The East London Line Extension

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Summary

• Project Background

• Project Objectives and Scope

• System Components
  – Railway Operations
  – Infrastructure
  – Rolling Stock

• Project Delivery

• Timescales and current status
The London Rail Vision

A Totally Integrated Rail System for London

- M25 & Circle Line
- Thameslink
- East London Line (Phase one)
- West London Line
- Crossrail
- Radial
- Fast Links Into London
- Orbital
- Inner Suburban Routes
- Interchanges
East London Line History

- Thames Tunnel (Brunel) built 1825 to 1843
- Railway opened 1869
- Electrified (4th rail) 1906 to 1913
- North London Railway to Broad Street opened 1865
- North London Railway closed 1986 to allow Broadgate development
- Line closed 1995 – 98 for refurbishment
Project Background

- LUL project concept devised mid 1980’s
- LUL proposals published 1993
- TWA Northern Extension obtained 1997
- TWA Southern Extension obtained 2001
- Project transferred LUL to SRA in 2001
- Project transferred SRA to TfL November 2004
- Project part of TfL 5 year investment
- Funding secured 2004
Funding

- TfL five year investment programme
  - £2.9bn “Prudential” borrowing powers approved
  - £1.5bn allocated to TfL London Rail to fund:
    - Phase One of the East London Line
    - DLR extensions
  - First £200M of bonds were over subscribed
  - European Investment Bank loan of £450m
Project Scope

Phase 1 (Orange)
• Extend the existing line
  – North to Dalston Junction
  – South to Crystal Palace and West Croydon

Phase 2 (Blue)
• Further extend services
  – Along North London Line to Highbury & Islington
  – West to Clapham Junction
Train Service

- 4 - car trains travelling on national rail infrastructure

- Phase 1 - 12 trains per hour to and from Dalston Junction, one third to New Cross, one third to Crystal Palace and one third to West Croydon

- Phase 2 - Train frequency rises to 16 trains per hour through the central section connecting to North London Line and Clapham Junction
Project Benefits

• Links north and south London

• First step towards an orbital system

• Offers congestion relief to central London

• Catalyst for significant regeneration
Potential Urban Regeneration
East London Line

The Railway System
ELL System Components & Packages

• Railway Operations
  – Network Operator (Network Rail)
  – Passenger Services Operator (TOC)

• Infrastructure
  – Enabling Works
  – Main Works (Dalston to New Cross & New Cross Gate)
  – Works on LUL infrastructure & stations
  – Network Rail southern stations

• Rolling Stock
  – Passenger Electric Multiple Units
  – Engineering vehicles (to be confirmed)
Standards

• Project designed and built to
  – Railway Group Standards
  – Network Rail Company Standards
  – Some London Underground Standards

• Interoperability
  – Plan to seek derogation from Interoperability as a Metro

• Project lifecycle based on
  – European standard for RAMS EN 50126
  – NR Guide to Railway Investment Projects (GRIP)
  – LUL standard E1008
  – Office of Government Commerce lifecycle & gateways
Railway Operations

- Extension converts existing LU line to National Rail standards and links at New Cross Gate
- Canada Water & Whitechapel remain LU stations
- Stabling at New Cross Gate
- Train maintenance at New Cross Gate (tbc)
- Feasibility timetable proves concept
- Passenger Services Operator (TOC) for stations & trains
- Network Operator to be
  - Network Rail south of New Cross Gate
  - London Underground north of New Cross Gate
Infrastructure - Structures

• Enabling Works now replacing and refurbishing structures on viaduct Shoreditch to Dalston

• Main Works to include:-
  – New viaduct including “signature bridge” over Shoreditch High St through Bishopsgate Goods yard to Great Eastern Railway
  – New major bridge (c80m span) over Great Eastern railway (GE19)
  – Major earthworks at New Cross Gate for stabling
  – New major bridge over Brighton Lines at New Cross Gate to create grade separated junction
  – Works to existing structures such that major maintenance not required for 15 years
Bridge GE19

Crossing at 0m 52ch of the Great Eastern Main Lines

Demolition of the existing 3-span brick jack-arch structure

Construction of the new single span steel Warren truss (80m span)
Infrastructure - Track

• **NR Category 2 track:**
  – Plain line and S&C Dalston Jn to New Cross & New Cross Gate Jn (approximately 12.5 km)
  – New Cross Gate Carriage servicing depot

• **Track slab:**
  – Shoreditch curve to Surrey Quays
  – Dalston Jn to Haggerston

• **Cess pathway:**
  – Dalston Jn to GE19

• **Fencing and access points**

• **Noise barriers** - Dalston Jn to Shoreditch High St
Infrastructure - Stations

Phase One new stations at
- Hoxton
- Haggerston
- Dalston Junction
- Shoreditch High Street

Existing ELL stations refurbished

Phase Two new station at Surrey Canal Road
Central Section Stations

- Whitechapel
- Rotherhithe
- Shadwell
- Canada Water
- Wapping
- Surrey Quays

• Closure of ELL during construction (2008/09)
• Installation of Secondary Means of Escape
Infrastructure – Electrification & Plant

- 750V Third rail DC electrification
- Three new substations:
  - Haggerston
  - Shadwell
  - Canal Junction
- 33kV HV feeders from north and south
- Traction system to have “n-2” redundancy
- SCADA control from LU Leicester Square
- Signalling power, station E&M, tunnel lighting, pumps, fire detection using 11kV and 400V distribution
Infrastructure – Signalling

• New Signalling Control Centre:
  – Dalston Junction to New Cross & New Cross Gate Junction
  – Interface with London Bridge SCC for NXG Junction

• Design to Network Rail Standards
• 24 train per hour design headway
• Processor based interlocking
• TPWS at every signal
• Axle Counters
• Proceed on Sight Aspects (POSA)
Infrastructure – Telecommunications

- Optical Fibre Bearer Network

- Radio:
  - Cab secure radio (GSM-R)
  - Emergency Services Radio (TETRA)

- Stations:
  - Long Line Public Address
  - CCTV
  - Customer Information
  - Customer Help Points
  - Ticketing

- Telephones:
  - Operational
  - Retail

- Tunnel Telephone System
New Cross Gate
Carriage Servicing Depot

- Operational Building Complex
  - Signaling Control Centre
  - Security Control Centre
  - PSO Control
  - Drivers accommodation

- Stabling for 20 x 4 car passenger trains

- Fully signalled

- Engineer’s siding
- Rolling Stock Maintenance
Rolling Stock

- 4 car Electric Multiple Unit – 3rd rail DC
- nominal 83 m length
- compliant with the Rail Vehicle Access Regulations
- nominal unit capacity of full load 705 people
- have BS 6853 Category 1a fire rating
- designed for Driver-Only Operation
- maximum speed of units 75 mph
- acceleration rate of at least 0.8 m/s²
- single unit capable of starting and propelling up a 1 in 29 gradient, a failed unit under crush load conditions
Rolling Stock

- OJEU issued June 2005
- Five new build and one cascade supplier pre-qualified
- Four tenders returned Jan 2006
- Three tenderers provided BaFO 3 April 2006
- Contract to be awarded June 2006
- Five units delivered May 2009
- Full fleet August 2009
- North London Railway fleet as part of order
East London Line

Contract Packaging
Breakdown of Infrastructure Works

Stage 1 enabling works
Stage 2 enabling works
Main Works
NR (on-network) works
Enabling Works One

- Demolition of the former Bishopsgate Goods Yard
- Refurbishment of Arches and Parapets
- Site Clearance of Dalston Junction Station Site
- Demolition of overbridges along the Kingsland Viaduct
Enabling Works Two

- Reconstruction/ refurbishment of 21 bridges along Kingsland Viaduct
- Waterproofing of the deck of the Kingsland Viaduct
- Temporary bridge over Brick Lane
- Works at Spitalfields City Farm
- Spraying of Japanese Knotweed
- Partial repair of bridge at Cold Blow Lane to enact southern powers
Main Works

- Civil & structures
- Track
- Stations
- Electrification & Plant
- Signalling
- Telecommunications
LU Works

- Closure of Shoreditch branch - 2006
- Closure of existing ELL – Spring 2008
- Interface with PFIs
  - Powerlink
  - Connect
  - Prestige
- PPP Interface at Whitechapel & Canada Water
NR Works

- Demolition of GE19
- Connection at New Cross Gate
- Two additional platforms at Crystal Palace
- Centre turnback siding at West Croydon
- Potential crossover at South Croydon
East London Line

Engineering Project Delivery
Engineering Approach

• Project is to deliver an operational railway
• System Engineering principles being applied comprising
  • Lifecycle Management
  • System Breakdown Structure (Leveling)
  • Interface definition and management
  • Configuration Management
  • Assurance via Technical Case
  • Single Assurance body – The ITC (Independent Technical Certifier)
ELLP Simple “V” Lifecycle

- Development Remit
- Functional Specification
- Preliminary Design
- Detailed Design
- Manufacture & Installation
- Test Running
- Test & Commissioning
- Trial Operations
- Operation & Maintenance

Phases:
- Inception
- Feasibility
- Development
- Delivery
- Closeout
Detailed “V” Lifecycle
ELLP Interface Classification

Interfaces exist between

• ELLP and other railways (LUL, NR, DLR…)
• ELLP and the outside world (environment)
• ELLP and other railway projects (Crossrail, Thameslink, LUL projects…)
• ELLP and other projects (Dalston master plan, Bishopsgate redevelopment….)
• ELLP rolling stock and ELLP infrastructure
• ELLP rolling stock and NR infrastructure
Levelling and the System Hierarchy
Levelling and the System Hierarchy

World

Railway

Not Railway

Other non-rail projects
Levelling and the System Hierarchy

World

Railway
- Existing Railway
- Changing Railway

Not Railway
- ELLP

Other rail projects
Levelling and the System Hierarchy

World

Railway

Existing Railway

Changing Railway

Infrastructure

Operations Processes

Trains

Not Railway

ELLPP

Infrastructure

Operations Processes

Trains

Geographical package interfaces

Level 1

Level 2

Level 3
Levelling and the System Hierarchy

World

Railway

Existing Railway

Changing Railway

Not Railway

ELLP

Level 1

Infrastructure

Operations Processes

Trains

Level 2

Infrastructure

Operations Processes

Trains

Structures

Bodyshell

Doorways

Traction

Braking

Level 4

E & P

Telecomms

Signalling

Track

Braking

E & P

Traction

Signalling

Telecomms

E & P
Interface Management - Level 4

World

Railway

Existing Railway

Changing Railway

Not Railway

ELLPA

Level 1

Infrastructure

Operations Processes

Trains

Level 2

Structures

Bodyshell

Doorways

Traction

Braking

Level 4

Infrastructure

Operations Processes

Structures

Track

Signalling

Telecomms

E & P
Interface Management - Level 3

World

Railway

Existing Railway

Changing Railway

Infrastructure

Operations Processes

Trains

Not Railway

ELLIP

Infrastructure

Operations Processes

Trains

EW1

EW2

MW

L

R

Level 1

Level 2

Level 3
Interface Management - Level 1

World

Railway

Existing Railway
Changing Railway

Operations Processes

Trains

Infrastructure

Structures
Track
Signalling
Telecomms
E & P

Not Railway

ELLP

Operations Processes

Trains

Infrastructure

Structures
Track
Signalling
Telecomms
E & P

Level 1

Level 2

Level 4
Managed vs. Specified Interfaces

- Managed interface
  - Undefined, fluid, trade-offs can be made across interface, require modelling to determine solution

- Specified interface
  - Fully defined at either end
  - Two parties can engineer their subsystems without talking to each other.....in theory!

- Interfaces must become fully specified during design phase of project lifecycle
Configuration Management

Project Lifecycle

Initial Railway Build Configuration

Intermediate Railway Build Configurations

All New Assets and Assets that have changed

Assets that haven’t changed

Required Railway Build Configuration (RRBC)
Technical Case

• Technical Case addresses totality of assurance
  – engineering, operations, safety, quality & environment

• Technical Case requires and assembles evidence that:
  – ELL will possess required behaviour (Product based argument)
  – correct processes used (Process based argument)

• Contractor has “burden of proof” that acceptance criteria met, ITC accepts

• Structure of the TC respects the project lifecycle and lifecycle stage gate review process
Independent Technical Certifier

- ELLP ITC addressing technical acceptance
- ITC is a function managed by ELL Project Team with ITC Responsible Engineers accepted by LU
- ITC assures (satisfies) the Duty Holders, via ELLP, that their project objectives and requirements have been correctly interpreted and delivered i.e. Approve in Principle
- ITC evidence provides input to the Technical Cases to support the argument that requirements and standards have been met at that point in the project life cycle
Project Timescales

- Enabling Works Stage 1 completed - end April 05
- Enabling Works Stage 2 commenced - June 05
- Programme Manager appointed - May 05
- Main Works tender issued - Autumn 05
- Main Works contract award - Summer 06
- Rolling Stock tender contract award - June 06
- Close existing line - Early 2008
- Public opening - June 2010
Conclusion

• The East London Line Extension
  – Has powers to build and operate
  – Has funding in place for Phase 1
  – Has procured programme manager and contractors to undertake works
  – Major procurements to be concluded by summer 2006
  – Is recruiting delivery team
  – Is implementing GLA & TFL Equality & Inclusion objectives

• Extended East London Line provides benefits
  – Links north and south London
  – First step towards an orbital system
  – Supports the London 2012 Olympics
  – Offers congestion relief to central London
  – Catalyst for significant regeneration
East London Line

Questions