.2 It is an essential requirement that the new Thameslink train shall have an appropriate means of emergency egress, bearing in mind the operational routes over which they will operate. This may be by end or side egress.
- 10.3 The Department is working with the Train Operators to develop cab layout options. A full width driving cab with a central driving position is preferred but is subject to the requirement to achieve emergency evacuation in an appropriate manner. Requirements will be finalised before the ITT is issued.
- 10.4 Passenger and crew access between units is not likely to be required. Requirements will be finalised before the ITT is issued.
- 10.5 Cab design shall address the appropriate levels of risk defined in the emerging EuroNorms for structures and crashworthiness.

11 Passenger Boarding and Alighting

- 11.1 A central requirement of the programme is to achieve a throughput of 24 trains per hour (tph) through the Core Section. To achieve 24tph, a train must arrive on average at the station platform every 2½ minutes. In order to allow for minor operational perturbations, a technical headway of 2 minutes is required of the railway system. The new Thameslink trains must support that objective. Managing station dwell time through robust system design is therefore of key importance, as 1,000 or more people must be able to move between the train and the platform at each station stop.
- 11.2 The overall dwell time is measured from the moment a train's wheels stop turning on arrival until the moment they start to turn on departure. It is made up of the necessary procedural, technical process and warning times at the start and end of the station stop, plus the passenger boarding and alighting time. The new Thameslink trains must be designed to achieve a station dwell time of no more than 45 seconds. Within the 45 second dwell time, the longest possible time for passengers to board and alight should be allowed.
- 11.3 Research and analysis conducted by the Department has shown that these dwell times are sufficient to allow the required numbers of passengers to board or alight based on the following assumptions:

- Doorways which are sufficiently wide to allow passengers to pass through two abreast, each carrying a briefcase or similar size package;
- Large standback areas are provided on both sides of each door;
- 16 doors per side of a 162m train; and
- A nominal 915mm platform and a nominal 1100mm vehicle floor height.

11.4 The new Thameslink trains shall be designed around an internal floor height which optimises the impact on train capacity, dwell time and accessibility taking account of the range of platform heights likely to be encountered. At Core Stations, where passenger flow is most critical, Network Rail is committed to a standard 915mm platform height. Network Rail and the DfT are working together to optimise the stepping arrangements over all stations and will engage with Bidders in due course.

11.5 The fully developed solution also needs to meet the needs of persons with reduced mobility. The Department is working with Network Rail and stakeholder groups to develop an optimised solution in this area. This may involve bridging devices at some train doors coupled with raised sections of specific platforms to give level access for wheelchair users, in order to avoid the dwell time impact of manually deployed ramps. The full set of requirements will be defined in the ITT.

12 Interior Features

12.1 Passenger Accommodation

12.1.1 The Department is working closely with stakeholders to develop a specification (or specifications if two variants are considered to be necessary) for the interior design of the new Thameslink trains which delivers high capacity and meets all users' needs. The Department will extend that process to include Bidders in due course. The critical requirements for the overall train design are:

- Maximised internal space for seated and standing passengers relative to overall train length. Open wide gangways offer advantages in this respect;
- Minimised structural intrusions and technical equipment cabinets within the passenger space;
- Free flow of passengers, with wide standbacks at external doorways to allow easy access; and
- Flexible internal layout, allowing refurbishment and/or relocation of interior furniture at minimal cost by ensuring the design permits work to be completed quickly – this will be achieved by providing a clear floor and a flexible system of mounting equipment.

12.1.2 The emerging specification(s) for the interior is likely to include the following (the proportions of which may vary between the two variants):

- seating in a 2+2 style with a large central gangway;
- a predominance of airline style face to back seating in order to maximise passenger accommodation, but with the provision of some face to face seating arranged in bays to accommodate family groups;
- access to a table, either fixed or folding, for most seated passengers;
- tip up, folding and perch seating to allow the maximum possible flexibility of interior layout;
- generous provision of handholds in all areas of the train to allow passengers to stand in relative comfort;

- overhead luggage racks for airline style hand baggage (except under pantograph wells);
- luggage space under seats in airline style seating areas;
- luggage stacks interchangeable with tip up or folding seating;
- Wi-Fi connectivity throughout the train, with 240V low current socket outlets at-seat in all or part of each train; and
- some units may be required to include a small proportion of First Class accommodation.

12.2 Passenger Information System

12.2.1 In order to meet customer expectations and deliver the overall capacity requirements of the project, all passengers (including those with disabilities or for whom English is not their native tongue) are to be provided with the best practicable information about their journey (including connections) through effective use of announcements, text and pictograms both on trains, at stations and through electronic communications media. The system must allow passengers to make informed choices about their journey during times of disruption. The design of the trains shall reflect this need.

12.2.2 Every vehicle shall be fitted with a Passenger Information System (PIS), which automatically generates audio and visual announcements and allows the driver to select emergency or other announcements to meet the requirements of standards, legislation, customer service and good practice. Applicants should assume that a central customer information centre will make appropriate information available to all new Thameslink units on a real time basis. Each unit should therefore process this information and pass on to customers only that information which is relevant to the current journey and present location.

12.2.3 The announcements shall be audible throughout the saloons, vestibules, open wide gangways and toilets and the visual displays shall be visible from the majority of seats. All displays shall be based on future-proofed technology, having TSI-PRM compliant characters and pictograms.

12.2.4 In the event that Selective Door Operation is in use, the system shall make specific announcements in the affected vehicles well in advance of arrival at the relevant station.

12.2.5 Consideration is being given to providing a fully integrated customer information system, to display real time information across the trains and stations on the route and providing information on connecting trains and interchanging services, including TfL routes. The Department will work with the Thameslink TOC and Network Rail to develop this.

12.3 Toilets

12.3.1 All new Thameslink units shall be capable of carrying controlled emission toilets, including universal access toilets as appropriate, which shall be accessible to passengers travelling either in first (if provided) or standard class accommodation.

12.4 Security and Cleanliness

12.4.1 It is an essential requirement that the new Thameslink trains shall provide an enhanced level of security for passengers and their possessions, compared with the trains that they replace. This will include:

- Easy to understand safety information;
- Ability for passengers to store a certain amount of luggage close to the seat;
- CCTV for monitoring saloon interiors, vestibules and doorways which will have a high frame on-board recording capability. Provision shall be made for the images to be made immediately available in a control room when an alarm is activated (subject to reception constraints in tunnels etc) through a wireless communications system;
- High quality environment with good lighting and sight lines; and
- Passenger alarms including 2 way communication.

12.4.2 The interiors shall be designed for easy and quick cleaning and rapid repair of damage.

12.5 Ride Quality

12.5.1 The new Thameslink trains shall deliver a ride quality to seated and standing passengers equal to, or better than, that which is offered to passengers on the existing Thameslink routes in December 2007, on equivalent track quality. Acceleration and braking characteristics should also support this objective, whilst also delivering the necessary performance.

12.6 Interior Noise

12.6.1 It is a requirement that the new Thameslink trains shall deliver a reduction in the level of interior audible noise within the vestibule, saloon and toilet areas when compared to that which is offered to passengers on the existing Thameslink routes in December 2007.

12.7 Heating and Cooling Systems

12.7.1 All units shall be fitted with a heating and cooling system which delivers a comfortable environment in all passenger saloons and vestibules. The systems shall be capable of regulating the temperature of all passenger saloons, vestibules, toilets and open wide gangway areas in a uniform manner. A method of providing emergency ventilation in the event of failure will be required.

12.7.2 Consideration shall be given to optimising the capacity of the heating and cooling systems, recognising the trade off between system energy consumption, weight and cooling capability. That said, the system shall be capable of maintaining a “comfortable” passenger environment in all likely ambient weather conditions.

12.7.3 In the interest of minimising energy consumption, each vehicle shall:

- incorporate a system which minimises temperature changes within the car when the doors are opened; and
- vary the volume of air which is moved within the car according to its loading i.e. when few people are on board, the air flow shall be low, with maximum flow only being reached when the vehicle is heavily loaded.

- 12.7.4 It is essential that each cab shall be provided with air conditioning to maintain an internal cab temperature, which can be selected by the driver within the range of 18°C to 25°C.

13 Standards

- 13.1 The new Thameslink trains will be expected to comply with the requirements of all applicable British and European Standards, and all European and UK legislation during the design, construction, delivery, testing and commissioning, maintenance and operation of the vehicles, including Technical Standards for Interoperability (TSIs) that are currently in draft form. Details on how technical compliance with the existing Network Rail infrastructure might be achieved are identified in Railway Group and Network Rail Company Standards. Where compliance with these standards or with the TSI requirements acts against the intent of a fully optimised system based on a whole life whole system cost, the standards should be challenged by the train supplier. Early challenge is encouraged.
- 13.2 Whilst the new Thameslink trains are expected to be compliant with the Interoperability Requirements for the Trans-European conventional network and associated TSIs, the current and proposed infrastructure for operation of the new Thameslink trains is not required to meet the Infrastructure System TSI. Nevertheless, it is the Department's intention to improve interoperability as far as practicable, in order to allow manufacturers to adopt generic solutions from other European railway systems. The trains will therefore need also to meet local requirements for operational compatibility. Where compatibility with Network Rail's infrastructure is not fully covered by the TSIs and associated standards, additional details will be provided in the Train-Infrastructure Interface Specification to be issued with the ITT.
- 13.3 Where not mandated by specific legislation or requirements the new Thameslink trains shall use EuroNorm standards. Where a supplier wishes to propose an alternative standard full justification shall be provided as to the applicability and acceptability of these standards.

14 Technical Compatibility

- 14.1 The new Thameslink trains shall achieve technical compatibility with the Network Rail infrastructure over which they are planned to operate including diversionary routes and access to depots. The intent of the Thameslink programme is that compatibility should be based on optimisation around whole life, whole system cost. Particular attention will be given to the imposition of low physical impacts on the infrastructure and train and low energy requirements.
- 14.2 The new Thameslink trains will be authorised into service under the Railways (Interoperability) Regulations 2006. These mandate conformity with relevant Technical Specifications for Interoperability, relevant Notified National Technical Rules and verification of compatibility between the trains and the rail system within which they will operate. That rail system will not necessarily be TSI compliant and the assessment of compatibility will need to consider the appropriateness of full TSI compliance for the new Thameslink trains.

- 14.3 Throughout the standards challenge, infrastructure compatibility and system optimisation phases Network Rail and the Department would wish to maintain a regular dialogue with the successful Bidder. Regular dialogue with HMRI will also be encouraged in order to facilitate acceptance of the new Thameslink trains onto the network.
- 14.4 For some infrastructure interface issues it may be more cost effective to modify the infrastructure rather than to modify the train design. Proposals on this basis will be encouraged.
- 14.5 The adherence to standards is only one element of the demonstration of compatibility between new Thameslink trains and the existing infrastructure. The successful Bidder will also be expected to produce a Risk Assessment and a file demonstrating conformity to the existing infrastructure and other railway undertakings' trains in operation and showing how the system has been optimised. This process is described in Group Standard GE/RT8270 issue 2.

15 Maintainability and Repairability

- 15.1 The new Thameslink train design shall focus on maintenance and repairability, and demonstrate features which will enable maintenance and repairs to be carried out quickly and efficiently. The new Thameslink trains shall require much less maintenance than the current generation, be less reliant on a large workforce, incorporating simple-to-change modular equipment, simple-to-manage train diagnostics and train data systems.
- 15.2 The train design shall minimise the likelihood and effect of vandalism and damage.
- 15.3 Maintenance downtimes must be significantly reduced from the current increasing trend that has arisen due to unnecessary sophistication and failure to incorporate maintainability into the earliest design stages.
- 15.4 The new Thameslink trains must use condition based maintenance wherever possible, relying far less on inefficient interval based maintenance.