2015/16 LINE, ASSET & NETWORK PLAN
RAIL & UNDERGROUND

FINAL *Version 5.0 (March 2015)*

TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

R&U Line, Asset & Network Plan

Version Control

Version	Date	Notes
1.0	01-Dec-14	Initial template
2.0	09-Jan-15	Initial draft for internal review
3.0	26-Jan-15	Final draft issued for wider consultation
4.0	03-Mar-15	Final version for RULM (10-Mar-15)
5.0	27-Mar-15	Published version

The 2015/16 R&U LANP is based on the TfL Business Plan 2014 and business as usual activities as at Quarter 3 2014/15 (v.309 for financial data).

The LANP is a cross team effort with close collaboration between R&U Strategic Planning (S&SD), LU & Rail Asset Managers and Sponsors, COO, CPD, R&U Finance and Insight.

Any feedback or questions regarding the contents of the document should be directed to David Tamagni or Sarah Scott in the R&U Strategic Planning team (S&SD).

R&U Line, Asset & Network Plan

Executive Summary

London Underground (LU) and London Rail now carries more people, more safely and reliably than ever before, with customer satisfaction at record highs. However, with London's population set to grow the equivalent of a Tube train full of people every three days up to 2030 the need to continue to invest in our assets is critical to support this growth and build and maintain a network that meets the needs of customers in the 21st century.

Rail & Underground (R&U), as part of an integrated TfL, must play its part in *'Keeping London working, growing and making life in London better',* by providing more services at better value whilst offering an improving customer experience. R&U manages an extensive asset base that requires intelligent stewardship to enable the business to deliver assets that support our vision 'To be World Class' and deliver the recent commitments that we made to London. This includes the introduction of the ground breaking 24-hour 'Night Tube' service at weekends as well as further improvements in the reliability, capacity and accessibility of Tube and Rail services while offering an ever-improving customer experience for all.

The task of upgrading, renewing and maintaining the asset base is framed by the context in which we operate – with the challenges of an aging network in transition, ever increasing demand growth, combined with economic funding constraints, all of which require difficult management decisions to be made to achieve the best use of available funds.

This 2015/16 Line, Asset and Network Plan (LANP) translates the outcomes of the TfL Business Plan 2014 into a ten-year forecast. It sets out how R&U will deliver its investment plan, outlining how much it will cost, the level of risk taken and the expected impact on day-to-day performance. In broad terms the LANP:

(a): Breaks down the cost of our capital, maintenance and operations;

(b): Identifies the volumes of works and deliverables expected and the impact on asset condition based on the levels of available funding; and

(c): Sets out the current position and forecasts of performance outcomes

The LANP also provides a detailed baseline from which R&U can understand and see the impact of investment through the lens of individual assets, lines and at network level. Alongside our Asset Strategies, it enables and informs the identification of areas of future investment required to feed into future TfL Business Planning processes.

The LANP constitutes one of a suite of publications, alongside the TfL Business Plan, TfL Budget and The Plan for R&U as well as our in-year performance scorecard, that work together to deliver R&U's overarching strategy and priorities.

R&U Line, Asset & Network Plan

Executive Summary

TfL Business Plan & TfL Budget

Description:
Structured around the four pillars of the TfL strategy: Customer, Delivery, People and Value, the Business Plan sets out TfL's plans into the next decade. Outlining how TfL will continue to play its part in the delivery of a bigger, better and even more successful London, with a clear connection to the Mayor's Transport Strategy. The Budget focuses on the first year of the Business Plan (i.e. 2015/16).

Audience & Timeframe:
External
TfL Business Plan: 2015/16 - 2020/21; TfL Budget: 2015/16 only

Alignment to LANP:
The LANP forecasts our levels of investment, cost, risk, deliverables and performance based on outcomes from the latest TfL Business Plan. Once complete, the LANP forms the baseline for the next TfL Business Planning round, illustrating the long-term expected outputs from our major programmes and business as usual activities.

Production Timescales: Drafted Q1 - Q2 with publication in Q3.

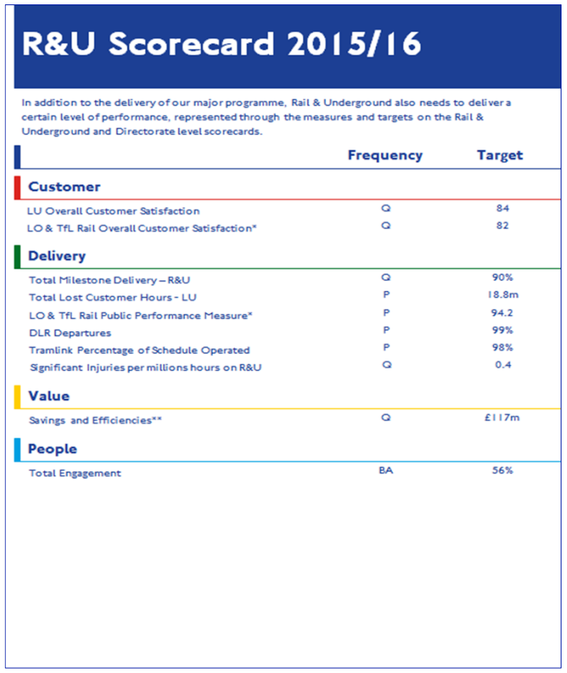
The R&U Plan

Description:
The R&U Plan details all the major programmes that R&U expects to deliver over the coming year, covering both the capital investment and business change programmes. It outlines the link to the Vision, Strategy and Priorities and provides detailed information on delivery timescales and key programme milestones and accountabilities. Each programme contained within the R&U Plan is governed by a Programme Board which has delegated authority to make decisions on behalf of the R&U Board.

Audience & Timeframe:
Internal
2015/16 only

Alignment to LANP:
The R&U Plan sets out the programmes and associated major milestones that need to be delivered for the year ahead, including the key deliverables set out in the LANP.

Production Timescales:
Drafted Q3 with publication in Q4.



R&U Scorecard 2015/16

In addition to the delivery of our major programme, Rail & Underground also needs to deliver a certain level of performance, represented through the measures and targets on the Rail & Underground and Directorate level scorecards.

	Frequency	Target
Customer		
LU Overall Customer Satisfaction	Q	84
LO & TfL Rail Overall Customer Satisfaction*	Q	82
Delivery		
Total Milestone Delivery – R&U	Q	90%
Total Lost Customer Hours - LU	P	18.8m
LO & TfL Rail Public Performance Measure*	P	94.2
DLR Departures	P	99%
Tramlink Percentage of Schedule Operated	P	98%
Significant Injuries per millions hours on R&U	Q	0.4
Value		
Savings and Efficiencies**	Q	£117m
People		
Total Engagement	BA	56%

The R&U Scorecard

Description:
Contained within the R&U Plan, the scorecards set out the level of performance required over the year ahead to aid delivery of our programmes and strategy and manage the day-to-day business. This performance requirement is represented through the measures and targets detailed on the R&U and Directorate level scorecards.

Audience & Timeframe:
Internal
2015/16 only

Alignment to LANP:
The detailed performance forecasts generated and represented through the LANP are integral to setting the R&U and Directorate level scorecard targets.

Production Timescales:
Drafted Q3 with publication in Q4 (within the R&U Plan).

R&U Line, Asset & Network Plan

Ambience (MSS) - London Underground

An established metric within London Underground that measures levels of ambience including cleanliness, litter, graffiti, decor, advertising, information, signage and station/train facilities such as ATMs. The score is provided by trained independent customer service auditors (known as mystery shoppers) who travel around the Underground network making detailed observations of the service provided and score this according to a set framework.

Asset Condition Reporting (ACR) - Physical Condition - London Underground

An annual asset assessment and signed certificate of assurance which reports the residual life of an asset:

Residual Life:
- Code A = 10yrs+;
- Code B = 5-10yrs;
- Code C = 0-5yrs; and
- Code D = no remaining residual life

Asset Condition Reporting - Functional Condition - London Underground

An annual asset assessment and signed certificate of assurance which reports the functional condition of an asset:

Functional condition:
- Code 1= asset fails to meet statutory requirements;
- Code 2 = where the use of the asset presents a major safety concern;
- Code 3 = where there is extraordinary maintenance associated with the use of the asset; and
- Code 4 = where the use of the asset or system could result in a service loss of £0.25 million per annum.

Customer Service Satisfaction (CSS) - All R&U modes

This is a continuous face-to-face survey designed to measure the level of customer satisfaction with the service provided by R&U (on a quarterly basis). It takes account of the most recent journey a customer has made on TfL transport. The survey is split between London Underground, London Overground, Tramlink and DLR as each mode offers a different journey experience. This split allows the important aspects for each mode to be captured and monitored consistently.

Mean Distance Between Failures (MDBF) - London Underground

The number of train kilometres operated in customer service divided by the number of rolling stock asset-related service disruptions of 2 minutes or more. This includes items that are attributed but still in abeyance to be agreed. The incident attribution process means that some delays initially classified as asset faults may be subsequently agreed as being caused by other factors, for example staff error or customer action. In such cases agreement of attribution could give rise to retrospective changes to the data.

Mean Time Between Failures - London Underground

The amount of time an asset has operated for (in terms of hours or days) divided by the number of asset-related service disruptions of 2 minutes or more, including items that are attributed but still in abeyance to be agreed. The incident attribution process means that some incidents initially classified as asset faults may be subsequently agreed as being caused by other factors, for example staff error or customer action. In such cases agreement of attribution could give rise to retrospective changes to the data.

Reliability - Lost Customer Hours (LCH) - London Underground

LCH measures the collective disruption to Tube passengers resulting from delays. They cover all incidents resulting in customer delays on trains and stations (lifts and escalators) and the numbers assigned to total LCH take into account the time, location and passenger loading associated with each delay.They are recorded periodically and are the aggregation of LCHs from all causes unless otherwise specified.

Reliability - On Time Departures - DLR

The key measure of DLR reliability under the new Franchise Agreement which assesses overall service quality and the extent to which it operates as scheduled; the percentage of schedule operated is measured. This is expressed as the percentage of all trains scheduled to run that have a minimum dwell time of 5 seconds, the correct number of carriages and complete their whole scheduled route.

Reliability - Public Performance Measure (PPM) - London Overground & Crossrail

PPM is measured by the rail industry as a means to monitor train operators' performance with regard to punctuality and reliability. The London Overground Concession Agreement includes yearly PPM MAA (Moving Annual Average) targets. PPM measures the performance of individual trains advertised as passenger services against their planned timetable as agreed between the Operator and Network Rail at 2200 the night before. PPM is therefore the percentage of trains 'on time' compared to the total number of trains planned. A train is defined as 'on time' if it arrives within five minutes (i.e. 4 minutes 59 seconds or less) of the planned destination arrival time for London and South East or regional services, or 10 minutes (i.e. 9 minutes 59 seconds or less) for long distance services.

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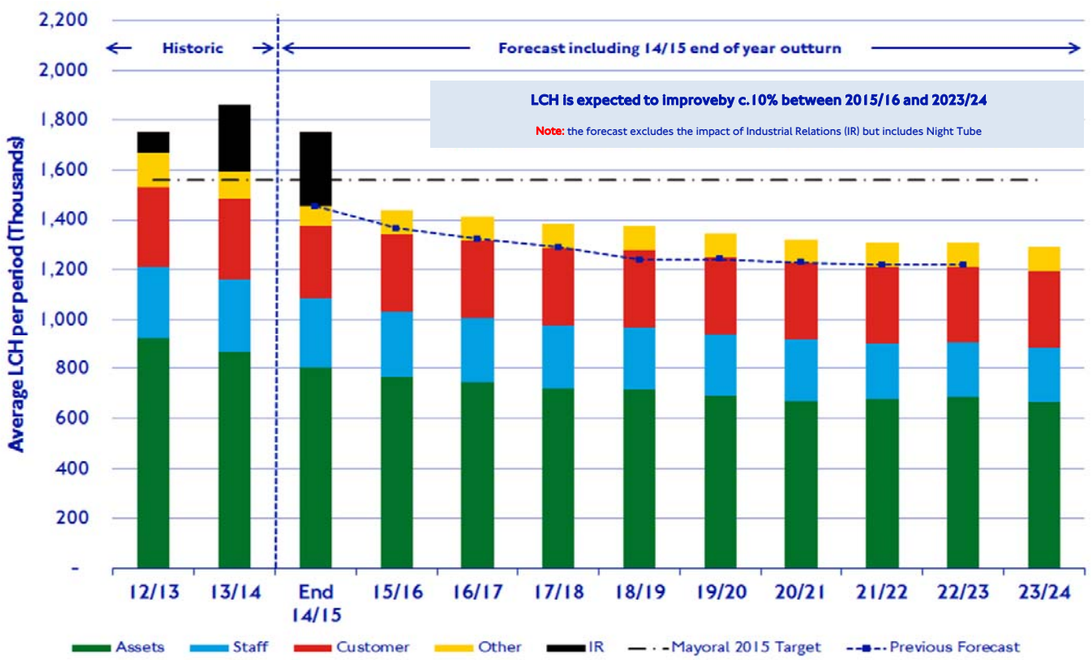
Reliability - Lost Customer Hours (LCH) - London Underground - Figure 1



The current plan shows an improving reliability trend. Recent performance has shown significant progress in reliability but future improvements will become increasingly more difficult to deliver. While planned LCH benefits such as fleet life extension works, condition monitoring and the modernisation of the SSR lines will drive performance improvement there are still areas of concern to address (e.g. Central line fleet reliability).

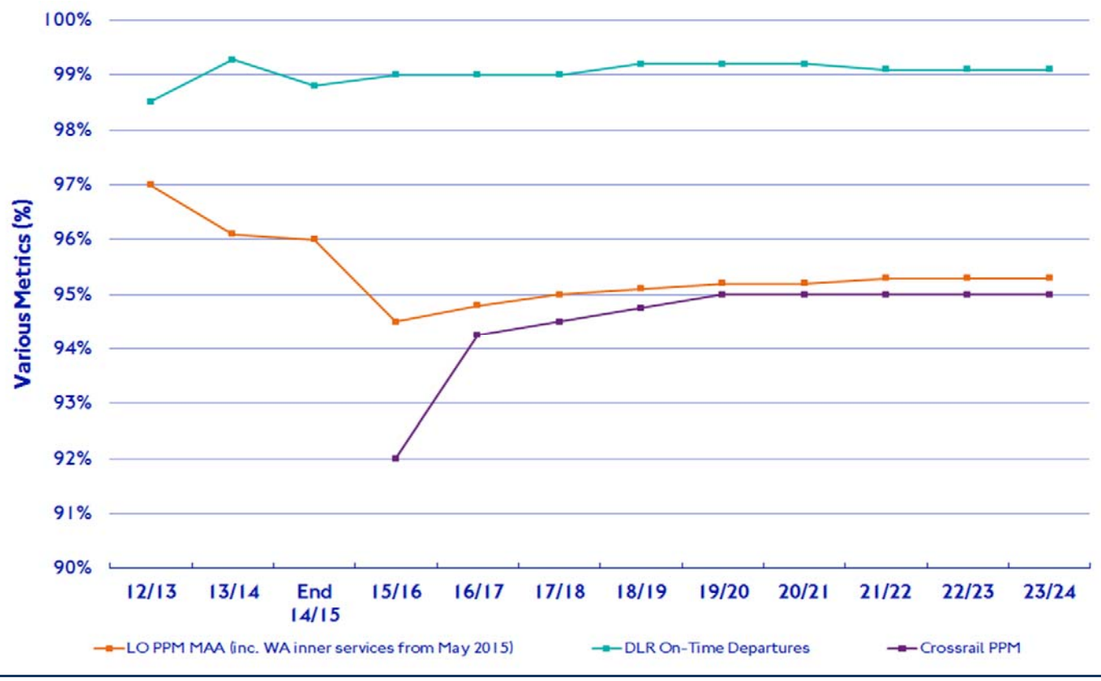
Assets: Asset LCH accounts for c.50% of total network LCH (exc. IR). Asset LCH will continue to improve over the first half of the plan as a direct result of the completion of the RAMS programme and core asset renewal (including the replacement of sub-assets/components). A further step change in LCH is expected as the SSR network is modernised, although any benefits will be offset at the end of the plan by an increase in LCH resulting from additional services delivered through our capacity programmes. See Section 3 for a more detailed explanation of Asset LCH (p.33).

Staff: Staff LCH accounts for c.20% of total network LCH (exc. IR). Staff LCH is forecasted to benefit from a programme of activity that aims to reduce Operator Not Available (ONA) and Staff Error LCH by c.45k LCH per period by 22/23. See Section 2 for a more detailed explanation of Staff / Customer / Other LCH (p.9).

Customer: Customer LCH accounts for c.22% of total network LCH (exc. IR). Customer LCH is forecasted to remain static across the plan. A review of the relationship between LCH and demand has been set up to test this assumption prior to next year's document.

Other: Other LCH accounts for c.8% of total network LCH (exc.IR). Other LCH is forecasted to remain static across the plan. Work has started to test this assumption for next year's document.

Reliability - On-Time Departures (DLR) and PPM (London Overground & Crossrail) - Figure 2



Over recent years the London Rail network has proven to be a service that can be relied on by customers.

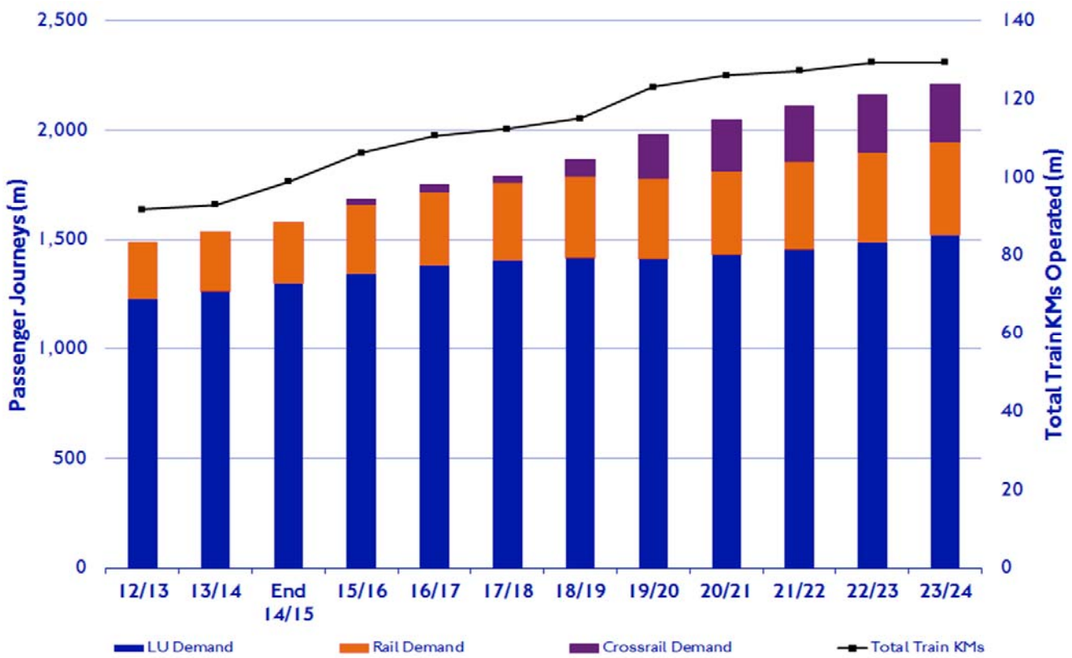
DLR: On-Time Departures performance has improved in recent years, exceeding 99% in 13/14. The current forecast represents the contractual target in the new Keolis Amey Docklands DLR franchise (calculated during the calibration of the new franchise performance regime). The slight dip in performance from 21/22 is caused by the introduction of new vehicles on the network as part of the Royal Docks Capacity Programme and the New Train for Docklands project. Combined, these projects will deliver 42 new fixed-formation, walk-through trains, four major station upgrades and increased capacity on the Beckton and City Airport lines.

London Overground: London Overground's Public Performance Measure (PPM) has improved significantly since TfL took over the franchise in 2007, and is now one of the top performing Train Operating Companies (TOCs) in the UK. Performance is expected to fall by 1.5 percentage points in 15/16 due to Network Rail and Southern's continued poor performance and as a direct result of the introduction of West Anglia inner services which are currently performing at a lower PPM than the existing network. Gradual improvements are expected from 15/16 onwards as LOROL take over operation of West Anglia inner services and through continuous improvement/resilience of existing network performance.

Crossrail: Crossrail will adopt a PPM measure of reliability as services begin operation from 15/16. The current forecast assumes an improvement from the current assumed base of 92% to 95% (the concession agreement target) by 19/20. The profile of improvement from 15/16 to 19/20 will be reviewed following commencement of services in 15/16.

R&U Network Summary

Capacity - Passenger Journeys (Millions) and Train Kilometres Operated (Millions) - R&U - Figure 3

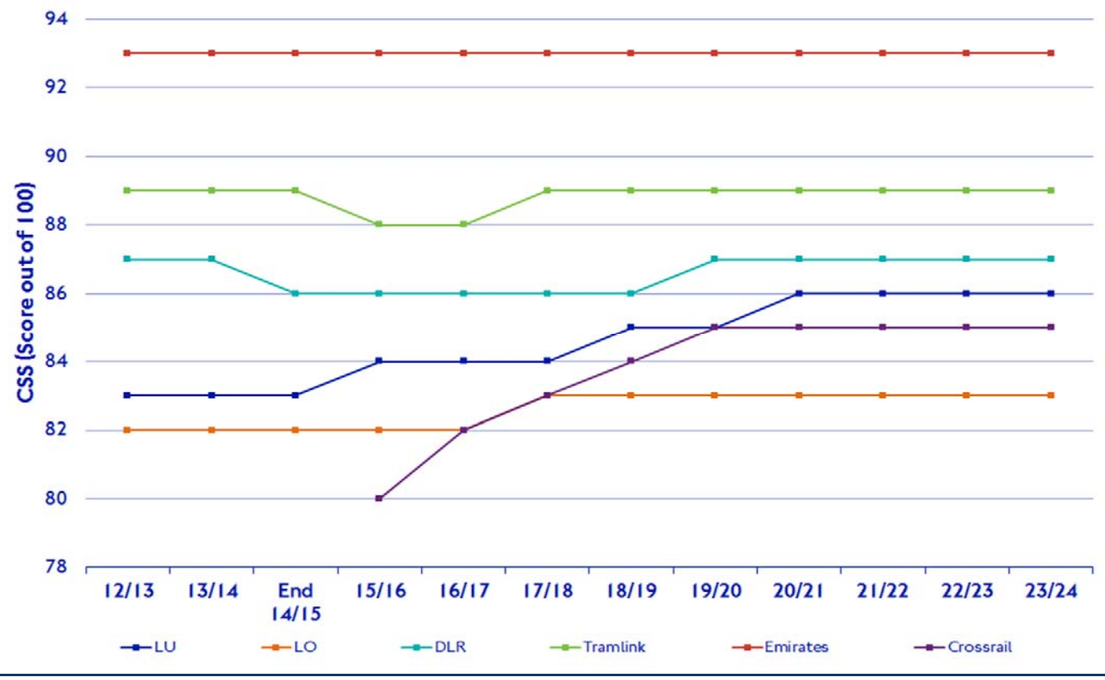


Demand for R&U services is expected to increase by approximately 40% between 14/15 and 23/24 as London's population expands. Providing additional capacity to cope with the growth in demand is an integral part of the R&U Strategy. The TfL Business Plan 2014 addresses the need for additional capacity through programmes focusing on growing the existing network (e.g. LU SSR modernisation, LU World Class Capacity (WCC), London Overground 5th-car and DLR double-tracking) and those which extend the network (e.g. Northern line Extension, Crossrail and Rail Devolution).

Crossrail perhaps provides the most significant of the changes planned, with the introduction of 10-carriage trains between Shenfield and Abbey Wood in the east and Central London and Reading to the west, providing a train every 2-3 mins during the peaks. Demand for Crossrail services is likely to be in the region of 200m passengers journeys in its first year of full operation (i.e. 19/20) . The introduction of Crossrail in 19/20 will slightly depress the demand for LU and London Rail services in the same year, although demand recovers in 20/21 and beyond.

It should be noted that while the TfL Business Plan 2014 delivers a significant enhancement in capacity compared to today's network, demand is still forecast to grow faster than supply, resulting in increased crowding at certain times and locations on the network. Further capacity upgrades beyond 23/24 will be required to support the ongoing growth in London beyond the life of this plan.

Customer Satisfaction - CSS - R&U - Figure 4



Customer research for LU suggests that a CSS score of 89 is indicative of world class performance, and that improvements approaching this figure become increasingly difficult to achieve.

London Underground: CSS is forecast to reach 86 by 20/21, which is maintained over the rest of the plan. Planned reliability initiatives and the SSR modernisation are significant drivers for this overall improvement.

DLR: DLR CSS is expected to remain constant at 86 until 19/20 where the introduction of Crossrail will temporarily reduce demand for DLR services and therefore have a positive effect on overcrowding. The arrival of new trains from 21/22 will support the sustained forecast of 87 over the end of the plan.

London Overground: CSS is forecast to improve over the plan to 83 from 17/18 as a number of key projects such as LOCIP and the electrification of Gospel Oak to Barking services are completed.

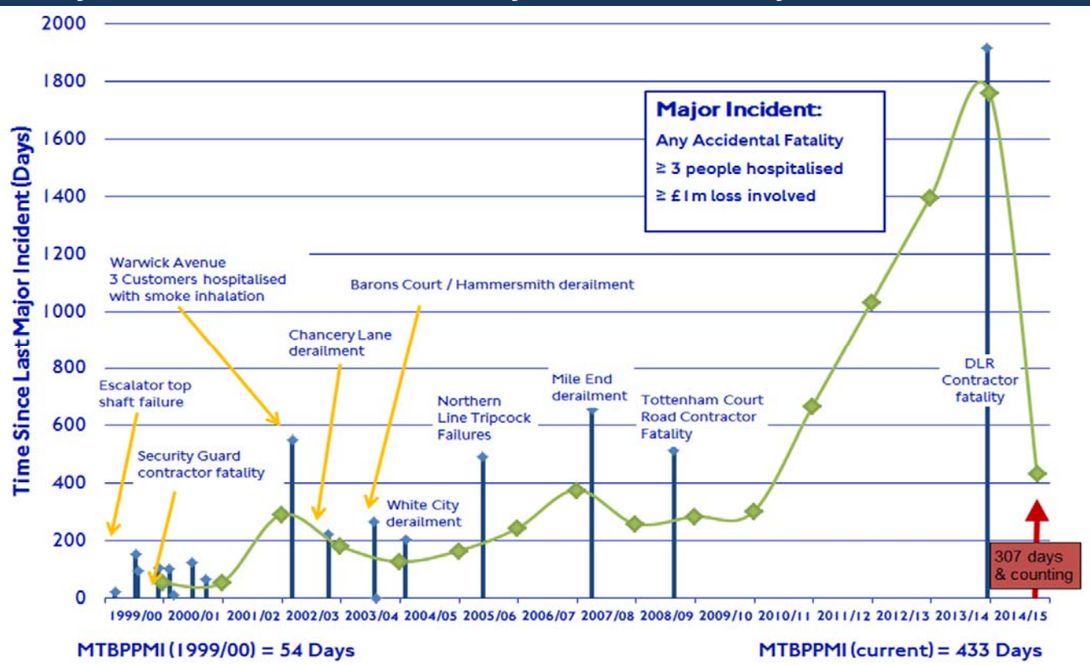
Tramlink: CSS scores remain high. The current CSS trend will be impacted by the disruption of services during the double tracking and platform works for the Wimbledon Enhancement Programme in 15/16 and 16/17.

Crossrail: CSS is expected to reach a high of 85 from 19/20 as the full route comes into operation.

Emirates Air Line: CSS is expected to remain at 93. As the score is already extremely high no specific funding or initiatives are planned to raise it any higher.

R&U Network Summary

Safety - Time Between Potentially Preventable Major Incidents (1999 to 2015) - London Underground & DLR - Figure 5

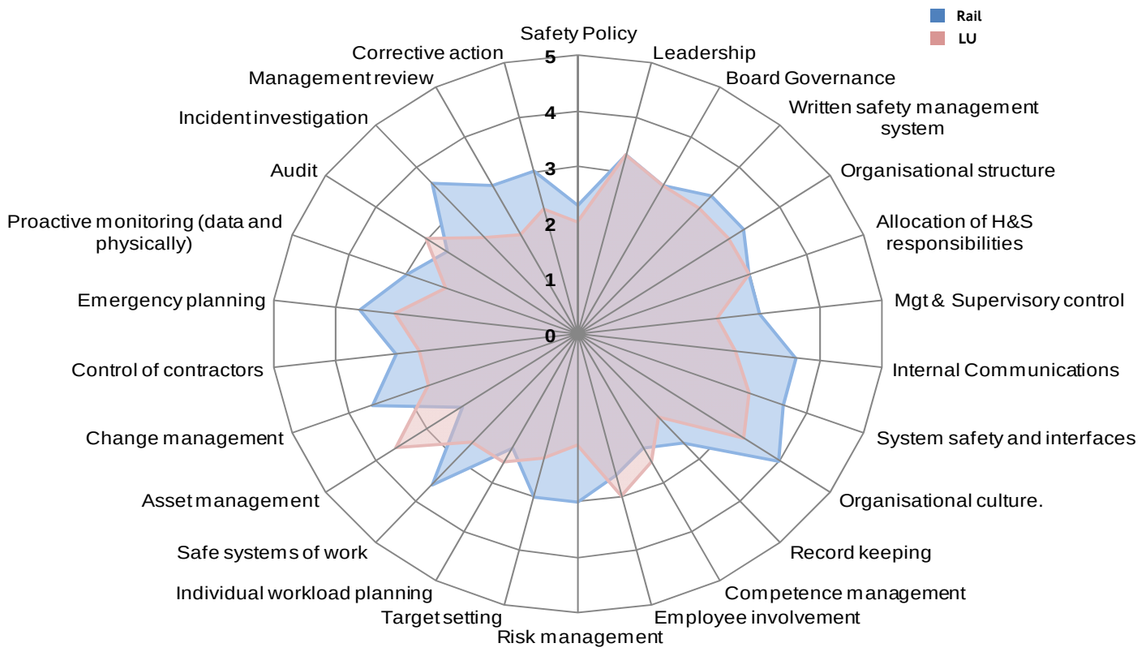


R&U has a clear health, safety and environment vision of: *Everyone Home Safe and Healthy Every Day* . This vision covers our customers, employees, contractors and members of the public affected by what we do.

Figure 5 shows the Mean Time between Potentially Preventable Major Incidents for R&U. Incidents are measured as: any accidental fatality to a customer, member of public, employee or contractor; three or more people hospitalised or a loss of £1m or more. The statistics therefore capture asset based incidents as well as occupational health and safety incidents. Since 1999 there has been a six-fold improvement in performance. This has been achieved against the backdrop of London's growing population and rapidly rising customer demand.

Today, based on statistics produced by the Office of Rail Regulation (ORR), R&U is amongst the safest railways in Europe. This has been achieved through substantial investment in asset renewals and modernisations, and enhanced maintenance alongside an ever strengthening safety management system - of which the asset management system is an integral part.

Safety - RM3 Maturity Model - R&U - Figure 6



The initial stage of an audit of London Underground against ISO 55001 – Asset Management has been concluded. This reviewed the structure of the organisation and management system to deliver sound asset management. The audit report indicates that London Underground has a management system meeting good practice. Further, during 14/15 an internal safety management system maturity assessment was conducted using the Office of Rail Regulation's Rail Management Maturity Model (RM3). The model covers all aspects of safety management. The result was an overall score of more than 3 (the top mark is 5). The findings of the assessment fed into the HSE Improvement Plan for 14/15 and will do so again in 15/16 - to further strengthen an already good Safety record.

R&U Network Summary

Cost

Financial Summary (£m, outturn including risk) - R&U - Table 1

Total Network Costs (£m outturn including risk)		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
COO Asset Maintenance	Fleet & Depots	290.3	334.1	355.9	316.3	288.6	300.3	307.6	327.6	338.7	351.1	**3,210.6**
	Signals	81.0	85.2	79.0	80.4	79.5	83.0	86.9	89.9	93.2	95.5	**853.5**
	Track	131.0	132.3	135.2	137.8	140.6	145.0	149.8	154.6	161.4	163.9	**1,451.5**
	Power	27.3	28.0	27.7	30.1	30.6	31.7	32.8	34.0	35.3	36.7	**314.3**
	Civils	26.3	25.8	25.1	26.4	27.1	27.8	28.6	29.4	30.4	31.5	**278.3**
	Stations	146.8	154.8	159.9	162.9	166.0	172.8	179.1	184.4	190.9	197.0	**1,714.5**
	Lifts & Escalators	37.8	38.3	39.4	41.6	43.2	46.0	48.8	50.0	52.9	54.9	**452.8**
COO Asset Maintenance Total		**740.6**	**798.5**	**822.1**	**795.5**	**775.4**	**806.6**	**833.6**	**869.9**	**902.7**	**930.6**	**8,275.6**
	Operations	773.0	809.7	812.4	827.0	853.5	885.3	909.4	945.3	975.8	1,009.0	**8,800.6**
COO Asset Maintenance & Operations		**1,513.6**	**1,608.2**	**1,634.5**	**1,622.5**	**1,629.0**	**1,691.9**	**1,743.0**	**1,815.2**	**1,878.6**	**1,939.6**	**17,076.2**
COO Non-Asset Costs	Engineering, Safety, Technical & Centrally Held COO Efficiencies	49.9	60.8	6.1	-1.1	7.6	2.7	3.1	2.1	-3.2	1.4	**129.3**
	Non Asset Specific Costs (mainly JNP specialist services)	81.2	66.2	100.6	90.0	71.2	78.8	82.3	100.9	102.2	102.6	**875.9**
Total Non-Asset Costs		**131.0**	**127.0**	**106.8**	**88.9**	**78.8**	**81.5**	**85.3**	**103.0**	**99.0**	**104.0**	**1,005.2**
COO Total Costs		**1,644.7**	**1,735.2**	**1,741.3**	**1,711.5**	**1,707.8**	**1,773.4**	**1,828.4**	**1,918.2**	**1,977.5**	**2,043.6**	**18,081.4**
CPD Asset Investment	Fleet & Depots	381.1	227.4	293.7	288.3	411.7	403.4	364.5	304.6	419.1	712.6	**3,806.4**
	Signals	119.4	125.7	258.4	224.8	240.7	279.7	332.3	309.6	309.7	195.6	**2,395.8**
	Track	262.8	291.7	247.8	273.9	206.7	183.4	246.2	222.8	254.1	231.8	**2,421.3**
	Power	62.3	89.5	75.7	75.2	88.9	78.2	82.4	81.0	76.6	90.8	**800.6**
	Civils	47.9	69.1	115.5	75.4	25.8	17.3	17.6	14.1	18.0	18.0	**418.7**
	Stations	368.0	377.0	379.8	348.5	232.2	230.1	364.9	147.0	181.1	167.2	**2,795.7**
	Lifts & Escalators	55.3	58.7	66.5	60.0	52.7	54.8	53.5	54.6	35.3	18.6	**510.1**
	Cooling the Tube	3.6	9.4	5.3	8.3	16.9	43.6	53.5	43.1	76.0	36.9	**296.8**
	ICT	17.9	20.1	29.8	13.0	16.0	12.8	34.0	65.0	131.0	125.0	**464.7**
CPD Asset Investment Total		**1,318.4**	**1,268.8**	**1,472.4**	**1,367.5**	**1,291.8**	**1,303.3**	**1,549.0**	**1,241.6**	**1,500.8**	**1,596.5**	**13,910.1**
CPD Non-Asset Costs	JNP Project Services & Non-IT Expenditure	1.9	5.4	7.4	8.9	0.7	0.5	3.3	0.6	5.3	0.3	**34.3**
	SSR Upgrade Non-Asset Costs	5.5	11.8	9.7	2.1	2.3	12.9	0.2	0.2	1.4	0.0	**46.1**
	Non-Asset Related RAMS	6.7	9.3	1.5	0.3	0.3	0.3	0.3	0.3	0.0	0.0	**19.0**
	Anticipated Programme Slippage	-101.0	-255.9	-311.1	-88.5	-20.8	69.4	41.1	-19.7	-55.1	-103.4	**-845.1**
	Fit For the Future Stations	32.9	82.9	37.0	1.3	0.8	0.8	0.8	0.9	0.9	0.9	**159.1**
	Central R&U Contingency Allowance	0.0	21.5	12.3	99.7	69.9	35.9	57.4	124.0	38.0	30.2	**488.7**
	Other (environmental, ATP etc)	112.6	119.6	107.5	59.2	32.9	47.7	12.9	3.2	2.9	-15.1	**483.4**
Total Non-Asset Costs		**58.5**	**-5.4**	**-135.8**	**83.1**	**86.0**	**167.4**	**116.0**	**109.5**	**-6.7**	**-87.1**	**385.5**
CPD Total Costs		**1,377.0**	**1,263.4**	**1,336.6**	**1,450.6**	**1,377.8**	**1,470.7**	**1,665.0**	**1,351.1**	**1,494.1**	**1,509.3**	**14,295.6**
London Rail Costs	Operating Expenditure	382.8	557.2	586.2	627.5	822.6	969.2	1,026.3	1,073.4	1,137.4	1,167.0	**8,349.6**
	Investment Programme	231.9	294.3	243.1	386.2	375.1	164.8	140.2	91.8	129.5	141.5	**2,198.3**
		614.7	**851.6**	**829.4**	**1,013.7**	**1,197.7**	**1,133.9**	**1,166.5**	**1,165.1**	**1,266.9**	**1,308.4**	**10,547.9**
LANP Total Outturn		**3,636.3**	**3,850.2**	**3,907.3**	**4,175.8**	**4,283.3**	**4,378.0**	**4,659.8**	**4,434.4**	**4,738.5**	**4,861.4**	**42,924.8**
Non LANP Programmes	Business Support: Finance, HR, ER, IM, PFI-Connect, PFI-BTP etc	350.1	467.7	584.3	474.9	420.7	511.3	318.3	289.6	362.0	375.6	**4,154.5**
	Utilities (including Traction)	99.4	113.9	118.5	119.4	120.6	129.3	142.4	155.4	166.0	176.2	**1,341.0**
	TfL Management Charge - Activity Only	28.4	31.7	33.2	34.9	36.0	37.1	38.3	39.6	41.0	42.5	**362.7**
	Traffic and Secondary Revenue	-2,964.2	-3,193.7	-3,444.8	-3,675.7	-4,041.4	-4,546.1	-4,928.0	-5,311.4	-5,702.9	-6,053.3	**-43,861.5**
Total		**-2,486.2**	**-2,580.5**	**-2,708.8**	**-3,046.6**	**-3,464.0**	**-3,868.4**	**-4,429.1**	**-4,826.8**	**-5,133.8**	**-5,459.0**	**-38,003.2**
Business Plan Total Outturn		**1,150.1**	**1,269.7**	**1,198.4**	**1,129.2**	**819.2**	**509.6**	**230.8**	**-392.4**	**-395.4**	**-597.7**	**4,921.7**

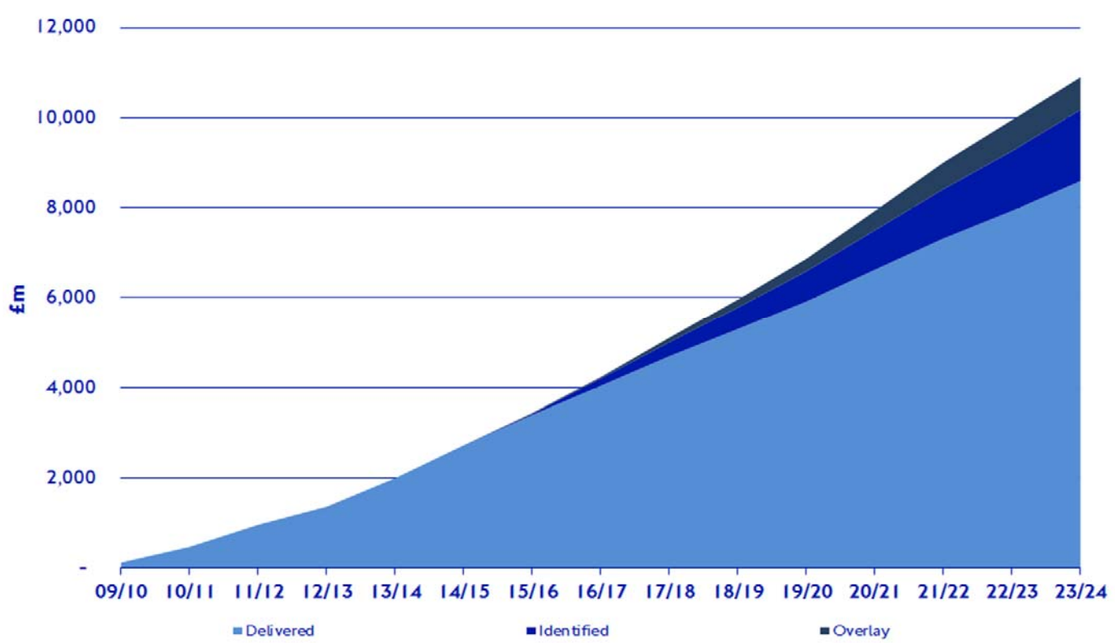
The R&U financial summary above aligns to the TfL Business Plan 2014.

For a more detailed summary of LU operational and asset spend please see the LU Line Plans (starting on p.9) and the LU Asset Plans (starting on p.33).

For a more detailed summary of DLR, London Overground, Tramlink, Emirates Air Line and Crossrail operational and asset spend please see the Rail Plans (starting on p.92).

R&U Network Summary

Cost - Proposed Net Efficiencies at Q3 2014/15 (£ms) - R&U - Figure 7

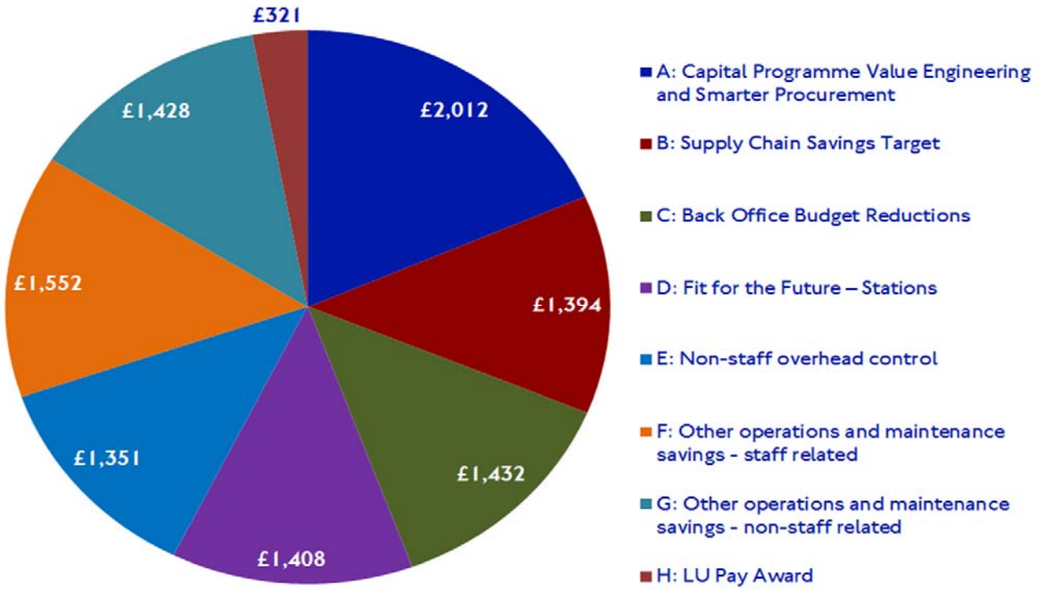


R&U has a target to deliver £10.9bn worth of efficiencies between 09/10 and 23/24. £10.9bn reflects the latest view of the R&U proposed net efficiencies forecast (which accounts for implementation costs of £505m). To date, £8.6bn has already been secured since 09/10, with a further £2.3bn to go. Of the £2.3bn, £0.7bn is assessed as being at risk with no provision in the TfL Business Plan 2014.

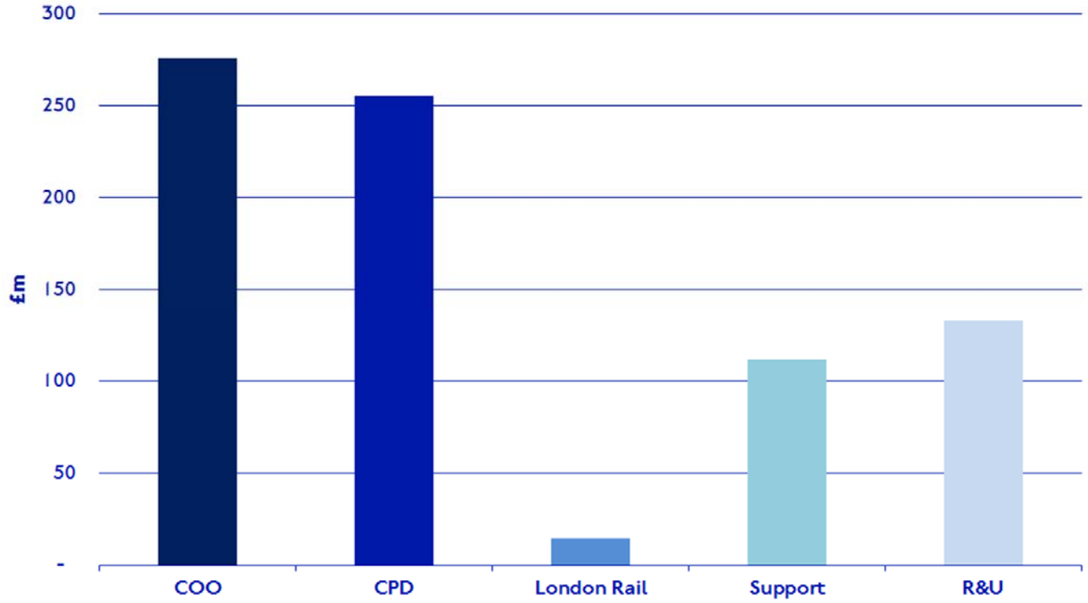
The target for 15/16 is £712m, of which £670m has already been secured. Of the £42m remaining, £17m is classified as 'Overlay', meaning there are no initiatives yet in place to secure this (with potential options being considered).

Key initiatives to go include; Fit for the Future - Stations, Track and Signals Maintenance Unit Rates, Access Savings and efficiencies from the Connect PFI contract.

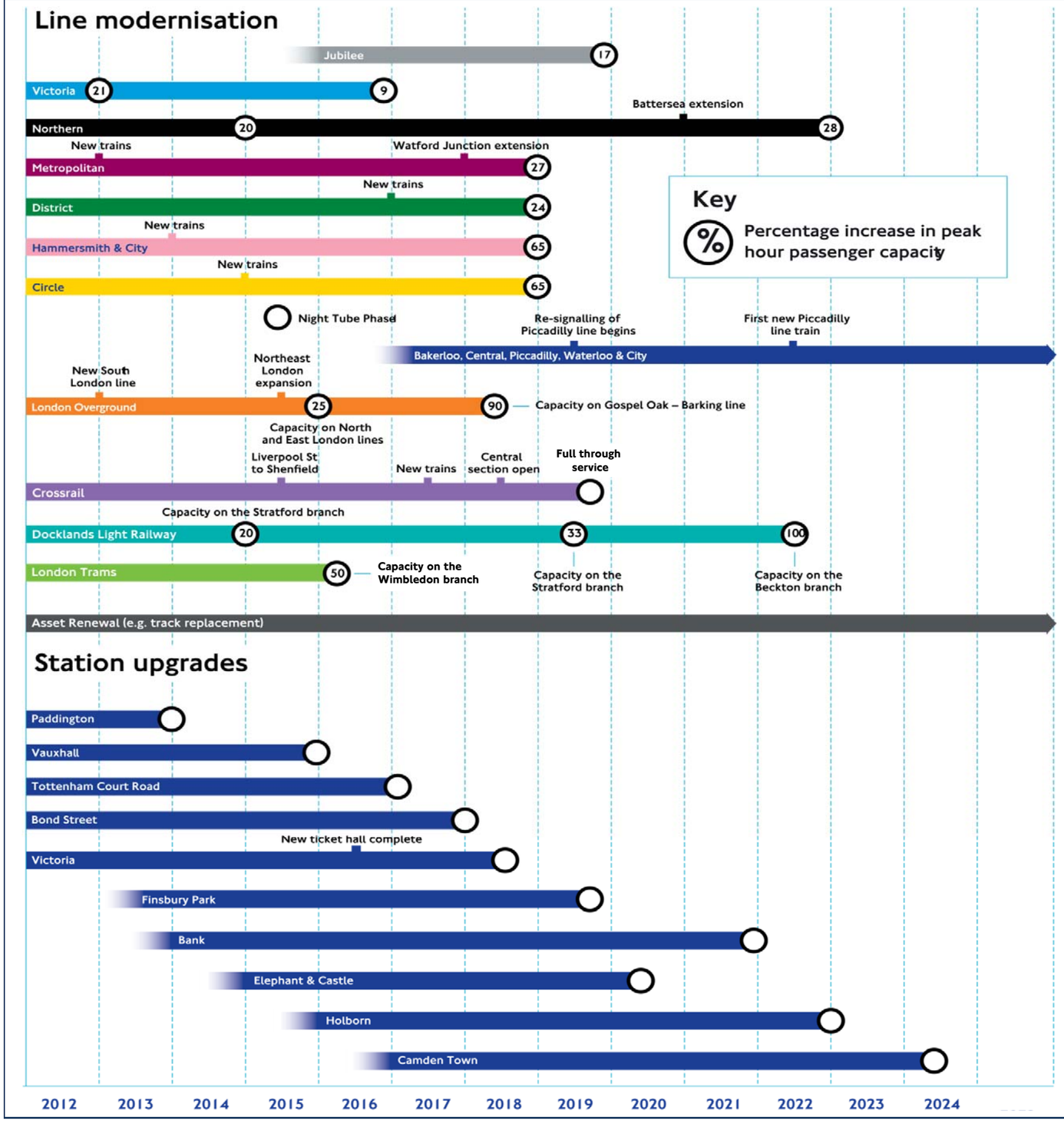
Cost - Proposed Net Efficiencies 2009/10 to 2023/24 (£ms) - Figure 8

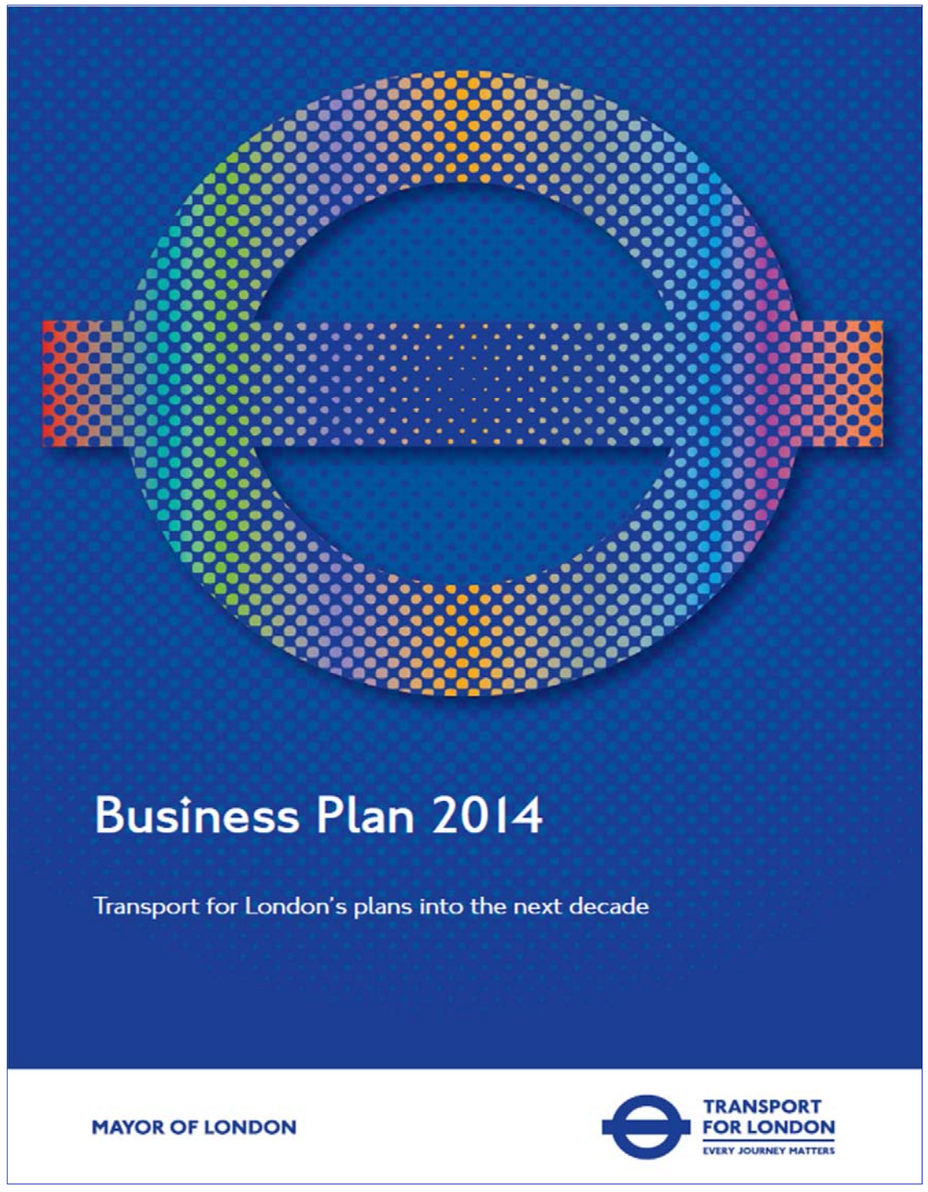


Cost - Potential Shortfalls 2014/15 to 2023/24 (£ms) - Figure 9



R&U Network Summary





R&U Network Summary

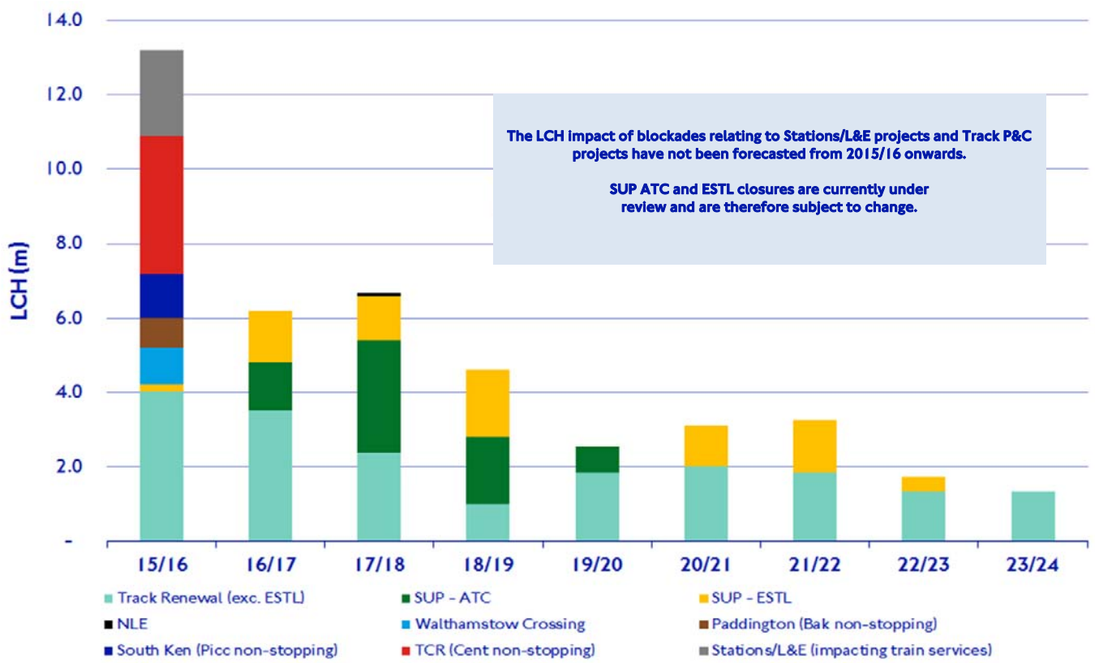
R&U have identified the following Strategic Risks facing the business:

Risk	Description	Owner	Current Exposure	Target Exposure
Inadequate Operating Performance	Inadequate operating performance causing disruption to the service.	COO	High	Medium
Industrial Relations Poorly Managed	Increased number of strikes could result in service disruptions, loss of revenue and impact of reputation.	HR/ER	High	Medium
Insufficient Funding and Inadequate Planning Processes	Failure to deliver funding requirements or poor planning leading to a review of business priorities.	R&U Finance	High	Medium
Failure to Deliver the Capital Investment Programme	Projects and programmes may not be delivered on time, budget or result in expected benefits. This could lead to accelerated costs, target benefits being delayed and risk the ongoing capital funding for DfT milestones.	CPD	High	Low
Failure to Deliver Key Elements of the People Strategy	R&U require delivery of a number of key initiatives in order to improve how employees are currently recruited, managed, rewarded and developed to ensure the availability of appropriate resources to deliver project, operational and change programmes.	HR/ER	Medium	Low
Catastrophic Incident	A major incident results in fatalities or multiple serious injuries to the travelling public, those working on our infrastructure or widespread disruption (including asset damage).	HSE	Low	Low
Failure or Over-reliance on a Critcal Supplier	Failure or over-reliance on a major or key supplier. This could be due to poor financial health of a key supplier, supplier unable to provide a level of service that meets R&U requirements coupled with absence of alternative supply route or key suppliers changing their business strategy and deciding to withdraw from market.	Commercial	Low	Low

R&U Strategic Risks are owned by the Rail and Underground Board (RUB) and are managed through the specialist risk software Active Risk Manager (ARM). This ensures that there are specific actions against each of the risks/opportunities so that they are mitigated /realised to an acceptable level. Additionally, R&U Strategic Risks are reported at TfL's Finance Leadership Team every quarter to ensure that TfL is correctly managing its risk exposure.

R&U Network Summary

Closures - Total LCH relating to planned closures (exc. passageway and minor L&E closures) - London Underground - Figure 10



Total LCH resulting from planned closures (excluding passageway and minor L&E closures) is expected to be c.13m LCH in 15/16. The main contributors to disruption are the non-stopping of the Central line to support the modernisation of Tottenham Court Road station, closures relating to the Track Partnership Programme and escalator works at South Kensington and Paddington.

The forecast for 16/17 onwards does not currently include assumptions regarding blockades relating to Station/L&E works or challenging Points and Crossing (P&C) renewals; the closure plans for these works are still under review.

Track Renewal LCH from 15/16 onwards has been forecasted using the volume of Ballasted Track Renewals (BTR) assumed in the Track LU Asset Plan and an average 'LCH per BTR closure' based on the Track Partnership programme as at Quarter 3 (14/15). The profile is therefore indicative only as: (i) the actual LCH for the programme will be highly dependent on the location of closures (which are still to be confirmed); and (ii) the forecast currently excludes P&C blockades. The Track Renewal forecast does however reflect the assumed reduction in BTR volumes between 17/18 and 19/20 and the improvement in BTR productivity from mechanised plant from 18/19. For more details about the LU track assets see p.51.

SUP ATC and ESTL closures reflect the latest programme as at Quarter 3 (14/15). These are currently under review and are likely to change as the project matures.

Closure requirements for key Station/L&E works from 16/17 onwards are still to be determined. These include projects at Holborn, Bank, Camden Town etc.

Closures - Number of Weekend Track Closures - London Underground, London Overground and DLR - Figure 11

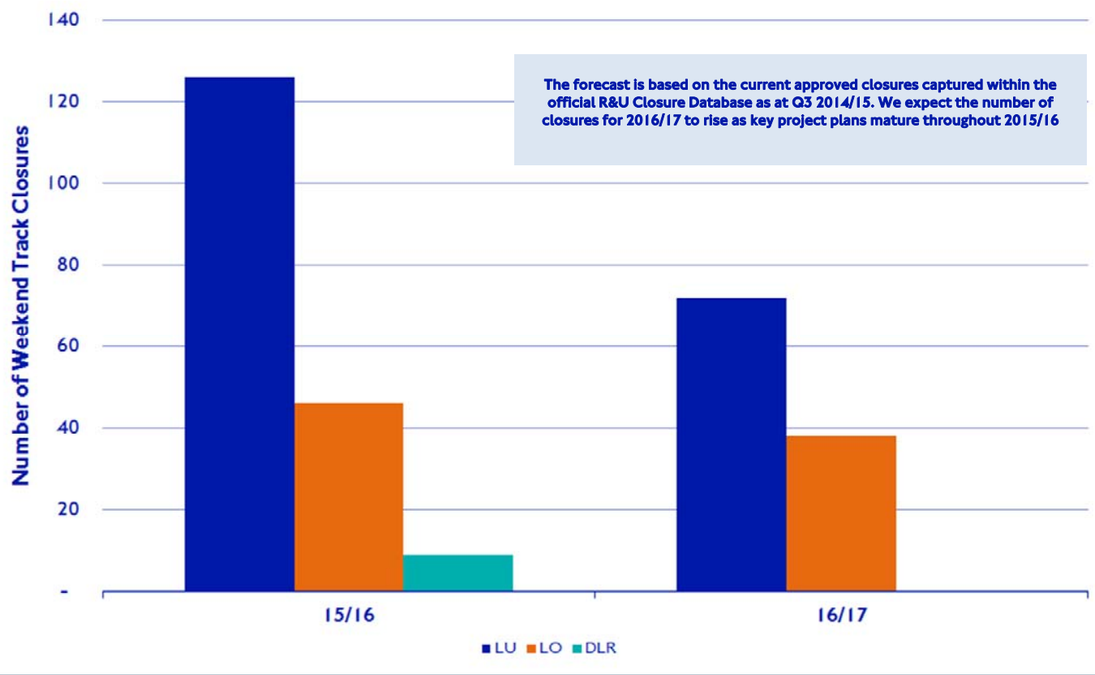


Figure 11 shows the current number of closures captured within the R&U Closure Database as at Quarter 3 (14/15). The number of closures assumed for 16/17 is expected to rise as project plans mature.

LU: there are currently 126 weekend closures programmed for 15/16. The majority of weekend closures are for track renewal works as part of the Track Partnership programme. Over 60% of the weekend closures in 15/16 are on the SSR network, with c.20% on both the JNP and BCV networks. 72 closures are current programmed for 16/17 (for a combination of SUP ATC, SUP ESTL and Track Renewal work). The number of closures in 16/17 is likely to rise as project plans mature throughout 15/16.

DLR: There are currently nine closures planned on the DLR. These included works to facilitate Crossrail services at Custom House and Pudding Mill Lane, and track renewal/heavy maintenance. No closures are currently programmed for 16/17; this is likely to change as project plans mature throughout 15/16.

LO: There are currently 46 closures planned on the London Overground network in 15/16 to support the LOCIP programme, electrification of the Gospel Oak branch, Crossrail and track heavy maintenance. 38 closures are programmed for 16/17; this is likely to change as project plans mature throughout 15/16.

2

LU Line Plans

Expected performance, cost and key deliverables by line

Bakerloo line

Headlines

- The plan focuses on maintaining the current levels of service and reliability until the modernisation of the line under the New Tube for London (NTfL) programme in the late 2020s

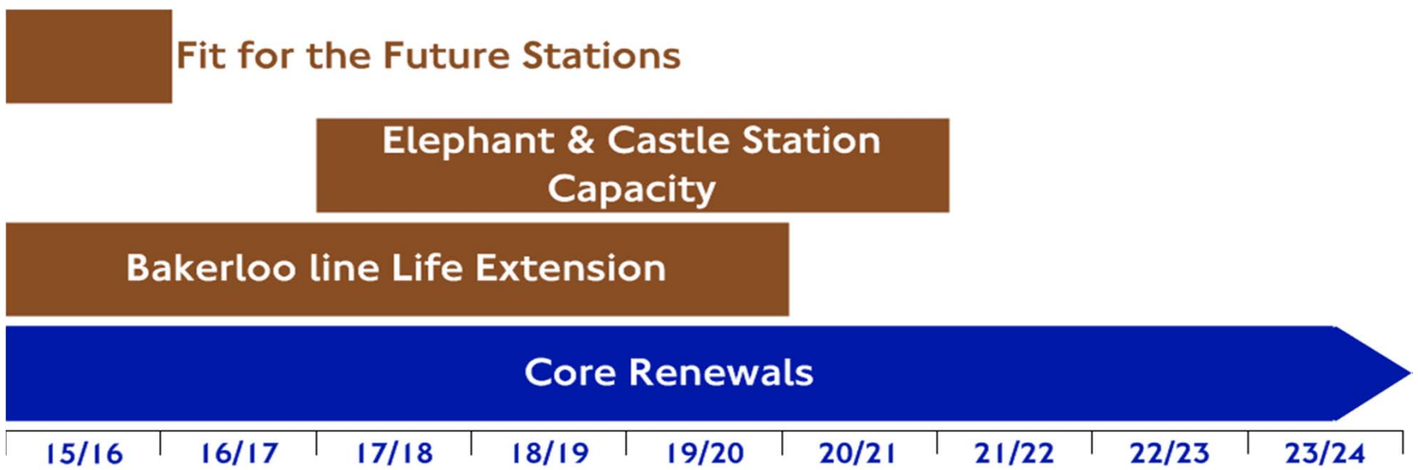
- Fleet reliability is a key focus of the plan through the fitment of BR76 Train Data Recorders, a weld repair project, life extension works and the continuation of core asset renewals

- The introduction of Working Timetable 40 (WTT40) in 15/16 sees a small increase in evening off-peak and Saturday service frequencies but there are no significant capacity benefits planned until NTfL (late 2020s)

The 37 year old Bakerloo line fleet is suffering from age related failures impairing its structural integrity. These issues will be addressed through life extension works

The station capacity works at Elephant & Castle and Fit for the Future - Stations will transform the customer experience

Key Deliverables & Facts



c.81m passenger journeys in 2013/14

Serves 25 stations

Fleet size: 36 trains (72TS)

97.6% of schedule operated in 2013/14 (as at Q3)

Traditional fixed block signalling with trainstop train protection

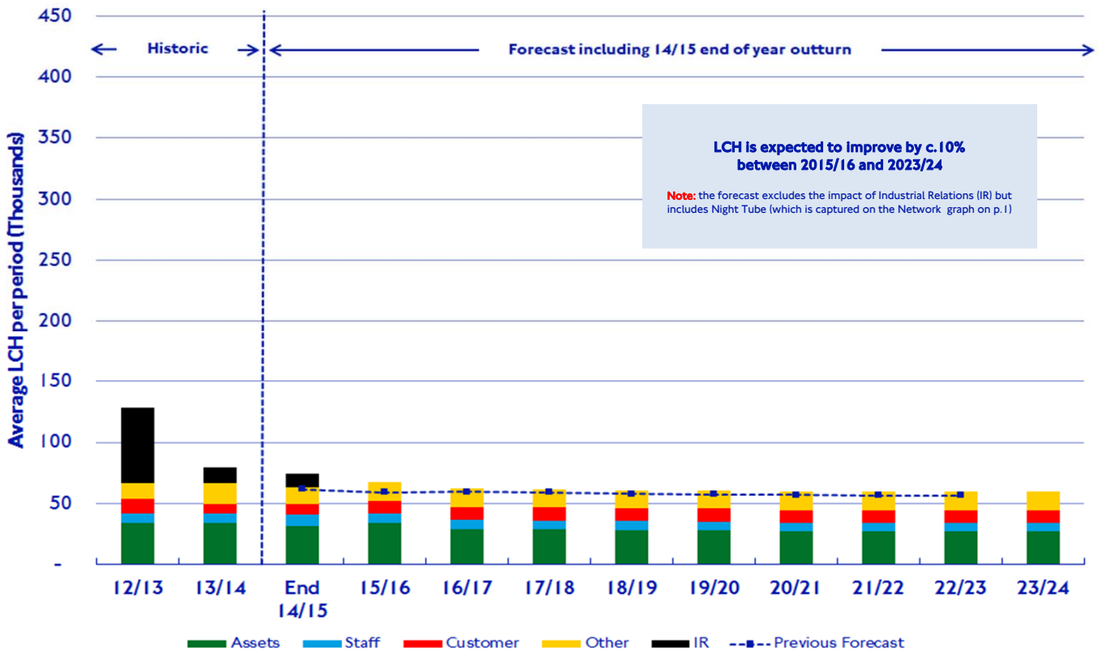
22 trains per hour (tph) operating during the peak

Total line length: c.32km including depots & sidings in both directions

Current Working Timetable: 39

Bakerloo line

Reliability - Lost Customer Hours (LCH) - Bakerloo line - Figure 12



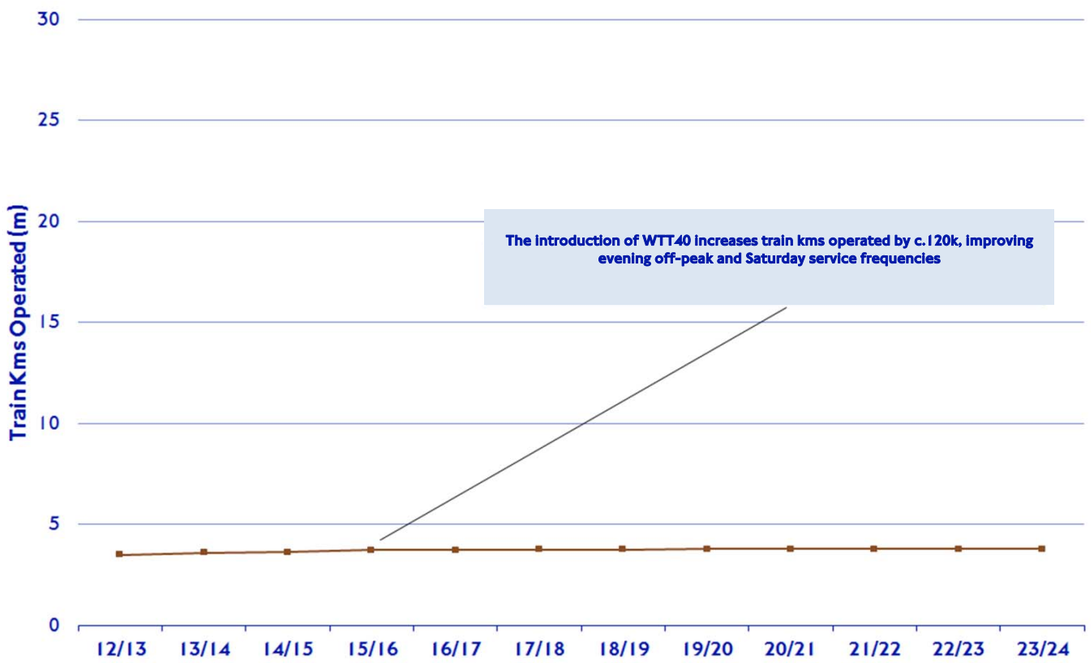
Asset: Asset LCH will account for c.30k LCH per period (c.50%) of total Bakerloo line LCH at the end of 14/15 (a marginal improvement on 13/14). In 15/16, performance is expected to revert back to 13/14 levels as additional demands are put upon Fleet, Signals and Track assets following the introduction of WTT 40. Reliability improves significantly in 16/17 as the benefits of the Train Data Recorder are fully realised (c. 5k LCH per period). From 17/18 onwards, Asset LCH is then forecasted to improve modestly as a result of the planned fleet life extension works and track renewals. Between Embankment and Waterloo, slurry ingress is posing a risk to the performance of the Track and Signals assets. This risk is being managed and a feasibility study is currently underway to identify an appropriate long-term solution.

Staff: Staff LCH in 15/16 (c.8k per period) is expected to be broadly similar to 14/15. Staff LCH is assumed to remain static up to 17/18 until the implementation of a number of initiatives that aim to reduce LCH relating to staff errors and the unavailability of train operators (i.e. ONAs).

Customer: Customer LCH in 15/16 (c.10k) is expected to be broadly similar to the current 14/15 trend. The forecast assumes that 15/16 performance is sustained across the plan, with planned initiatives (e.g. marketing campaigns, suicide training) broadly offsetting the impact of growing demand. A review of the relationship between LCH and demand has been set up to review this assumption prior to future LANP documents.

Other: Other LCH in 15/16 (c.15k) is expected to be broadly similar to the current 14/15 trend. It is assumed that the 15/16 performance is sustained across the plan.

Capacity - Train Kms Operated (Millions) - Bakerloo line - Figure 13



The planned capacity benefits scheduled as part of the NTfL programme have been deferred outside of the current planning horizon. As such, planned timetable improvements focus solely on getting the most from the existing train systems (i.e. fleet, power and signals), infrastructure and resources.

Currently, the only planned timetable improvement is WTT40, which is due to be implemented in May 2015. WTT40 is scheduled to enhance evening off-peak and weekend services, with a total increase in kilometrage of c.120k per annum, and additional passenger benefits of c.£2.6m per annum.

Line performance will continue to be reviewed periodically, with the impact of subsequently agreed timetable changes reflected in future LANP documents.

Cost Summary (£m, outturn) - Bakerloo line - Table 2

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Capital Investment											
Fleet & Depots	8.9	13.7	25.8	28.5	40.5	34.4	23.9	16.0	46.8	96.2	334.7
Signals	-	1.4	2.6	11.4	8.1	-	-	8.9	25.4	113.8	171.5
Track	5.0	8.3	16.3	5.6	5.2	2.6	19.5	16.3	11.1	14.7	104.7
Power	-	-	-	-	-	-	-	-	7.6	36.5	44.1
Civils	0.6	-	-	-	-	-	-	-	-	-	0.6
Stations	0.8	2.6	3.2	3.0	-	2.3	5.5	4.9	-	-	22.4
Lifts & Escalators	2.2	2.4	3.3	5.2	3.4	5.0	11.8	6.4	-	-	39.8
Total Capital Investment	17.6	28.4	51.3	53.7	57.1	44.3	60.8	52.6	90.9	261.2	717.8
Asset Maintenance											
Fleet & Depots (excl Heavy Overhaul)	12.0	13.2	13.0	13.7	14.1	14.4	14.3	14.8	15.4	16.0	140.9
Fleet Heavy Overhaul	4.8	7.9	4.0	4.2	4.4	4.5	4.4	4.6	4.7	4.9	48.3
Signals	3.1	2.5	2.6	2.6	2.6	2.7	2.8	2.9	3.1	3.2	28.1
Track	6.0	6.5	6.5	6.4	6.6	6.8	7.1	7.3	7.6	7.8	68.7
Power	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0
Total Asset Maintenance	26.0	30.2	26.2	27.0	27.8	28.6	28.7	29.7	30.8	32.0	287.1
Operations											
Service Control SC	4.0	4.0	4.2	4.3	4.5	4.6	4.8	4.9	5.1	5.3	45.7
Service Delivery Unit	0.6	0.5	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	8.0
Stations	23.6	23.9	26.8	27.7	28.7	29.8	30.8	31.9	33.1	34.4	290.8
Trains	15.9	17.1	17.7	18.4	19.0	19.8	20.4	21.1	21.9	22.7	194.0
Total Operations	44.0	45.4	49.5	51.2	53.0	55.1	56.9	58.9	61.0	63.4	538.5
Bakerloo Line Total*	87.6	104.0	126.9	132.0	137.9	128.0	146.4	141.2	182.7	356.5	1,543.3

*** Total excludes costs which cannot be broken down by line. For BCV, these are summarised on the BCV Network Cost Summary (page 18).**

Capital Investment: The LANP reflects the latest scope and delivery assumptions relating to the modernisation of the Bakerloo line as part of the NTfL programme (assumed to deliver in the late 2020s). The majority of capital investment is focused on the current Fleet, with funds allocated during the middle of the plan to undertake life extension works, deliver RVAR benefits and fix a number of urgent reliability issues (e.g. weld repairs) to ensure that all trains can continue to operate safely and reliably until their replacement. Investment in new trains and signalling for NTfL starts at the end of the plan; this focuses on the procurement of new trains and modern signalling (and the associated project management costs). The remaining capital investment focuses on core asset renewal, including track renewal and the refurbishment/replacement of L&E assets at Piccadilly Circus, Marylebone, Lambeth North and Elephant and Castle. It should be noted that the summary excludes: (i) the Elephant & Castle station capacity and step-free project budget which is currently held by TfL Planning; and (ii) capital investment that is either being delivered by and/or benefits the BCV network as a whole (a summary of which is provided on p.18).

Asset Maintenance: the table outlines Fleet & Depots, Signals, Track and Power maintenance costs only; costs for Civils, Stations and L&E are covered on the BCV Network Cost Summary on p.18. Fleet costs have fluctuated marginally since the last plan as a result of changes to the heavy maintenance programmes, with other key changes relating to track assets, notably the phasing of rail grinding and the inclusion of efficiency programmes including Automated Track Monitoring System (ATMS) savings.

Operations: Operations costs remain relatively steady across the plan. The forecasts exclude the impact of Fit for the Future - Stations, which is captured on the BCV Network Cost Summary (p.18) but include the forecasted impact of WTT40.

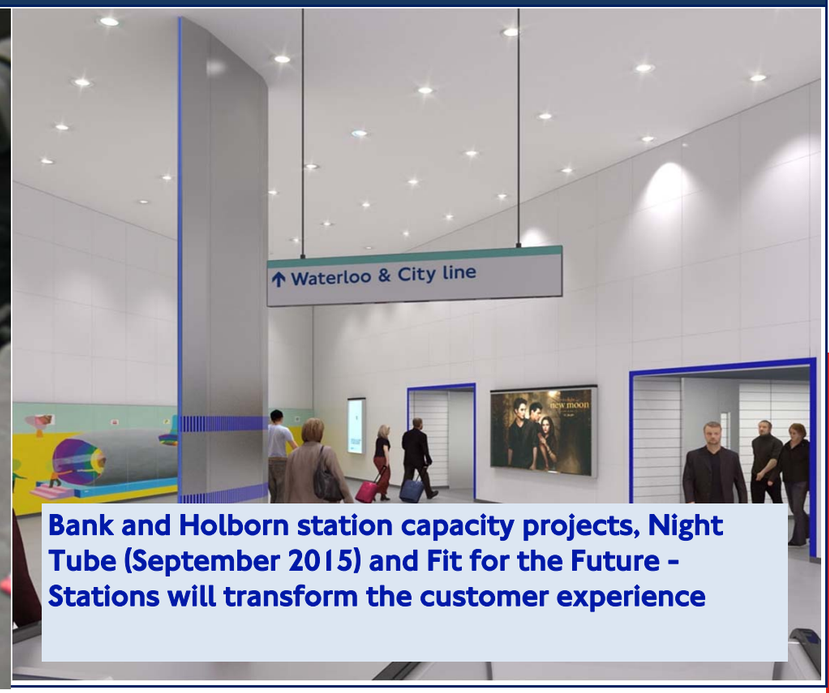
Central and Waterloo & City lines

Headlines

- The Central line fleet is currently operating beyond its design parameters - designed for 127,000km per annum, and currently operating 155,000km per annum (22% higher)

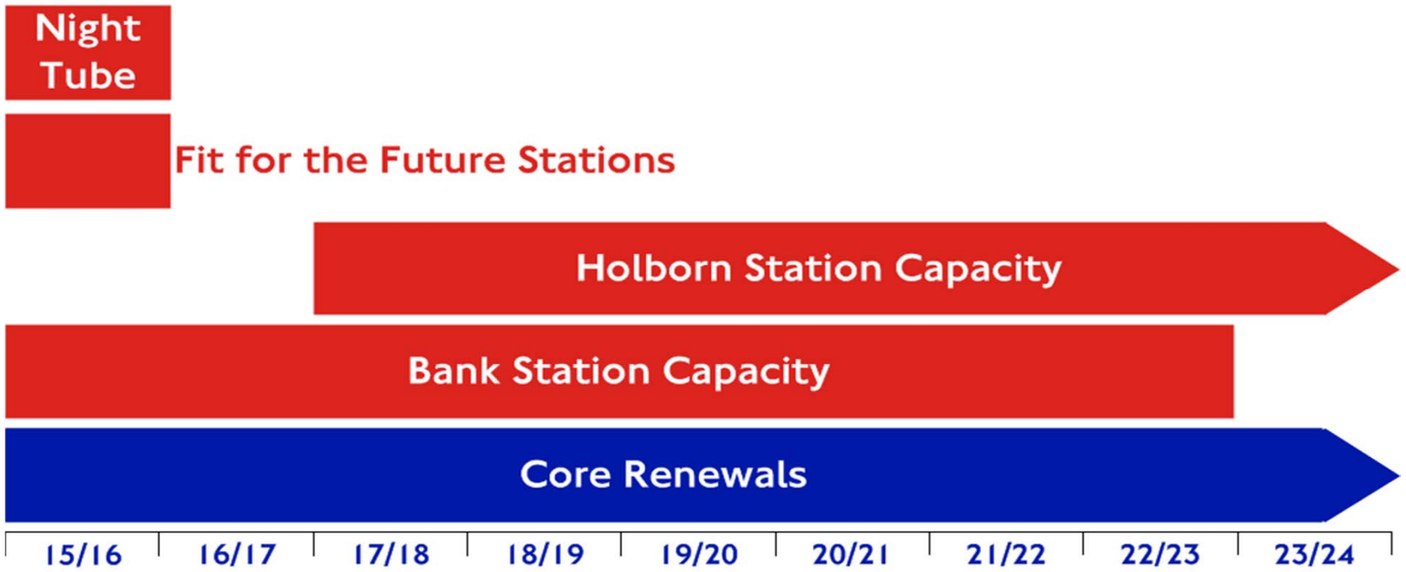
- Unplanned works (gearbox overhaul), the motor containment programme and poor overall reliability is causing high non-availability of trains to meet service. AC traction conversion, replacement of the Data Transmission System (DTS) and implementation of Working Timetable 68 (reducing peak service requirement) are expected to yield significant reliability improvements

The replacement of the DC traction system with AC will improve inter-station run times, fleet reliability, journey times and reduce maintenance costs



Bank and Holborn station capacity projects, Night Tube (September 2015) and Fit for the Future - Stations will transform the customer experience

Key Deliverables & Facts



c.196m Central line and c.10m W&C passenger journeys in 2013/14

Combined, the Central and W&C lines serve 51 stations

Fleet size: 85 Central line and 2.5 Waterloo & City line (92TS)

95.7% (Central line) and 97.3% (W&C line) schedule operated in 2014/15 (as at Q3)

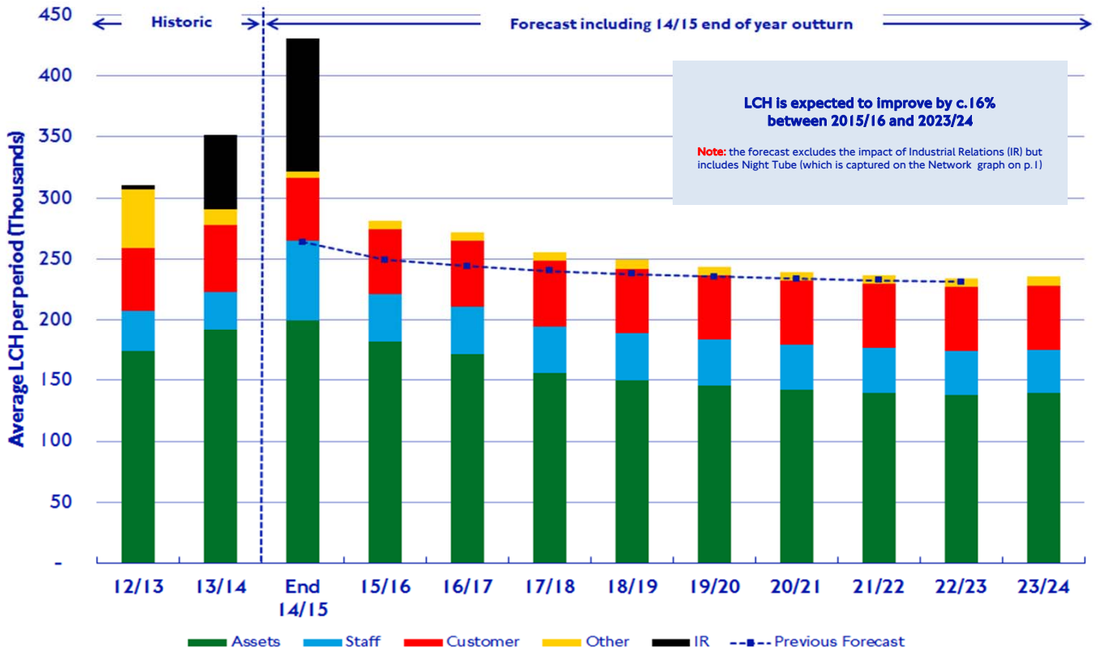
Westinghouse ATO and ATP (Central line) and traditional fixed block signalling (W&C line)

31 (Central line) and 22 (W&C line) trains per hour (tph) operating during the peak hour

Total line length: c.210km including depots & sidings in both directions

Current Working Timetables: 67 (Central line) and 6 (W&C line)

Reliability - Lost Customer Hours (LCH) - Central and W&C lines - Figure 14



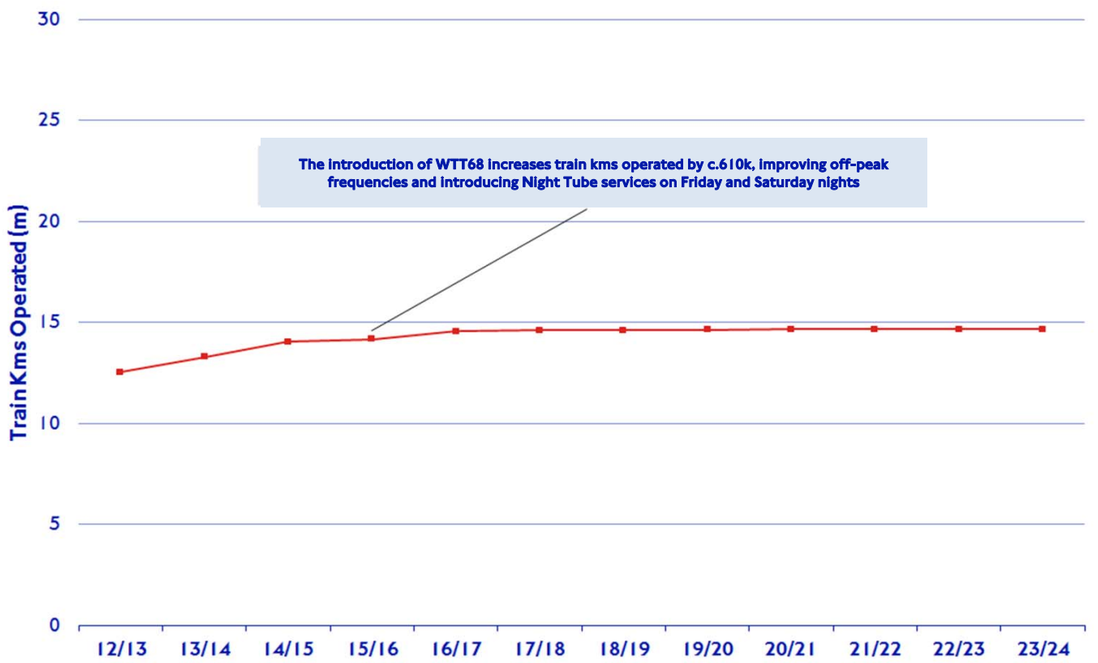
Assets: Asset LCH will account for c.200k LCH per period (c.45%) of total Central and W&C line LCH at the end of 14/15 (c.8k worse than 13/14). Asset reliability remains a concern, and the combination of unplanned works (e.g. gearbox overhaul to mitigate bearing failure), the motor containment programme and poor overall reliability is causing continued train availability issues. WTT68 in September 2015 will reduce the peak service requirement by one train, giving some relief, but availability will remain a challenge as planned reliability improvements are delivered between 2015 and 2020 (e.g. AC traction conversion and the Data Transmission System).

Staff: LCH relating to ONAs in 14/15 has been uncharacteristically high compared to recent years but has significantly improved in Quarter 3. Line management believe that the recent improved ONA trend can be maintained and this is reflected in the forecast for 15/16 (c.40k LCH) per period. The current forecast for 15/16 excludes any LCH risk for issues relating to the bedding in of WTT68. Staff LCH is assumed to remain static up to 17/18 until the implementation of a number of initiatives to reduce LCH relating to staff errors and ONAs.

Customer: Customer LCH in 15/16 (c.53k) is expected to be broadly similar to the current 14/15 trend. The forecast assumes that 15/16 performance is sustained across the plan, with planned initiatives (e.g. marketing campaigns, suicide training) broadly offsetting the impact of growing demand. A review of the relationship between LCH and demand has been set up to review this assumption prior to future LANP documents.

Other: Other LCH in 15/16 (c.7k) is based on the current 14/15 trend. It is assumed that the 15/16 performance is sustained across the plan.

Capacity - Train Kms Operated (Millions) - Central and W&C lines - Figure 15



Planned improvements to the Central and W&C lines as part of NTfL fall outside of the current planning horizon. As such, planned timetable improvements focus solely on getting the most from the existing train systems (i.e. fleet, power and signals), infrastructure and resources.

The next significant timetable improvement is WTT68, which is due to be implemented in September 2015. WTT68 is scheduled to enhance Sunday and early morning / late evening mid-week services, plus introduce all night services on Friday and Saturday nights as part of the Night Tube programme, with a total increase in kilometrage of c.610k per annum, and additional passenger benefits of c.£5m per annum.

Line performance will continue to be reviewed periodically, with the impact of subsequently agreed timetable changes reflected in future LANP documents.

Cost Summary (£m, outturn) - Central and W&C lines - Table 3

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Capital Investment											
Fleet & Depots	8.9	10.4	57.8	91.6	99.6	36.3	14.8	1.2	4.5	15.9	340.8
Signals	0.8	2.0	5.8	12.4	6.7	-	0.5	0.5	-	35.5	64.2
Track	21.8	16.9	22.3	11.6	18.4	27.0	22.3	29.7	34.2	32.1	236.3
Power	0.3	0.1	-	-	3.9	4.0	0.2	0.2	-	6.5	15.3
Civils	1.7	-	-	-	-	-	-	-	-	-	1.7
Stations	183.7	160.2	131.0	103.1	60.6	49.0	156.5	-42.8	0.1	-	801.4
Lifts & Escalators	4.3	1.9	7.1	6.3	4.5	6.8	4.3	7.1	0.6	-	42.8
Total Capital Investment	221.4	191.4	224.1	224.9	193.6	123.1	198.6	-4.1	39.4	89.9	1,502.4
Asset Maintenance											
Fleet & Depots (excl Heavy Overhaul)	29.9	28.8	28.8	32.8	21.6	34.7	35.5	38.7	40.0	43.1	333.9
Fleet Heavy Overhaul	5.0	47.4	56.9	22.1	13.5	4.1	4.3	12.7	13.2	13.6	192.8
Signals	14.9	15.0	15.1	15.1	15.2	15.8	16.2	16.7	17.3	17.9	159.2
Track	19.2	20.4	21.2	21.4	21.6	22.1	22.9	23.6	24.4	25.3	221.9
Power	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	4.7
Total Asset Maintenance	69.5	111.9	122.3	91.8	72.4	77.2	79.3	92.3	95.4	100.4	912.5
Operations											
Service Control SC	6.3	6.6	6.8	7.1	7.3	7.6	7.9	8.1	8.4	8.7	74.8
Service Delivery Unit	0.8	1.5	1.0	1.1	1.1	1.1	1.2	1.2	1.3	1.3	11.6
Stations	40.9	42.0	45.5	47.4	49.4	51.5	53.2	55.1	57.1	59.3	501.4
Trains	38.7	42.0	44.0	45.6	47.2	49.0	50.6	52.4	54.2	56.3	480.2
Total Operations	86.6	92.1	97.4	101.2	105.0	109.3	112.9	116.9	121.0	125.6	1,067.9
Central and W&C Line Total*	**377.5**	**395.4**	**443.9**	**417.9**	**370.9**	**309.6**	**390.7**	**205.1**	**255.8**	**315.9**	**3,482.8**

*** Total excludes costs which cannot be broken down by line. For BCV, these are summarised on the BCV Network Cost Summary (page 18).**

Capital Investment: Capital investment is focused on Fleet, Track and Stations. Fleet investment focuses on life extension and reliability works, including the continuation of the gearbox overhaul works, AC traction conversion and the replacement of the Data Transmission System (DTS). This investment will improve current fleet reliability and enable the 72TS to continue to serve the line until their planned replacement as part of NTfL (in the late 2020s). Investment in new trains and signalling for NTfL starts at the end of the plan; this focuses on the procurement of new trains and modern signalling (and the associated project management costs). In excess of £200m is to be invested in track assets through a programme of Ballasted Track Renewals (BTR) and Deep Tube Renewals (DTR), which will improve the condition of track and drive the strategy to replace track with a new modern track form. The Central line costs include several station upgrade projects including those at Tottenham Court Road, Bond Street and Bank (which includes a new Waterloo & City line entrance), with some station project costs recoverable from our development partners (as seen in year 21/22). It should be noted that the summary excludes capital investment that is either being delivered by and/or benefits the BCV network as a whole (a summary of which is provided on p.18).

Asset Maintenance: the table outlines Fleet & Depots, Signals, Track and Power maintenance costs only; costs for Civils, Stations and L&E are covered on the BCV Network Cost table on p.18. Fleet costs have fluctuated marginally since the last plan as a result of changes to the heavy maintenance programmes, with other key changes relating to track assets, notably the phasing of rail grinding and the inclusion of efficiency programmes including Automated Track Monitoring System (ATMS) savings.

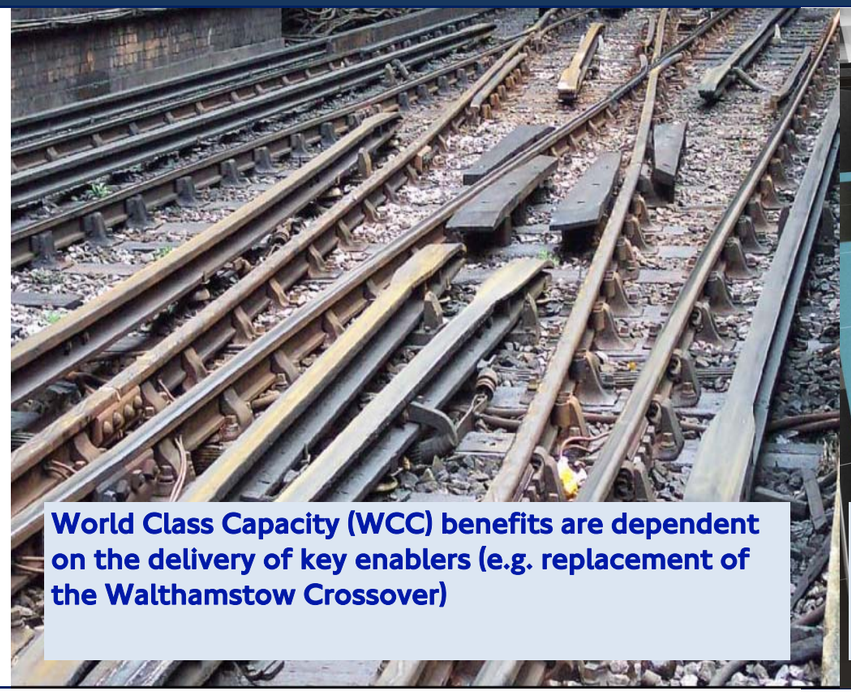
Operations: Operations costs remain relatively steady across the plan. There are no further timetable increases incorporated in the plan following WTT68 however minor increases in station staffing at Bank and Bond Street have been included following completion of station capacity works. The forecasts exclude the impact of Fit for the Future - Stations, which is captured on the BCV Network Cost Summary (p.18).

Victoria line

Headlines

- Following completion of the World Class Capacity (WCC) programme the Victoria line will run up to 36 trains per hour in the peak - space for an additional 5,000 passengers in the peak hour

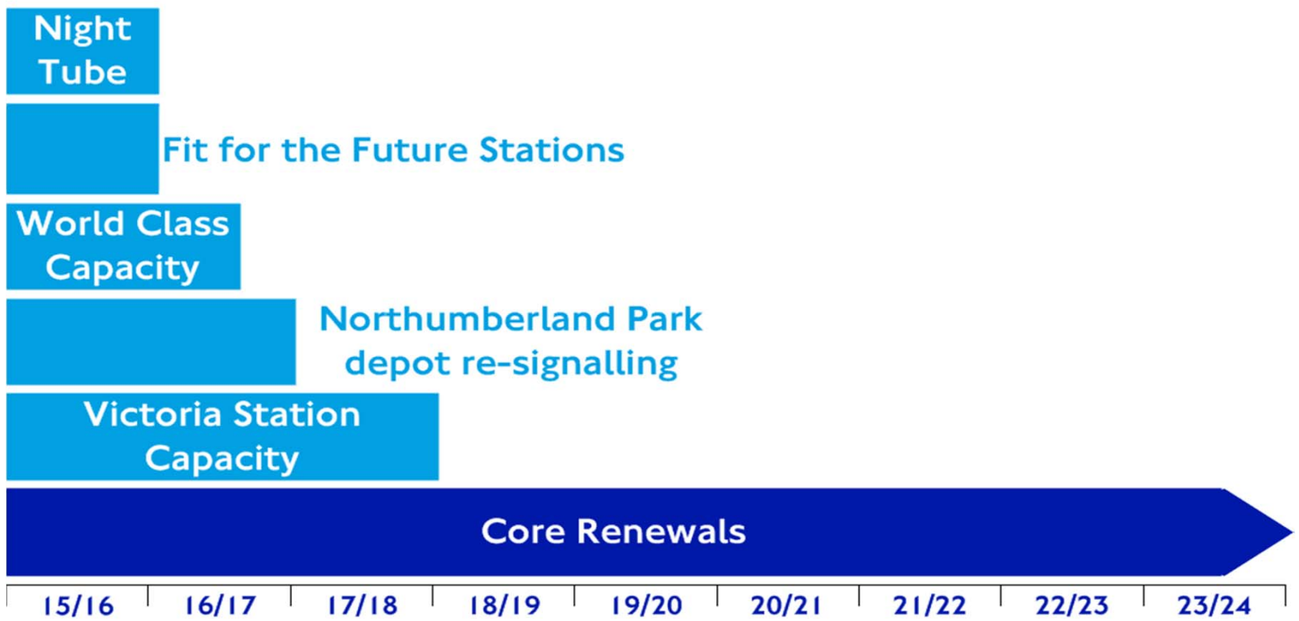
- Ongoing issues with door sensitive edge and train-borne signalling equipment are being addressed. Resolution of these issues will enable achievement of steady state reliability of 37,500km MDBF by 2017/18



World Class Capacity (WCC) benefits are dependent on the delivery of key enablers (e.g. replacement of the Walthamstow Crossover)

Victoria Station Upgrade, Night Tube and Fit for the Future - Stations to transform the customer experience

Key Deliverables & Facts



c.163m passenger journeys in 2013/14

Serves 16 stations

Fleet size: 47 trains (09TS)

98% of schedule operated in 2014/15 (as at Q3)

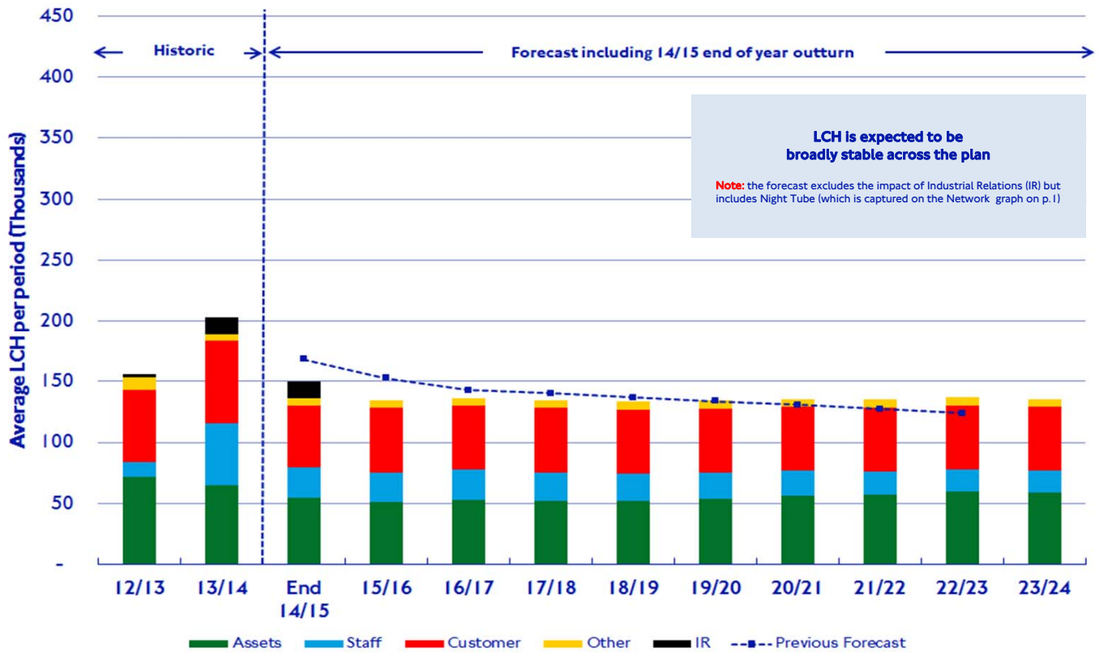
Modern DTR-G signalling system

33 trains per hour (tph) operating during the peak

Total line length: c.61km including depots & sidings in both directions

Current Working Timetable: 37

Reliability - Lost Customer Hours (LCH) - Victoria line - Figure 16



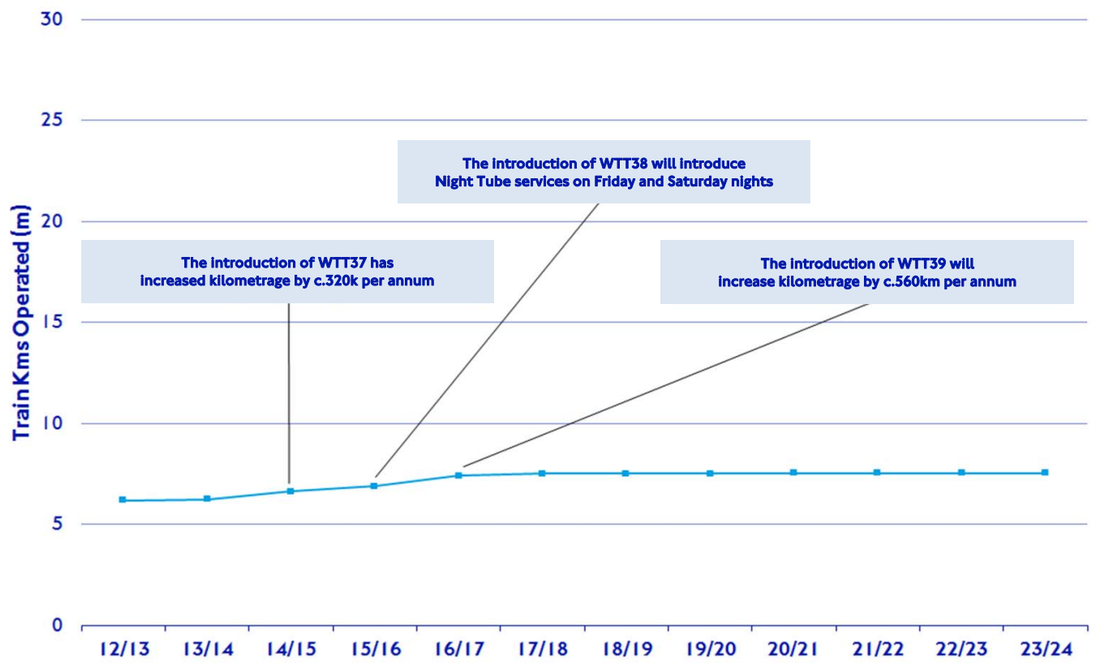
Assets: Asset LCH will account for c.54k LCH per period (c.40%) of total Victoria line LCH at the end of 14/15 (an improvement of c.10k LCH on 13/14). Reliability is expected to improve by c.3k per period in 15/16 as sensitive edge door (and other MDBF) issues are resolved on the 09TS. Asset LCH then deteriorates by c.7k LCH per period between 15/16 and 22/23. This is due to track related LCH, which despite the increase in track renewal projects over the end of the plan deteriorates due to the increase in capacity (and resulting asset degradation) following the delivery of the World Class Capacity (WCC) programme. Options for mitigating the forecasted deterioration in track asset condition will be considered as part of next year's business planning round.

Staff: Staff LCH in 15/16 (c.25k per period) is expected to be broadly similar to the current 14/15 trend. Staff LCH is assumed to remain static up to 17/18 until the implementation of a number of initiatives that aim to reduce LCH relating to staff errors and the unavailability of train operators (i.e. ONAs).

Customer: Customer LCH in 15/16 (c.53k) is expected to be broadly similar to the current 14/15 trend. The forecast assumes that 15/16 performance is sustained across the plan, with planned initiatives (e.g. marketing campaigns, suicide training) broadly offsetting the impact of growing demand. A review of the relationship between LCH and demand has been set up to review this assumption prior to future LANP documents.

Other: Other LCH in 15/16 (c.6k) is expected to be broadly similar to the current 14/15 trend. It is assumed that the 15/16 performance is sustained across the plan.

Capacity - Train Kms Operated (Millions) - Victoria line - Figure 17



The World Class Capacity (WCC) programme will provide additional capacity beyond that delivered by the recent line modernisation. The programme will focus on train, signalling, power and cooling modifications; in particular improvements to Walthamstow and Brixton crossovers, to enable implementation of up to 36 trains per hour in service (WTT39) in April 2016. WTT39 will increase kilometrage by approximately 560k per annum, with additional passenger benefits of c.£14.8m per annum.

WTT 38, implemented in September 2015, will introduce all night services on Friday and Saturday nights as part of the Night Tube programme.

Line performance will continue to be periodically reviewed, with the impact of subsequently agreed timetable changes reflected in future LANP documents.

Cost Summary (£m, outturn) - Victoria line - Table 4

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Capital Investment											
Fleet & Depots	2.2	9.2	3.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	16.6
Signals	2.1	12.1	7.8	2.8	1.8	-	-	-	-	-	26.6
Track	3.0	9.6	8.2	8.4	6.1	3.7	25.7	22.5	42.5	27.2	156.9
Power	0.3	3.2	1.0	3.6	-	-	-	-	-	-	8.2
Civils	0.0	-	-	-	-	-	-	-	-	-	0.0
Stations	102.2	98.3	105.9	62.9	28.3	8.0	11.2	6.4	10.0	6.5	439.8
Lifts & Escalators	2.7	3.0	6.2	1.5	-	-	0.7	1.9	-	-	16.1
Total Capital Investment	112.5	135.5	132.4	79.6	36.4	12.0	37.9	31.1	52.8	34.0	664.2
Asset Maintenance											
Fleet & Depots (excl Heavy Overhaul)	20.7	24.2	24.5	23.2	20.6	21.4	22.3	19.7	20.2	24.5	221.4
Fleet Heavy Overhaul	-	-	3.1	2.5	-	-	-	3.2	3.5	-	12.3
Signals	2.8	3.6	3.6	3.6	3.6	3.7	3.9	4.0	4.2	4.3	37.3
Track	7.3	8.4	8.6	8.8	9.1	9.4	9.6	10.0	10.3	10.7	92.2
Power	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	3.3
Total Asset Maintenance	31.0	36.5	40.1	38.3	33.5	34.9	36.2	37.4	38.6	39.9	366.4
Operations											
Service Control SC	3.9	4.0	4.1	4.3	4.4	4.6	4.8	4.9	5.1	5.3	45.3
Service Delivery Unit	0.5	0.4	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.9	7.3
Stations	16.6	16.9	18.5	19.6	20.2	21.0	21.7	22.5	23.3	24.2	204.6
Trains	21.2	24.2	26.1	26.9	27.8	28.9	29.8	30.9	31.9	33.2	280.8
Total Operations	42.1	45.5	49.4	51.4	53.3	55.3	57.1	59.1	61.2	63.5	538.0
Victoria Line Total*	185.6	217.5	221.9	169.4	123.2	102.2	131.2	127.6	152.5	137.4	1,568.6

*** Total excludes costs which cannot be broken down by line. For BCV, these are summarised on the BCV Network Cost Summary (page 18).**

Capital Investment: Following the modernisation of the line, focus has moved onto the completion of key station capacity upgrades and the delivery of the WCC programme in 16/17. The capital investment forecast includes station upgrade projects at Vauxhall and Finsbury Park, and most significantly at Victoria. The Victoria line WCC programme largely builds on existing asset infrastructure (mainly Power and Signals). The remaining capital investment focuses on track renewal, with the majority of work taking place over the end of the plan.

Asset Maintenance: Asset Maintenance costs shows Fleet & Depots, Signals, Stations, Track and Power maintenance costs only; costs for Civils, Stations and L&E are covered on the BCV Network Cost table on p.18. Fleet costs fluctuate as a result of changes to the TSSSA contract and phasing of heavy maintenance programmes, with other changes relating to track assets, notably the phasing of rail grinding and the inclusion of efficiency programmes including ATMS savings.

Operations: Operations costs remain relatively steady across the plan. Timetables 36 - 38 are incorporated into the first three years of the plan. The Victoria Station Upgrade project is expected to finish in 2017/18, with a marginal uplift in station staff.

BCV Network

Costs

Cost Summary (£m, outturn) - BCV Network - Table 5

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Capital Investment											
Fleet & Depots	4.5	3.4	9.5	16.8	13.2	9.3	0.9	0.6	1.5	1.0	60.7
Signals	0.5	0.7	0.2	-	-	-	-	-	-	-	1.4
Track	7.5	7.2	4.8	4.1	1.4	3.2	-	-	-	-	28.1
Power	0.2	0.7	0.7	0.5	0.5	0.5	-	-	-	-	3.0
Civils	8.2	3.0	0.6	0.6	0.7	0.7	0.7	0.7	-	6.3	21.5
Stations	0.1	-	-	-	-	-	-	-	-	-	0.1
Lifts & Escalators	10.5	13.6	15.7	16.7	17.5	21.4	19.9	23.5	19.1	18.6	176.5
Total Capital Investment	31.5	28.5	31.5	38.7	33.3	34.9	21.5	24.8	20.6	25.9	291.2
Asset Maintenance											
Fleet & Depots (excl Heavy Overhaul)	9.0	6.8	6.5	6.9	6.6	7.0	7.2	7.5	7.7	8.0	73.2
Fleet Heavy Overhaul	0.5	0.2	0.2	0.5	0.5	0.2	0.2	0.2	0.2	0.2	2.9
Signals	2.5	4.2	4.3	4.3	4.5	4.6	4.8	4.9	5.1	4.9	44.1
Track	7.5	7.4	7.7	7.9	8.1	8.5	8.7	9.0	9.3	6.5	80.4
Power	0.8	0.9	0.9	1.0	0.9	0.9	0.9	1.0	1.0	1.0	9.2
Civils	6.2	6.3	6.4	6.5	6.7	6.9	7.0	7.2	7.4	7.7	68.3
Stations	44.3	45.7	47.6	49.3	50.9	52.6	54.9	56.3	58.3	60.1	520.0
Lifts & Escalators	12.7	13.8	14.5	15.6	16.2	17.3	18.8	19.5	20.3	21.1	170.0
Total Asset Maintenance	83.3	85.3	88.1	92.0	94.4	98.0	102.5	105.6	109.4	109.6	968.3
Operations											
Service Control SC	-	-	-	-	-	-	-	-	-	-	-
Service Delivery Unit	3.3	6.7	0.0	-4.6	-5.0	-5.5	-5.7	-6.4	-6.3	-6.5	-29.9
FFFStations Overlay	-1.1	-5.1	-14.0	-15.5	-16.8	-17.9	-18.9	-19.9	-21.1	-21.9	-152.3
Stations	-	-	-	-	-	-	-	-	-	-	-
Trains	-	-	-	-	-	-	-	-	-	-	-
Total Operations	2.2	1.6	-14.0	-20.1	-21.8	-23.4	-24.6	-26.3	-27.4	-28.4	-182.2
BCV Network Only*	117.0	115.5	105.6	110.6	105.9	109.5	99.4	104.1	102.6	107.1	1,077.2

* Total includes costs not allocated to BCV lines

Capital Investment: Table 5 above shows BCV costs that are held centrally rather than allocated directly to a line. For capital investment this includes Bakerloo and Central line RVAR costs (in Fleet & Depots), the tunnel cleaning train, life extension works of battery locomotives and the track monitoring system. L&E costs mainly cover the L&E replacement and refurbishment programme.

Asset Maintenance: Table 5 covers all Civils, Stations and L&E maintenance costs which are managed centrally rather than on a line-by-line basis. Fleet costs held centrally relate to depot security, engineering, training and overheads etc.

Operations: Table 5 outlines the proposed savings on the BCV network resulting from the Fit for the Future - Stations Programme and assumed efficiencies to central overheads.

Jubilee line

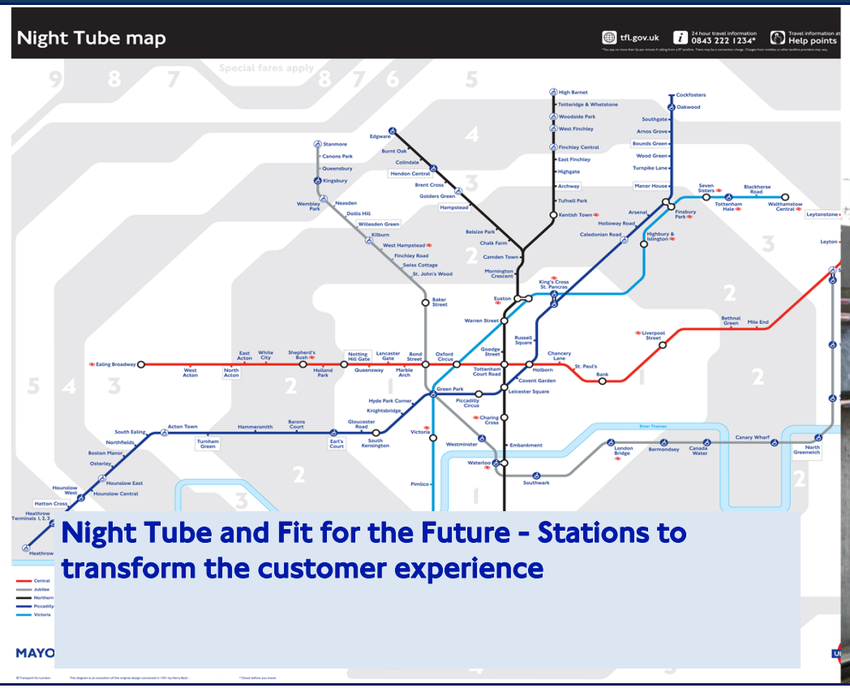
Context & Deliverables

Headlines

- Continued fleet reliability improvements achieved through a comprehensive package of RAMS initiatives

- Ten additional trains will be procured as part of the World Class Capacity programme, enabling a significant frequency increase

- The mid-life fleet refurbishment will refresh passenger facing assets. It will require one train out of service for two weeks at a time, reducing train availability (and service flexibility/recovery)



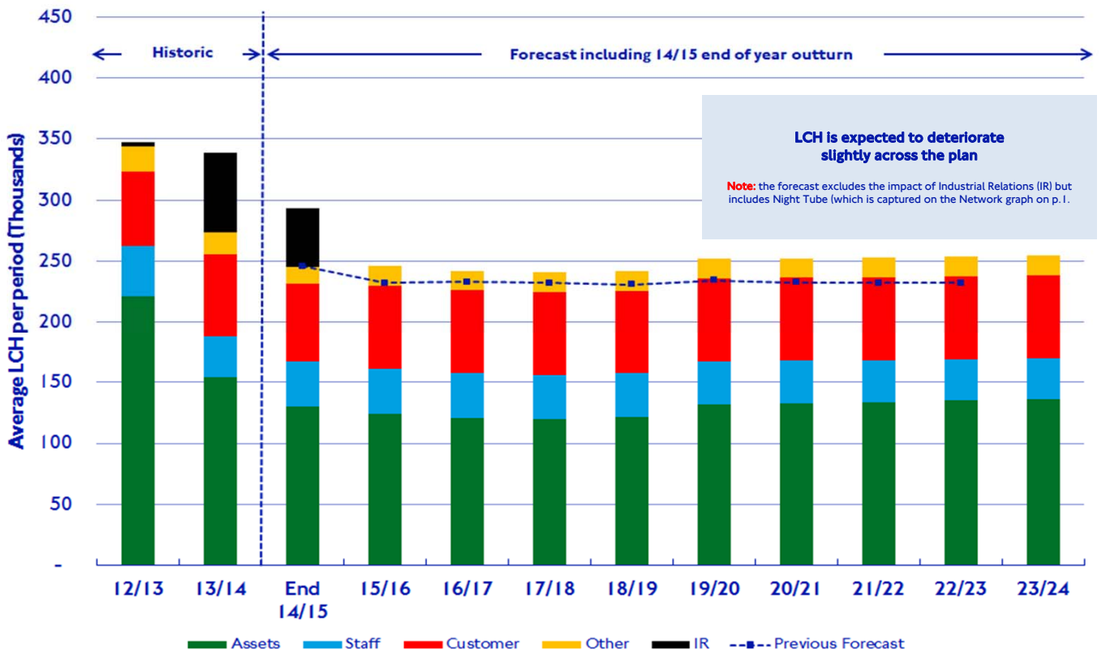
Night Tube and Fit for the Future - Stations to transform the customer experience

The World Class Capacity (WCC) programme will focus on increasing the size of the fleet alongside track and signals enabling works to increase peak frequencies by up to 6 trains per hour by 2019/20

Key Deliverables & Facts

- c.173m passenger journeys in 2013/14
- Serves 27 stations
- Fleet size: 63 trains (96TS)
- 97.9% of schedule operated in 2014/15 (as at Q3)
- Thales SelTrac S40 Transmission Based Control System (TBTC)
- 30 trains per hour (tph) operating during the peak
- Total line length: c.118km including depots & sidings in both directions
- Current Working Timetable: 13

Reliability - Lost Customer Hours (LCH) - Jubilee line - Figure 18



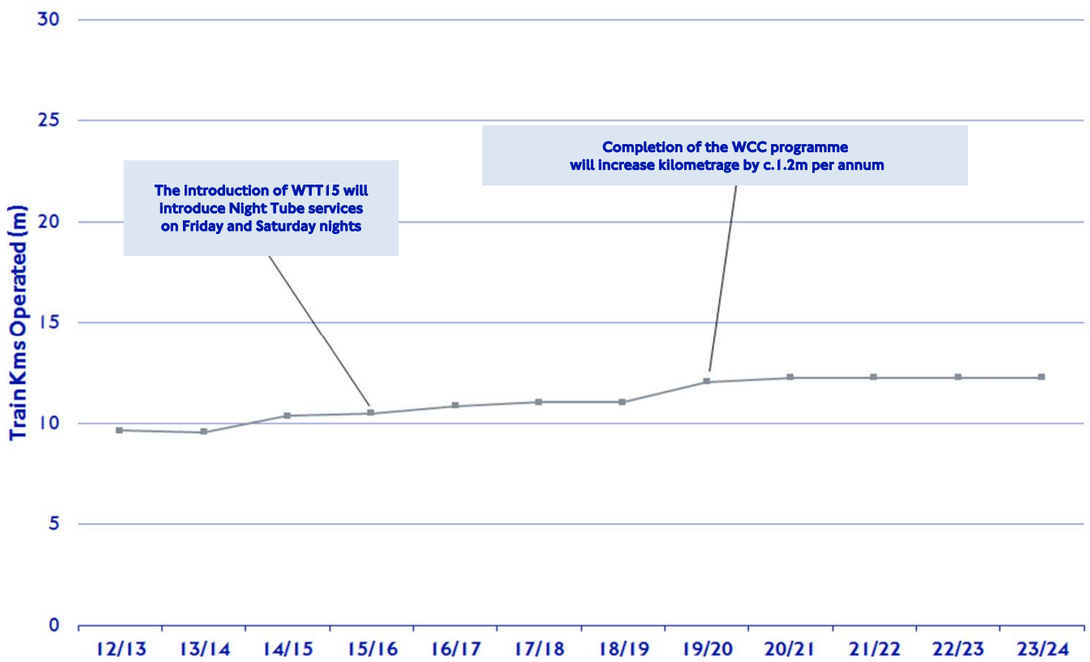
Assets: Asset LCH will account for c.130k LCH per period (c.45%) of total Jubilee line LCH at the end of 14/15 (an improvement of 20k LCH on 13/14). Further reductions in Asset LCH are predicted in the early part of the plan through a comprehensive package of RAMS initiatives, including traction system improvements, the replacement of obsolete electronic components and signalling initiatives such as 'point care' and TBTC loop failure reduction. LCH levels are predicted to return to 14/15 levels in the latter half of the plan as a result of the increase in capacity resulting from the World Class Capacity (WCC) programme, with the line benefitting from additional trains in service (a c.10% increase in total kilometres).

Staff: Staff LCH in 15/16 (c.36k per period) is expected to be broadly similar to the current 14/15 trend. Staff LCH is assumed to remain static up to 17/18 until the implementation of a number of initiatives that aim to reduce LCH relating to staff errors and the unavailability of train operators (i.e. ONAs).

Customer: Customer LCH is expected to be c.68k per period in 15/16. This is slightly higher than the current trend but account for the likely disruption of the National Rail services at London Bridge. The forecast assumes that 15/16 performance is sustained across the plan, with planned initiatives (e.g. marketing campaigns, suicide training) broadly offsetting the impact of growing demand. A review of the relationship between LCH and demand has been set up to review this assumption prior to future LANP documents.

Other: Other LCH in 15/16 (c.16k) is expected to be broadly similar to the current 14/15 trend. It is assumed that the 15/16 performance is sustained across the plan.

Capacity - Train Kms Operated (Millions) - Jubilee line - Figure 19



WTT 15, implemented in September 2015, will introduce all night services on Friday and Saturday nights as part of the Night Tube programme.

The World Class Capacity (WCC) programme will maximise the benefits of the earlier line modernisation, focusing on increasing the size of the fleet, as well as enabling works on track and signalling assets. This will ultimately deliver a peak service on the line of up to 36 trains per hour and an off-peak service of up to 27 trains per hour. The programme is scheduled to complete in May 2019 with a resultant increase of c.1.2m kilometres per annum and customer benefits of £55m per annum.

Line performance will continue to be reviewed periodically, with the impact of subsequently agreed timetable changes reflected in future LANP documents.

Cost Summary (£m, outturn) - Jubilee line - Table 6

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Capital Investment											
Fleet & Depots	3.3	18.0	22.1	8.1	33.2	55.3	36.8	5.0	-	-	181.9
Signals	22.5	4.9	26.2	24.7	10.0	7.2	0.1	-	-	-	95.7
Track	0.2	1.8	9.5	6.1	0.8	-	-	-	-	-	18.4
Power	0.1	1.1	4.4	3.2	0.3	-	-	-	-	-	9.1
Civils	9.7	7.9	2.2	2.5	0.1	0.0	0.0	0.0	0.0	0.0	22.5
Stations	1.6	0.0	0.0	-	-	-	-	-	-	-	1.6
Lifts & Escalators	8.3	7.4	8.6	8.0	-	-	-	-	-	-	32.3
Total Capital Investment	45.8	41.2	73.1	52.6	44.4	62.5	36.9	5.0	0.0	0.0	361.5
Asset Maintenance											
Fleet & Depots (excl Heavy Overhaul)	15.2	13.1	14.5	15.0	15.1	15.6	16.1	16.7	17.3	18.5	157.0
Fleet Heavy Overhaul	4.6	1.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	8.0
Signals	5.3	3.2	3.1	3.3	3.4	3.5	3.6	3.7	3.9	4.0	37.0
Track	9.5	9.0	9.7	10.1	9.6	9.5	9.9	10.2	10.6	10.7	98.9
Power	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	5.1
Total Asset Maintenance	35.0	26.9	28.0	29.1	28.8	29.4	30.5	31.5	32.6	34.1	305.9
Operations											
Service Control SC	6.2	6.3	6.5	6.7	7.0	7.2	7.5	7.7	8.0	8.3	71.5
Service Delivery Unit	0.8	1.1	1.0	1.0	1.0	1.1	1.1	1.1	1.2	1.2	10.6
Stations	38.0	39.2	42.2	43.7	45.3	47.0	48.6	50.3	52.1	53.9	460.3
Trains	29.4	32.2	33.5	34.8	36.0	41.5	43.2	44.7	46.2	47.8	389.5
Total Operations	74.5	78.9	83.2	86.3	89.3	96.8	100.4	103.8	107.5	111.3	931.9
Jubilee Line Total*	155.2	147.0	184.3	168.0	162.6	188.8	167.7	140.3	140.1	145.3	1,599.4

*** Total excludes costs which cannot be broken down by line. For JNP, these are summarised on the JNP Network Cost Summary (page 28).**

Capital Investment: The capital investment forecast includes the World Class Capacity (WCC) programme which builds on the completed modernisation of the Jubilee line to further enhance train frequencies. Unlike the Victoria line WCC programme, additional trains are required to deliver programme requirements incurring significant additional fleet costs. The cost of trains amounts to nearly £140m of the overall programme cost of £250m. Mid-life fleet refurbishment costs make a significant portion of the remainder of the costs. The remaining capital investment focuses on core asset renewal, including track renewal and the refurbishment / replacement of Lifts & Escalators (L&E) assets.

Asset Maintenance: Maintenance costs decreased by c.15% in 14/15 compared to 13/14 due to the completion of the fleet overhaul programme. As a result asset maintenance costs remain consistent over the rest of the plan period.

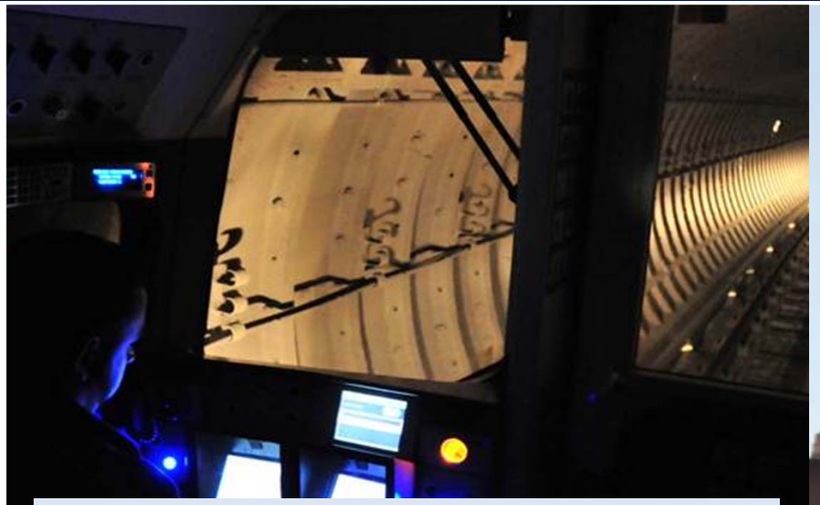
Operations: Operations costs rise over the plan as additional staff are required to support the WCC programme.

Northern line

Headlines

- The Northern line Extension and World Class Capacity programme will build on the recent modernisation of the Northern line, increasing total kilometres run by 27% and will require the fleet to be increased by 24 trains

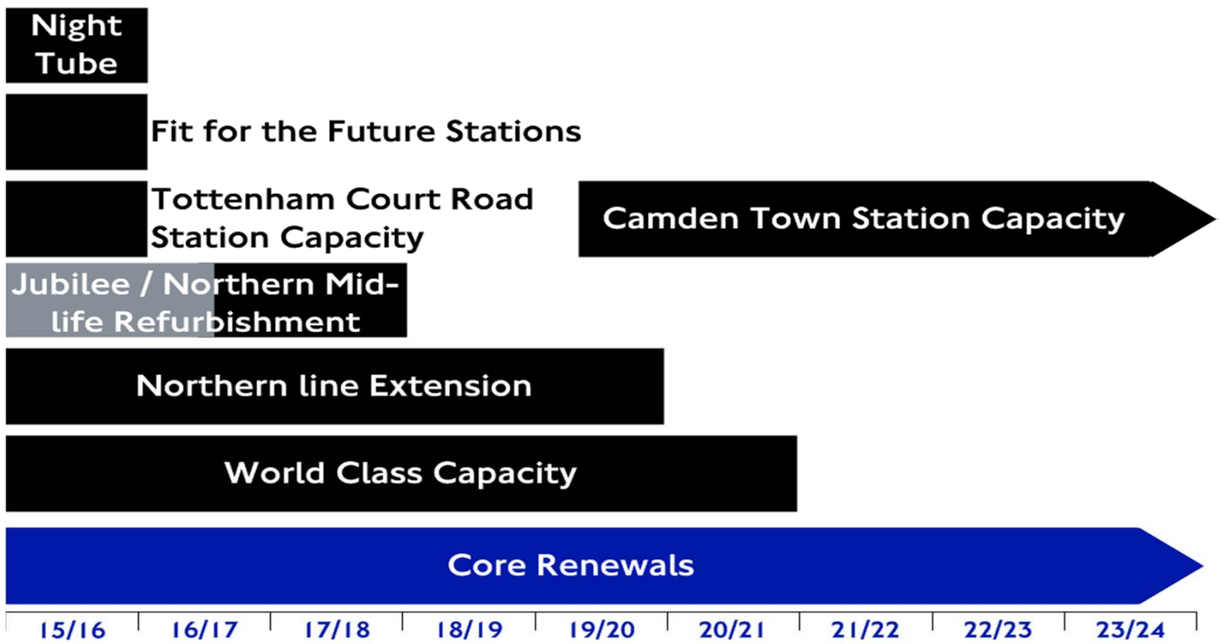
- World Class Capacity will change the way services are operated through Kennington, enabling at least 30 trains per hour to be operated on each branch of the line by 2022



Major capacity improvements delivered through the World Class Capacity (WCC) programme and the Northern line Extension to Battersea

The Northern Line Extension to Battersea, Night Tube, Tottenham Court Road and Camden Town capacity schemes and Fit for the Future - Stations to transform customer experience

Key Deliverables & Facts



c.184m passenger journeys in 2013/14

Serves 50 stations

Fleet size: 106 trains (95TS)

98.8% of schedule operated in 2014/15 (as at Q3)

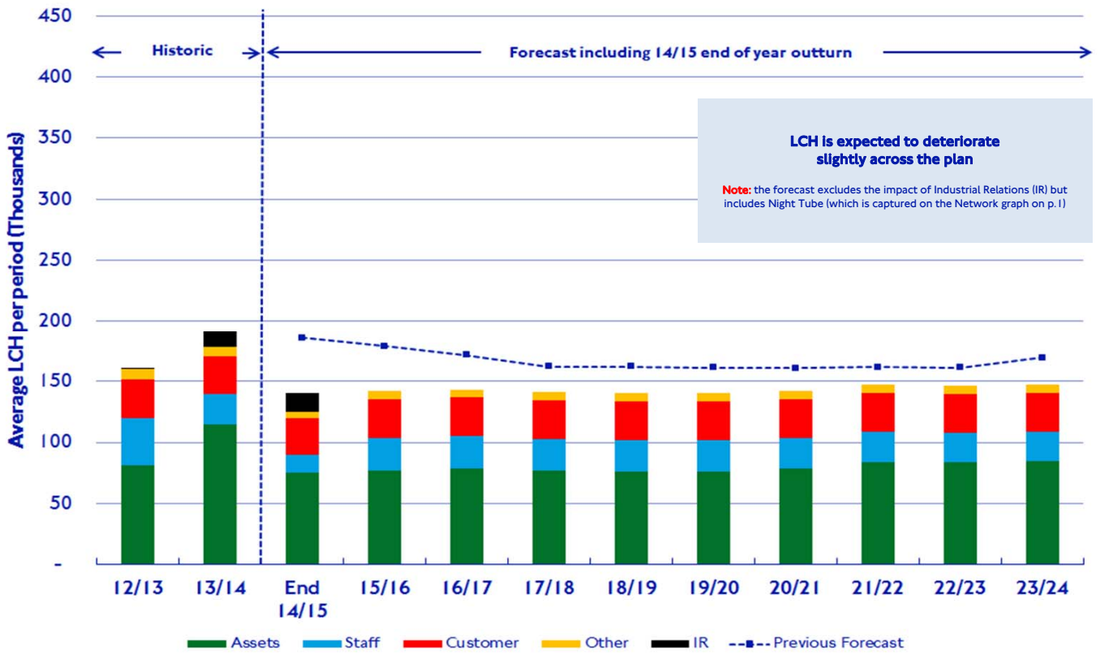
Thales SelTrac S40 Transmission Based Control System (TBTC)

24-26 trains per hour (Bank branch) and 24 (Charing Cross branch) in peak

Total line length: c.127km including depots & sidings in both directions

Current Working Timetable: 55

Reliability - Lost Customer Hours (LCH) - Northern line - Figure 20



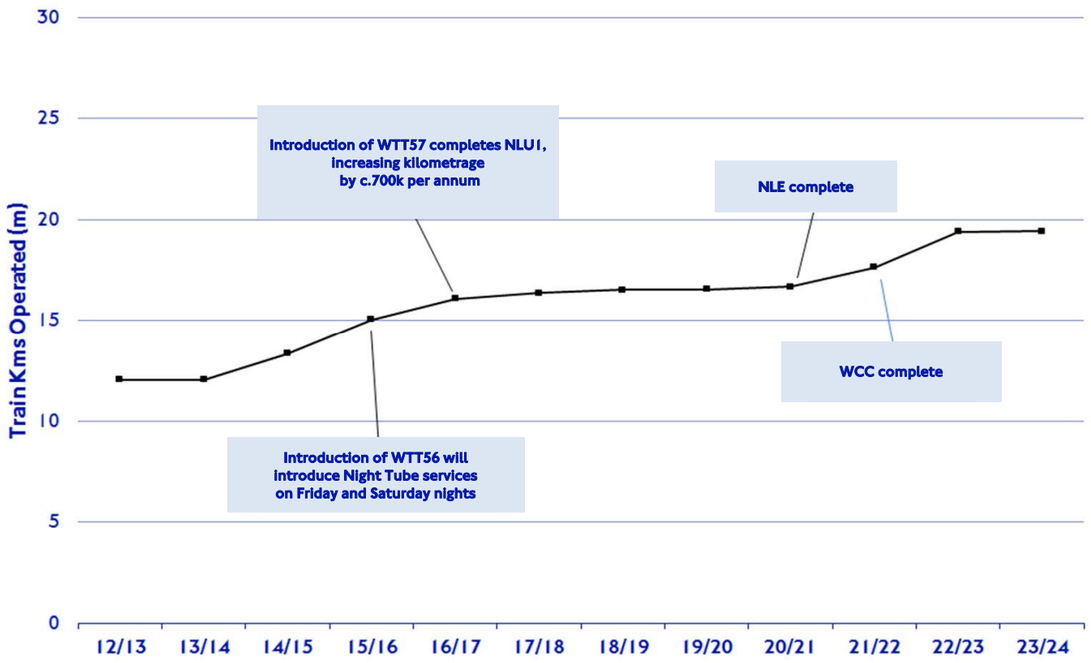
Assets: Asset LCH will account for c.75k LCH per period (c.50%) of total Northern line LCH at the end of 14/15 (c.40k better than 13/14), This is a significant improvement on 13/14, and reflects the benefits of the modernisation programme. However, LCH in 13/14 was uncharacteristically high and it is expected that LCH levels across the remainder of the plan will follow the 14/15 trend until a deterioration in the later part of the plan from 21/22 following completion of the Northern line Extension and World Class Capacity programmes, both of which require the procurement of additional trains and will result in a significant increase in annual kilometrage.

Staff: Staff LCH is expected to be c.26k per period in 15/16. This is slightly higher than the current trend but accounts for the likely rise in ONAs following the removal of the additional staff covering the delivery of the upgrade. Staff LCH is assumed to remain static up to 17/18 until the implementation of a number of initiatives that aim to reduce LCH relating to staff errors and the unavailability of train operators (i.e. ONAs).

Customer: Customer LCH in 15/16 (c.32k) is expected to be broadly similar to the current 14/15 trend. The forecast assumes that 15/16 performance is sustained across the plan, with planned initiatives (e.g. marketing campaigns, suicide training) broadly offsetting the impact of growing demand. A review of the relationship between LCH and demand has been set up to review this assumption prior to future LANP documents.

Other: Other LCH in 15/16 (c.7k) is expected to be broadly similar to the current 14/15 trend. It is assumed that the 15/16 performance is sustained across the plan.

Capacity - Train Kms Operated (Millions) - Northern line - Figure 21



The modernisation of the Northern line was delivered in December 2014 as per the DfT Annex B milestone. The initial post-modernisation timetable introduced a trunk frequency of 24 trains per hour during the peaks and 20 trains per hour off-peak.

WTT 56, implemented in September 2015, will introduce all night services on Friday and Saturday nights as part of the Night Tube programme.

WTT 57 (March 2016) will complete delivery of the upgrade benefits with the delivery of further frequency enhancements, with an associated additional scheduled kilometrage of c.700k per annum.

The Northern Line Extension will be delivered into customer service in 2020, with associated additional scheduled kilometrage of c.500k per annum. Subsequent to this extension, the World Class Capacity programme will procure additional trains for service to provide a significant increase in kilometrage later in the plan with an overarching goal to provide a 33 trains per hour service on both branches of the line.

Line performance will continue to be reviewed periodically, with the impact of subsequently agreed timetable changes reflected in future LANP documents.

Cost Summary (£m, outturn) - Northern line - Table 7

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Capital Investment											
Fleet & Depots	19.9	20.1	25.7	25.0	95.9	92.7	58.6	31.5	43.6	-	413.0
Signals	42.8	-14.6	16.3	3.7	7.7	20.2	17.0	-0.6	0.0	0.0	92.5
Track	11.8	11.4	2.1	10.4	18.6	34.8	21.6	-	-	-	110.7
Power	1.0	1.9	4.2	17.8	40.3	42.2	11.2	-	-	-	118.6
Civils	12.8	33.8	80.7	56.5	13.3	1.8	0.6	-	-	-	199.5
Stations	3.8	63.4	53.7	88.1	54.8	45.6	41.5	30.0	24.0	21.2	426.2
Lifts & Escalators	8.3	8.8	7.5	1.4	-	-	-	-	-	-	25.9
Total Capital Investment	100.4	124.7	190.3	202.9	230.7	237.3	150.5	60.9	67.6	21.2	1,386.5
Asset Maintenance											
Fleet & Depots (excl Heavy Overhaul)	77.7	84.0	84.9	81.4	78.2	83.0	85.4	87.8	90.6	93.1	846.2
Fleet Heavy Overhaul	-	-	-	-	-	-	-	-	-	-	-
Signals	2.3	1.7	1.4	1.3	1.0	1.0	1.1	1.6	1.7	1.7	14.9
Track	10.7	9.9	10.3	10.7	10.3	10.3	10.7	10.9	11.1	11.6	106.4
Power	0.6	1.0	1.0	1.0	1.0	1.1	1.2	1.2	1.2	1.3	10.6
Total Asset Maintenance	91.2	96.7	97.6	94.3	90.5	95.5	98.3	101.5	104.6	107.7	978.0
Operations											
Service Control SC	5.0	5.4	5.6	5.8	6.0	6.2	6.4	6.7	6.9	7.1	61.1
Service Delivery Unit	0.7	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.3	1.3	11.0
Stations	41.9	43.4	46.9	48.6	50.3	52.3	54.1	57.3	59.3	61.4	515.5
Trains	44.3	47.7	52.1	55.2	57.9	61.6	64.6	75.2	77.8	80.5	616.8
Total Operations	91.9	97.5	105.6	110.7	115.4	121.2	126.3	140.3	145.2	150.3	1,204.4
Northern Line Total*	**283.6**	**318.9**	**393.5**	**407.9**	**436.6**	**454.0**	**375.1**	**302.8**	**317.4**	**279.2**	**3,568.8**

*** Total excludes costs which cannot be broken down by line. For JNP, these are summarised on the JNP Network Cost Summary (page 28).**

Capital Investment: The World Class Capacity programme costs c.£550m with fleet costs of c.£240m (the purchase of additional trains), and significant cooling and power costs (around £200m). The significant station contribution to the overall costs is largely due to the planned congestion relief scheme at Camden Town, with costs of c.£180m. Line upgrade efficiencies are captured under Signals (with net savings in 15/16 and 21/22).

Asset Maintenance: The general trend for maintenance costs is to rise over the ten year period, with the vast majority for fleet and depot maintenance. Delivery of Northern Line Extension in forecast to take place in 20/21 and the associated maintenance costs have been included in the business plan.

Operations: Operations costs rise over the end of the plan as WCC and NLE are delivered. Timetables 56 - 57 are incorporated into the plan, as are the costs relating to NLE and WCC.

Piccadilly line

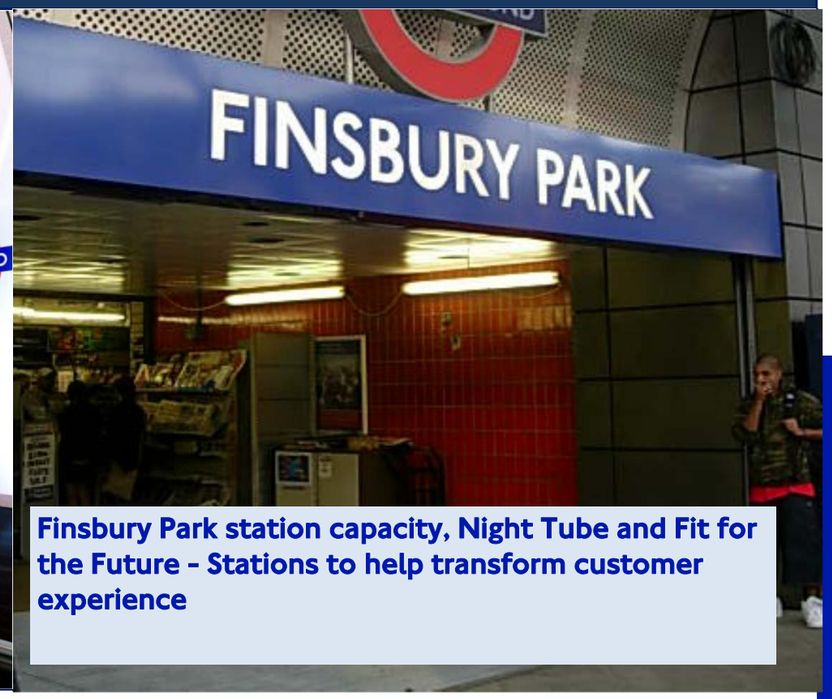
Headlines

- New fleet will be introduced as part of the New Tube for London programme, and is planned to be in operation by 2025/26

- The obsolete control system will be replaced by an interim control centre until the New Tube for London programme delivers the planned line modernisation in the mid-2020s

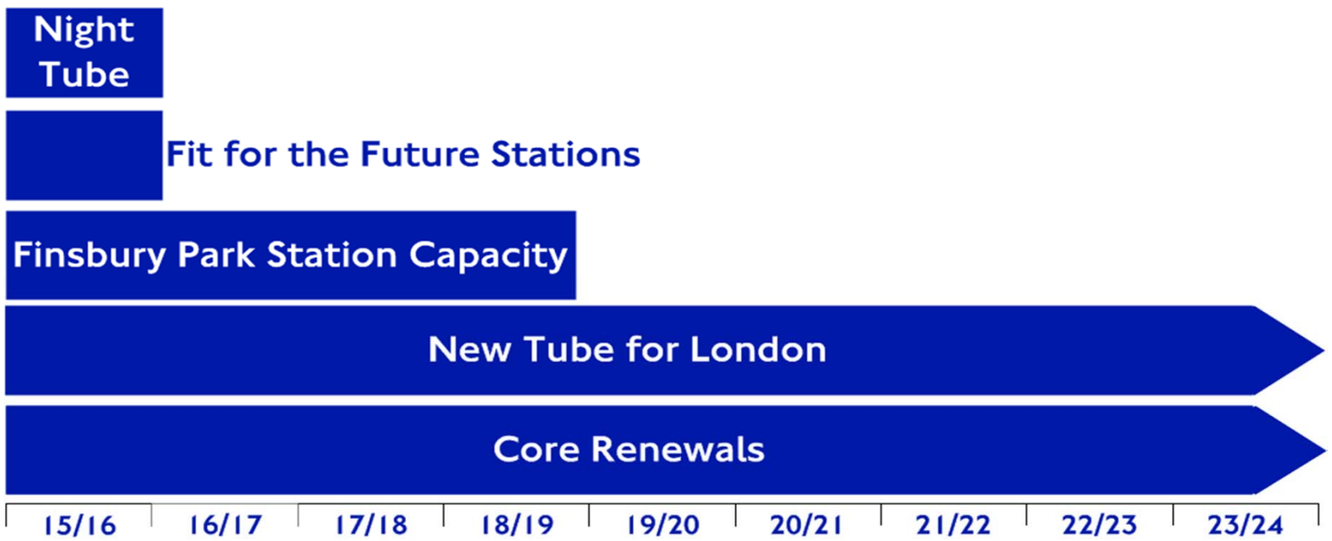
- Emerging issues with Fleet and Signals reliability to be monitored and life extension/maintenance plans reviewed

The Piccadilly line will be upgraded as part of the New Tube for London programme, with benefits starting in the mid-2020s



Finsbury Park station capacity, Night Tube and Fit for the Future - Stations to help transform customer experience

Key Deliverables & Facts



c.152m passenger journeys in 2013/14

Serves 53 stations

Fleet size: 86 trains (73TS)

96.8% of schedule operated in 2014/15 (as at Q3)

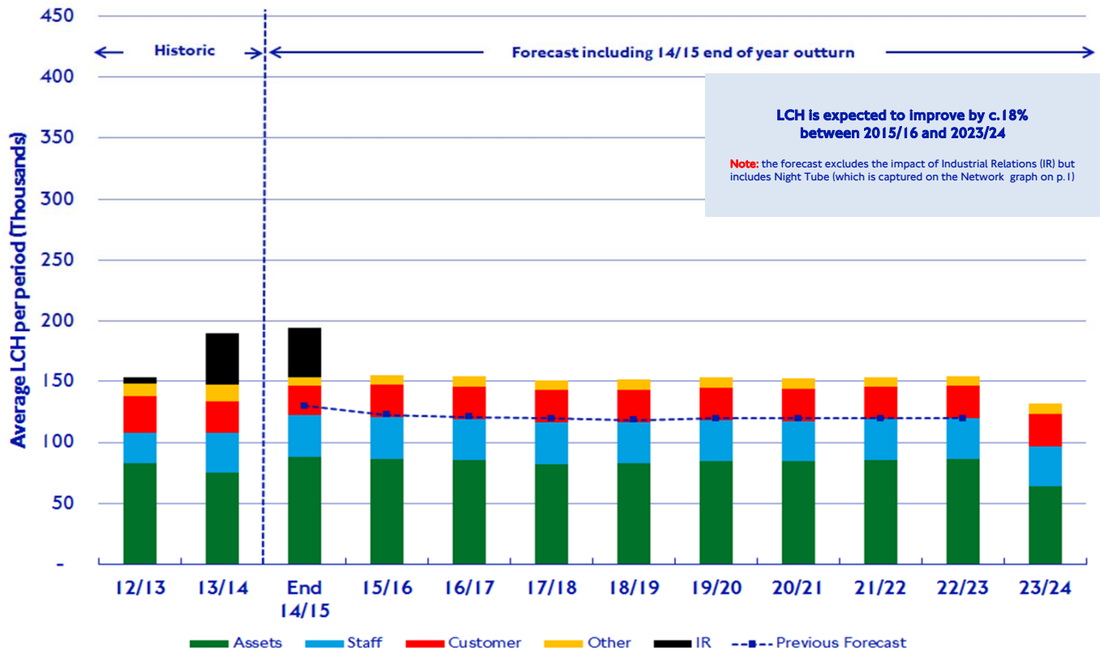
Traditional fixed block signalling with trainstop train protection

24 trains per hour (tph) operating during the peak

Total line length: c.139km including depots & sidings in both directions

Current Working Timetable: 53

Reliability - Lost Customer Hours (LCH) - Piccadilly line - Figure 22



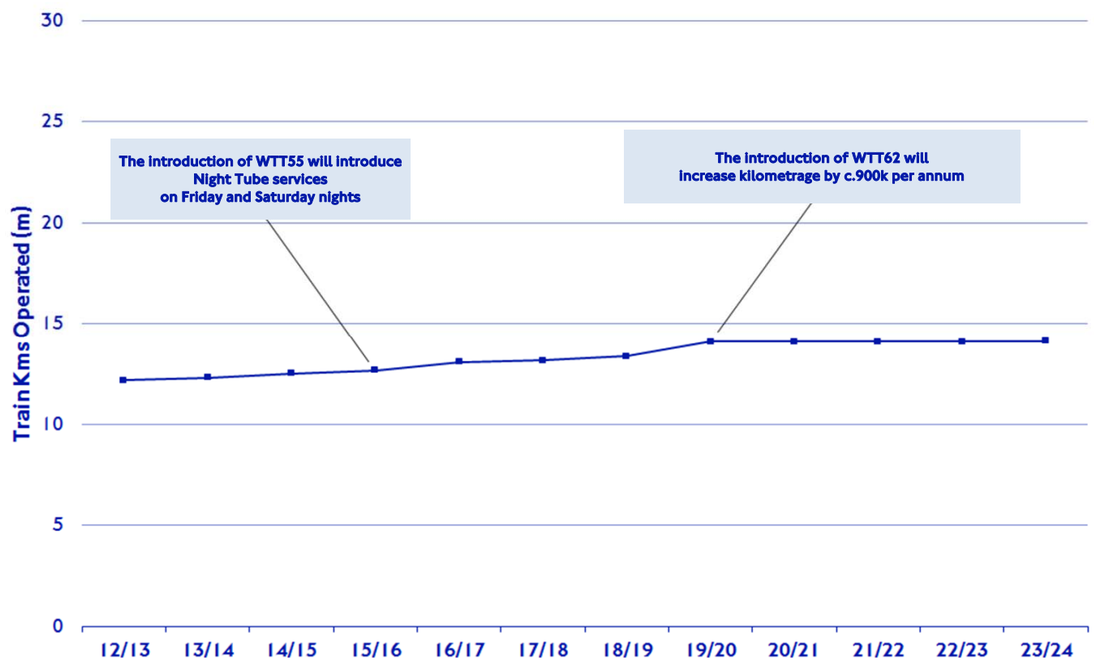
Assets: Asset LCH will account for c.88k LCH per period (c.45%) of total Piccadilly line LCH at the end of 14/15 (c.13k worse than 13/14). The deterioration in performance has resulted from an increase in fleet and signals incidents. The current trend is being monitored in order to evaluate whether the current plans are sufficient to deliver a reliable train service prior to the replacement of trains delivered by NTfL (in the early 2020s). The Asset LCH improvement assumed in 23/24 is a result of the modernisation of the signalling system (also delivered through NTfL).

Staff: Staff LCH in 15/16 (c.34k per period) is expected to be broadly similar to the current 14/15 trend. Staff LCH is assumed to remain static up to 17/18 until the implementation of a number of initiatives that aim to reduce LCH relating to staff errors and the unavailability of train operators (i.e. ONAs).

Customer: Customer LCH in 15/16 (c.26k) is expected to be broadly similar to the current 14/15 trend. The forecast assumes that 15/16 performance is sustained across the plan, with planned initiatives (e.g. marketing campaigns, suicide training) broadly offsetting the impact of growing demand. A review of the relationship between LCH and demand has been set up to review this assumption prior to future LANP documents.

Other: Other LCH in 15/16 (c.8k) is expected to be broadly similar to the current 14/15 trend. It is assumed that the 15/16 performance is sustained across the plan.

Capacity - Train Kms Operated (Millions) - Piccadilly line - Figure 23



WTT 55, implemented in September 2015, will introduce all night services on Friday and Saturday nights as part of the Night Tube programme.

WTT 62, due for implementation in 2018 will increase off-peak frequencies, giving an increase in kilometrage of c.930k per annum, and additional passenger benefits of c£21m per annum.

The Piccadilly line is the first of the deep tube lines to be upgraded as part of the New Tube for London programme. While roll-out of the new fleet is planned to begin in 2021/22, the benefits in terms of kilometrage are not seen over the ten year planning horizon with improvements expected from 2025 when the last legacy trains are withdrawn.

Piccadilly line

Costs

Cost Summary (£m, outturn) - Piccadilly line - Table 8

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Capital Investment											
Fleet & Depots	0.1	1.8	79.0	101.1	121.3	161.0	216.3	243.1	322.5	599.2	1,845.4
Signals	10.7	13.3	13.5	40.7	120.4	189.7	290.3	300.7	284.3	46.3	1,309.9
Track	-	-	0.8	6.6	13.6	19.6	37.6	50.7	67.5	83.0	279.5
Power	-	-	-	8.5	10.6	13.8	53.4	63.4	51.7	39.5	241.0
Civils	0.2	0.8	0.0	-	-	-	-	-	-	-	1.0
Stations	5.1	2.5	3.1	9.7	11.7	45.8	67.9	68.3	59.8	51.6	325.6
Lifts & Escalators	5.1	1.4	1.2	0.4	-	-	-	-	-	-	8.1
Total Capital Investment	21.1	19.9	97.6	167.1	277.7	429.9	665.5	726.3	785.8	819.7	4,010.4
Asset Maintenance											
Fleet & Depots (excl Heavy Overhaul)	24.2	25.1	26.5	22.4	23.1	22.2	23.0	23.9	24.8	24.6	239.7
Fleet Heavy Overhaul	11.9	12.3	6.2	4.0	0.7	-	-	-	-	-	35.1
Signals	6.3	2.7	1.6	1.5	1.2	1.2	1.3	1.3	1.5	1.5	20.0
Track	10.9	9.6	10.5	10.9	10.5	10.5	10.9	11.2	11.5	11.6	108.1
Power	0.7	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	5.0
Total Asset Maintenance	54.0	50.2	45.2	39.2	35.9	34.3	35.6	36.9	38.3	38.2	407.9
Operations											
Service Control SC	8.7	9.2	9.5	9.9	10.2	10.2	10.4	10.7	11.1	11.5	101.3
Service Delivery Unit	0.7	1.8	1.0	1.1	1.1	1.1	1.2	1.2	1.3	1.3	11.8
Stations	40.7	41.7	45.1	46.7	48.5	50.4	52.1	53.9	55.8	57.8	492.8
Trains	39.7	43.5	45.5	47.5	50.8	52.7	54.4	56.4	57.7	59.7	508.0
Total Operations	89.8	96.2	101.2	105.2	110.6	114.4	118.1	122.2	125.9	130.3	1,113.9
Piccadilly Line Total*	164.9	166.2	244.0	311.4	424.2	578.7	819.2	885.4	950.0	988.2	5,532.2

*** Total excludes costs which cannot be broken down by line. For JNP, these are summarised on the JNP Network Cost Summary (page 28).**

Capital Investment: The capital investment forecast's major expenditure is for the New Tube for London programme with Fleet costs of c.£960m, Signals costs of c.£1,2bn, Power costs of c.£330m and Track costs of c.£280m. The Holborn congestion relief project account for c.£320m of investment in stations.

Asset Maintenance: The costs peak in 14/15 and subsequently shows a gradual decrease thereafter. The peak is driven by two main work streams; Piccadilly Line Signalling Upgrade and Fleet Life Extension. The decrease in cost is attributed to the Fleet Life Extension being brought forward therefore showing a reduced run rate in later years and secondly, less maintenance on outgoing Fleet, assuming roll-out of the new fleet begins in 21/22.

Operations: Operations costs remain relatively steady across the plan (timetable costs are incorporated into the plan).

JNP Network

Cost Summary (£m, outturn) - JNP Network - Table 9

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Capital Investment											
Fleet & Depots	0.2	0.3	9.1	0.3	-	-	-	-	-	-	9.9
Signals	0.0	0.0	-	-	-	-	-	-	-	-	0.1
Track	45.4	74.3	78.4	61.3	52.0	95.5	96.6	82.4	72.1	74.1	732.1
Power	4.2	3.2	3.5	0.0	-	-	-	-	-	-	11.0
Civils	9.2	10.0	9.3	14.6	10.3	13.6	15.2	12.0	18.0	0.0	112.3
Stations	2.4	3.4	2.5	0.5	-0.3	-0.2	0.5	0.0	0.0	0.0	8.8
Lifts & Escalators	4.9	9.8	12.9	20.4	27.4	21.6	16.9	15.7	15.6	0.0	145.2
Total Capital Investment	66.3	101.0	115.7	97.2	89.4	130.5	129.1	110.2	105.7	74.1	1,019.3
Asset Maintenance											
Fleet & Depots (excl Heavy Overhaul)	4.1	2.9	3.1	3.2	3.3	3.4	3.6	3.7	3.8	3.9	35.1
Fleet Heavy Overhaul	-	-	-	-	-	-	-	-	-	-	-
Signals	17.7	23.5	19.4	20.1	19.8	21.3	22.8	23.6	24.5	25.3	218.0
Track	12.8	16.7	15.8	16.3	17.7	19.2	19.9	20.3	22.7	24.0	185.5
Power	0.7	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	3.7
Civils	6.4	6.9	5.9	6.2	6.4	6.6	6.8	7.1	7.3	7.6	67.1
Stations	54.2	60.1	61.5	61.5	61.3	64.6	66.8	69.0	71.3	73.8	644.1
Lifts & Escalators	18.0	18.0	18.2	19.0	19.8	21.2	22.2	22.2	24.0	24.9	207.4
Total Asset Maintenance	113.9	128.5	124.2	126.6	128.5	136.6	142.4	146.2	154.0	159.9	1,360.9
Operations											
Service Control SC	-	-	-	-	-	-	-	-	-	-	-
Service Delivery Unit	5.2	10.1	5.9	1.5	1.1	1.0	0.2	-0.4	-0.0	-0.0	24.5
FFFStations Overlay	-1.6	-7.4	-20.4	-22.7	-24.5	-26.2	-27.6	-29.1	-30.8	-31.9	-222.2
Stations	-	-	-	-	-	-	-	-	-	-	-
Trains	-	-	-	-	-	-	-	-	-	-	-
Total Operations	3.6	2.6	-14.5	-21.1	-23.4	-25.2	-27.4	-29.5	-30.9	-32.0	-197.7
JNP Network Only*	183.8	232.1	225.4	202.7	194.5	242.0	244.1	226.9	228.9	202.1	2,182.4

*** Total includes costs not allocated to JNP lines**

Capital Investment: Table 9 above shows JNP costs that are held centrally rather than allocated directly to a line. For capital investment this includes the mid-life refurbishment project risk (in Fleet & Depots). Track costs include the RP3 programme and drainage works. Stations and L&E costs mainly cover the JNP Lift and Escalator programme.

Asset Maintenance: Table 9 covers all Civils, Stations and L&E maintenance costs which are managed centrally rather than on a line-by-line basis.

Operations: Table 9 outlines the proposed savings on the JNP network resulting from the Fit for the Future - Stations Programme and assumed efficiencies to central overheads.

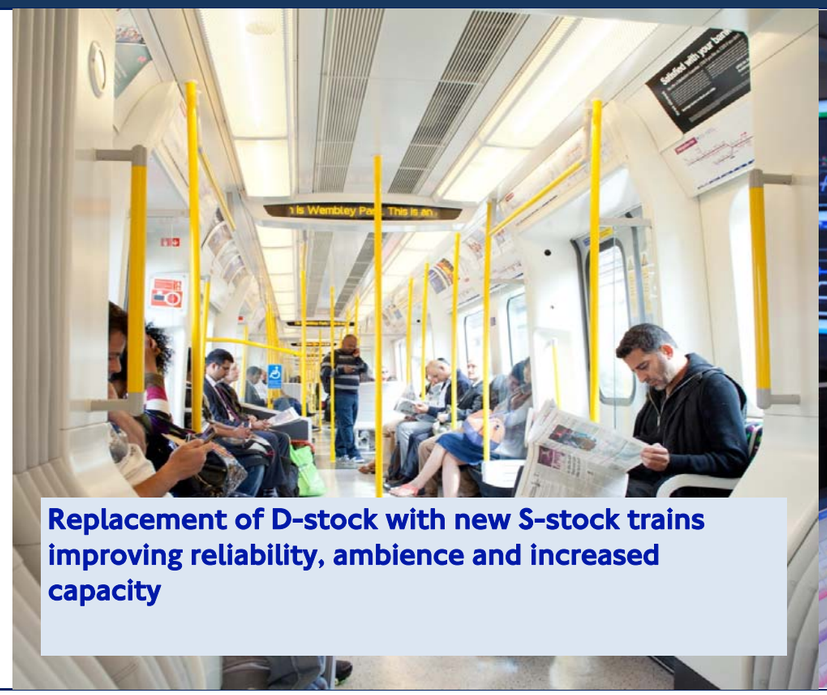
Sub-surface lines

Context & Deliverables

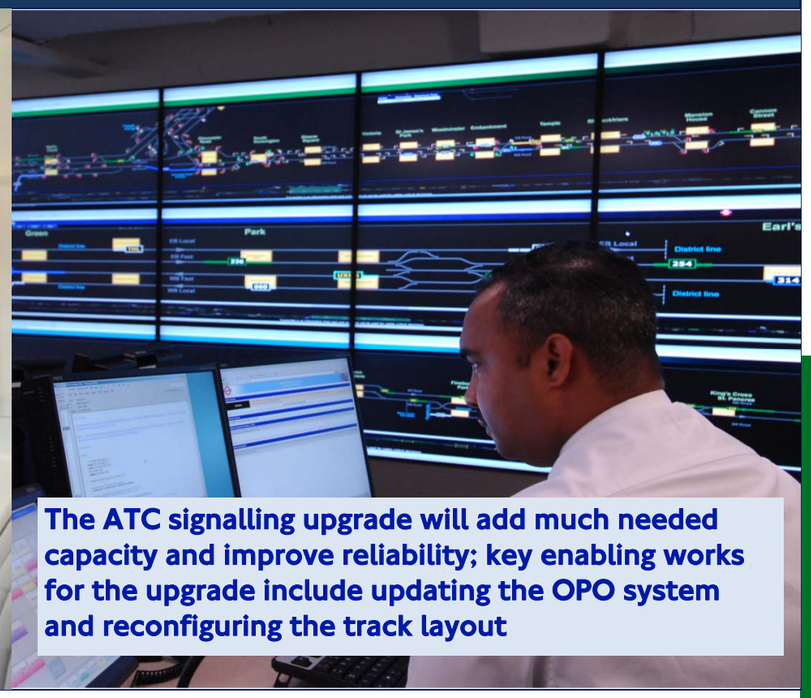
Headlines

- The modernisation programme is well underway with the continued replacement of legacy fleet with new S-stock trains. This will be followed by the delivery of the signalling upgrade

- The plan currently assumes delivery of the ATC modernisation programme as per the Q3 (2014/15) assumptions. This is currently subject to change as the new contract is agreed and communicated.

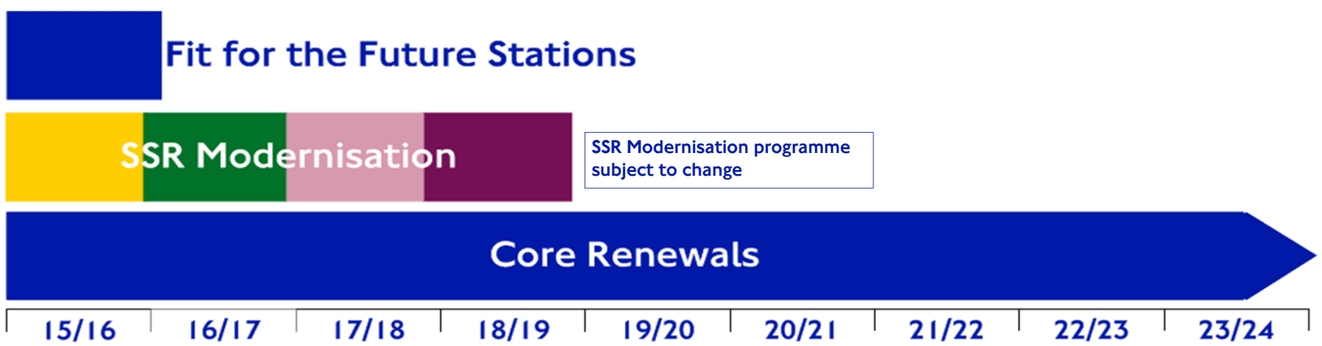


Replacement of D-stock with new S-stock trains improving reliability, ambience and increased capacity



The ATC signalling upgrade will add much needed capacity and improve reliability; key enabling works for the upgrade include updating the OPO system and reconfiguring the track layout

Key Deliverables & Facts



c.159m passenger journeys in 2013/14 (District), c.39m (H&C), c.53m (Circle) and c.53m (Metropolitan)

Serves 60 stations (District), 47 (Circle & H&C) and 34 (Metropolitan)

Fleet size: 191 (When S-stock is fully delivered and D-stock withdrawn)

97.5% (District), 96% (C&H) and 97.8% (Metropolitan) of schedule operated in 2014/15 (as at Q3)

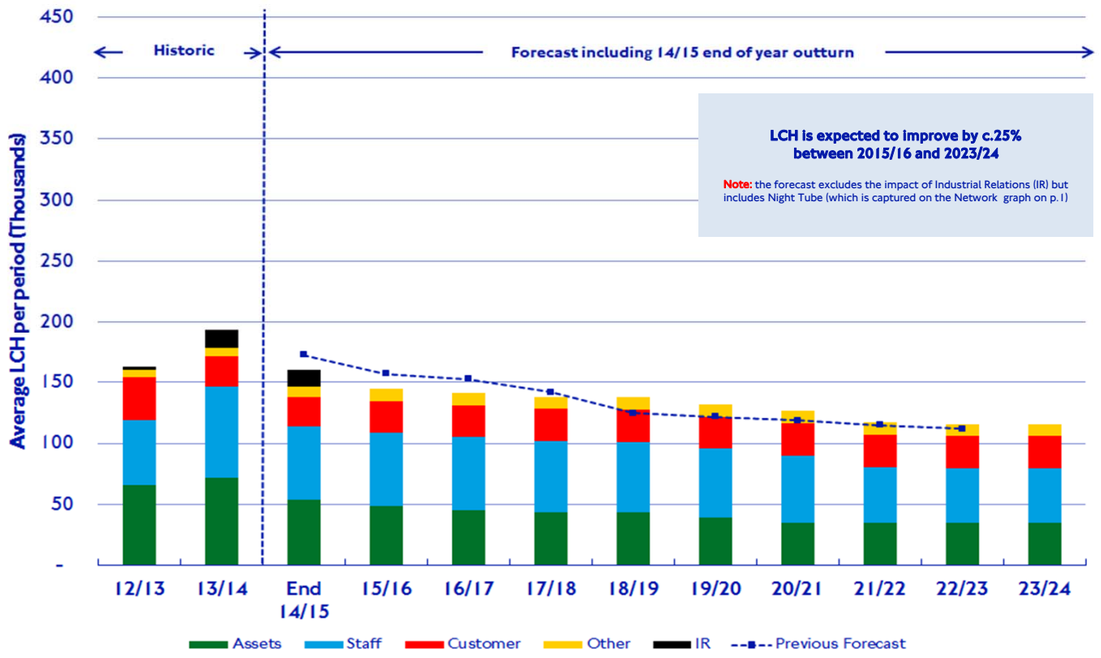
Traditional fixed block signalling with trainstop train protection

32 trains per hour (tph) operating during the peak

Total line length: c.150km+ including depots & sidings in both directions

Current Working Timetables: 146 (District), 32(Circle & H&C) and 336 (Metropolitan)

Reliability - Lost Customer Hours (LCH) - Circle and Hammersmith & City lines - Figure 24



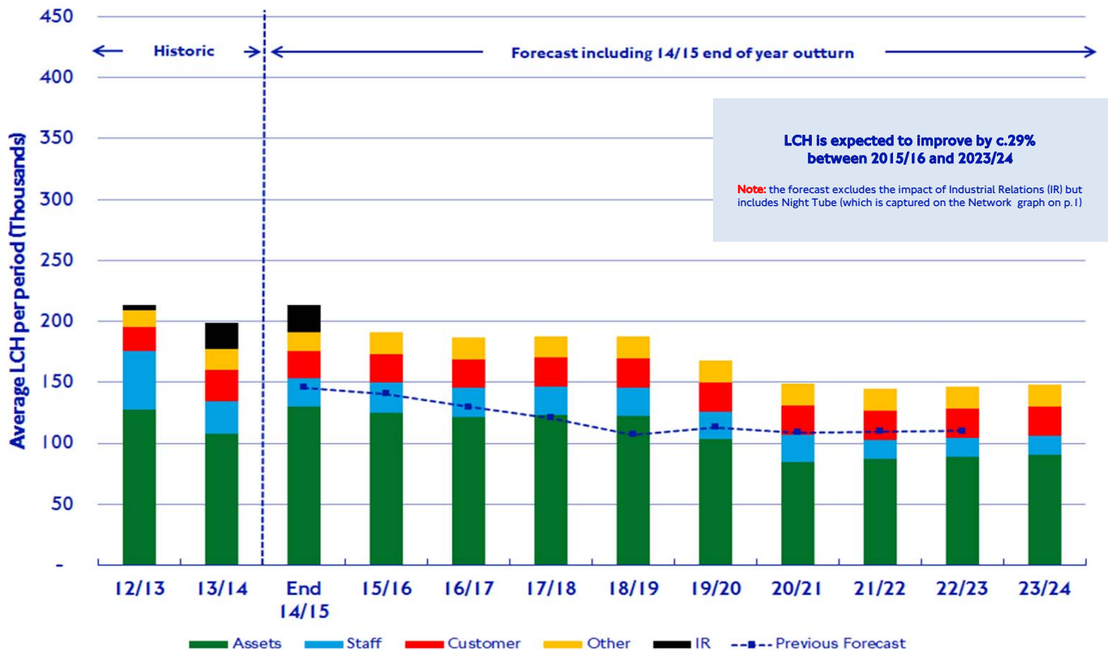
Assets: Asset LCH will account for c.53k LCH per period (c.33%) of total Circle and H&C line LCH at the end of 14/15 (c.17k better than 13/14). The improvement in LCH is primarily due to the replacement of the C-stock fleet with S7s (completed June 2014). The forecasted improvement in asset reliability relates to the assumed growth in S7 MDBF towards its end-state reliability (by 17/18) and the completion of the SSR signalling upgrade (the benefits of which are assumed to start from 19/20).

Staff: Staff LCH in 15/16 (c.60k per period) is expected to be broadly similar to the current 14/15 trend. Staff LCH is then expected to remain static until 17/18 onwards following delivery of a number of initiatives assumed to improve a number of Staff LCH incident types including the reduction of staff errors and ONAs.

Customer: Customer LCH in 15/16 (c.26k) is expected to be broadly similar to the current 14/15 trend. The forecast assumes that 15/16 performance is sustained across the plan, with planned initiatives (e.g. marketing campaigns, suicide training) broadly offsetting the impact of growing demand. A review of the relationship between LCH and demand has been set up to review this assumption prior to future LANP documents.

Other: Other LCH in 15/16 (c.10k) is expected to be broadly similar to the current 14/15 trend. It is assumed that the 15/16 performance is sustained across the plan.

Reliability - Lost Customer Hours (LCH) - District - Figure 25



Assets: Asset LCH will account for c.138k LCH per period (c.61%) of total District line LCH at the end of 14/15 (c.30k worse than 13/14). Delivery of additional S7s started in January 2015 at the rate of about one train per week. By June 2016 delivery of the new trains will be complete and all D-stocks will be removed from service. The improved reliability of the S-stock will reduce LCH but this forecast improvement is less pronounced than that on the C&H lines due to an increase in kilometres run over the ten year period. The reliability of the Signals asset is also expected to improve significantly following completion of the SSR signalling upgrade (from 19/20).

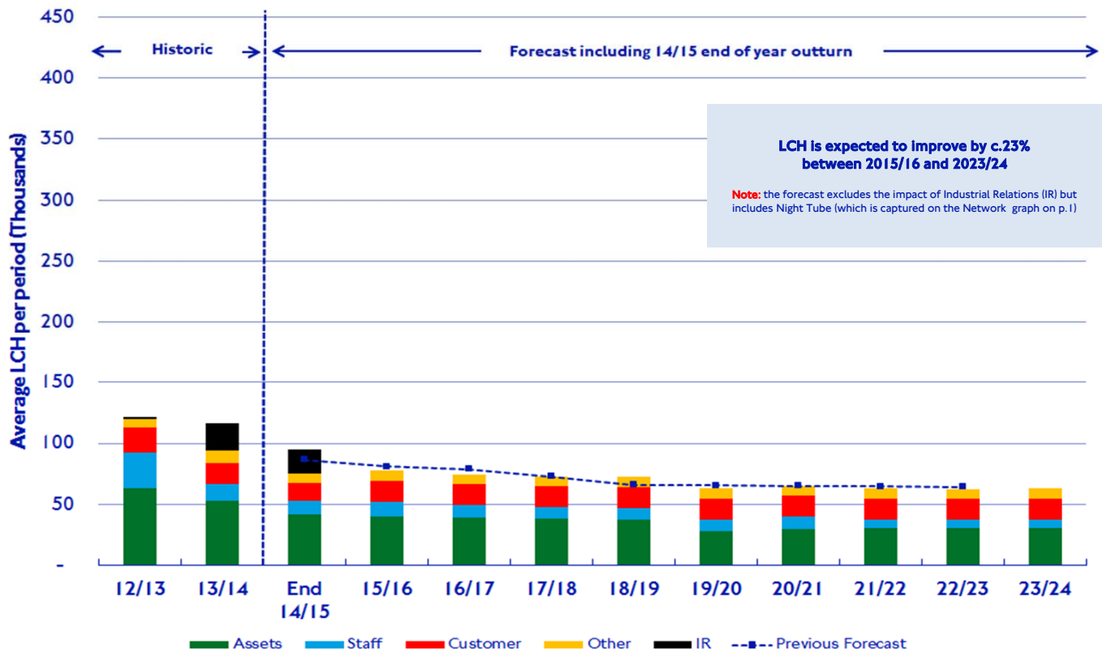
Staff: Staff LCH in 15/16 (c.25k per period) is expected to be broadly similar to the current 14/15 trend. The forecast in 15/16 does however include a small increment in incidents relating to driver technique as staff move from D-stock to the new S7D fleet. Staff LCH is then expected to remain static until 17/18 onwards following delivery of a number of initiatives assumed to improve a number of Staff LCH incident types including the reduction of staff errors and ONAs. Staff ONAs will be monitored in 16/17 following removal of the S stock upgrade resources.

Customer: Customer LCH in 15/16 (c.24k) is expected to be broadly similar to the current 14/15 trend. The forecast assumes that 15/16 performance is sustained across the plan, with planned initiatives (e.g. marketing campaigns, suicide training) broadly offsetting the impact of growing demand. A review of the relationship between LCH and demand has been set up to review this assumption prior to future LANP documents.

Other: Other LCH in 15/16 (c.18k) is expected to be broadly similar to the current 14/15 trend. It is assumed that the 15/16 performance is sustained across the plan.

Sub-surface lines

Reliability - Lost Customer Hours (LCH) - Metropolitan line - Figure 26



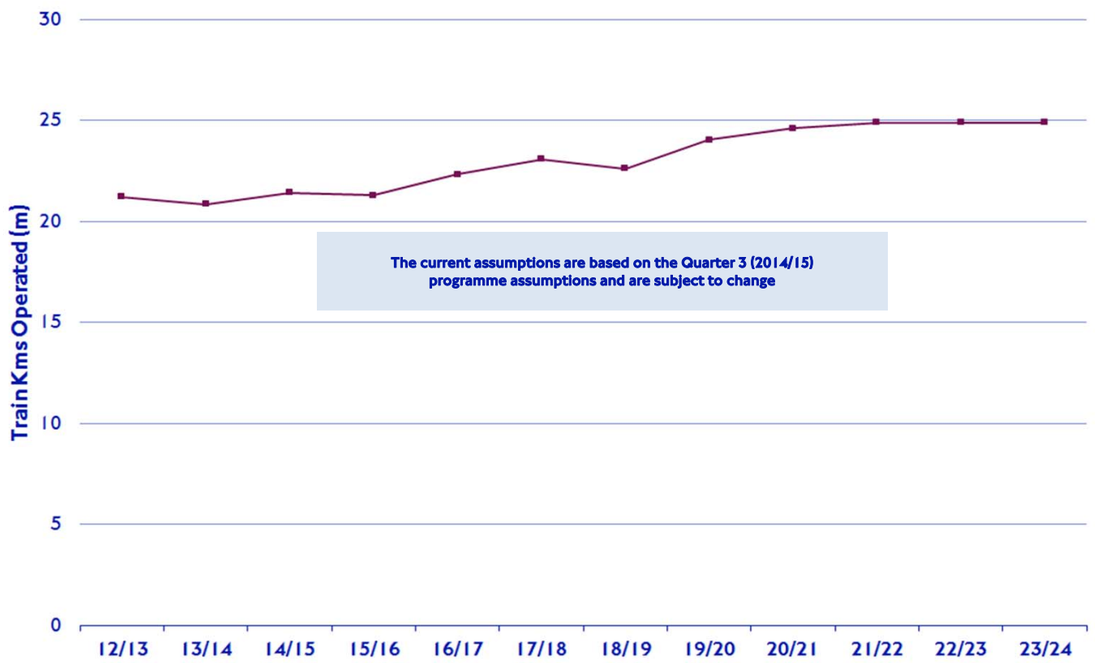
Assets: Asset LCH will account for c.41k LCH per period (c.45%) of total Metropolitan LCH at the end of 14/15 (an improvement of c.10k LCH on 13/14). The S8 fleet has bettered last year's LCH forecasts and the modifications introduced to address OPO CCTV unreliability are proving to be effective. Asset LCH is expected to improve by approximately 20% between 15/16 and 23/24. The forecasted improvement in reliability relates to the assumed growth in S8 MDBF towards its end-state reliability (by 17/18) and the completion of the SSR signalling upgrade (from 19/20).

Staff: Staff LCH in 15/16 (c.12k per period) is expected to be broadly similar to the current 14/15 trend. The forecast in 15/16 does however include a small increment in LCH to account for the bedding in of the current timetable and resulting Personal Need Request incidents (PNRs). Staff LCH is then expected to remain static until 17/18 onwards following delivery of a number of initiatives assumed to improve a number of Staff LCH incident types including the reduction of ONAs.

Customer: Customer LCH in 15/16 (c.17k) is expected to be broadly similar to the current 14/15 trend. The forecast assumes that 15/16 performance is sustained across the plan, with planned initiatives (e.g. marketing campaigns, suicide training) broadly offsetting the impact of growing demand. A review of the relationship between LCH and demand has been set up to review this assumption prior to future LANP documents.

Other: Other LCH in 15/16 (c.8k) is expected to be broadly similar to the current 14/15 trend. It is assumed that the 15/16 performance is sustained across the plan.

Capacity - Train Kms Operated (Millions) - Sub-surface lines - Figure 27



The Sub-surface lines see a steady increase in train kilometres operated from 14/15 to 21/22 followed by a plateau upon planned completion of the Sub-surface modernisation programme. Increases are dependant on availability of additional S7s for service, and the signalling and infrastructure improvements as part of the upgrade programme. The current assumption sees train frequencies significantly improve as the new automatic train control signalling system is delivered over three main phases: (i) phase 1 in 19/20 on the extended Circle line allowing 30 trains per hour, (ii) phase 2 in 19/20 on the extended Circle allowing 32 trains per hour and up to 24 trains per hour on parts of the District line, and (iii) phase 3 in 20/21 on the Metropolitan line north of Baker Street allowing 28 trains per hour. These assumptions were made based on the position of the ATC signalling at Quarter 3 (14/15) and are subject to change as the new contract is agreed.

Sub-surface lines

Costs

Cost Summary (£m, outturn) - Sub-surface lines - Table 10

	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Capital Investment											
Fleet & Depots	333.2	150.0	61.0	16.3	7.7	14.2	12.8	6.9	-	-	601.9
Signals	27.7	105.0	182.9	127.4	86.2	62.6	24.0	-	-	-	615.8
Track	86.5	102.0	74.7	115.2	61.2	32.2	33.1	46.9	49.7	42.7	644.2
Power	48.7	57.8	44.1	20.2	5.8	2.4	0.4	-	-	-	179.4
Civils	5.3	13.6	22.7	1.2	1.4	1.2	1.2	1.3	-	11.7	59.5
Stations	64.0	39.9	73.2	77.9	70.7	71.8	74.0	75.3	75.6	76.6	699.1
Lifts & Escalators	8.5	7.1	2.9	-	-	-	-	-	-	-	18.5
Total Capital Investment	573.8	475.4	461.4	358.2	233.0	184.3	145.4	130.4	125.3	130.9	2,818.3
Asset Maintenance											
Fleet & Depots (excl Heavy Overhaul)	70.8	66.9	83.5	79.6	78.9	89.2	90.9	93.7	88.4	91.4	833.2
Fleet Heavy Overhaul	-	-	-	4.4	7.6	-	-	-	8.5	8.8	29.3
Signals	26.3	28.7	27.8	28.7	28.3	29.1	30.4	31.0	32.0	32.7	295.0
Track	47.2	44.3	44.9	45.5	47.0	48.7	50.3	52.0	53.8	55.7	489.4
Power	2.5	2.5	2.7	2.9	2.7	2.8	2.9	3.0	3.1	3.2	28.3
Civils	13.8	12.6	12.7	13.7	14.0	14.4	14.7	15.1	15.7	16.2	142.9
Stations	47.5	47.9	49.6	50.8	52.5	54.3	56.0	57.7	59.8	61.5	537.6
Lifts & Escalators	7.1	6.5	6.6	6.9	7.2	7.4	7.9	8.2	8.6	8.9	75.4
Total Asset Maintenance	215.2	209.4	227.9	232.6	238.3	245.9	253.1	260.8	269.8	278.3	2,431.1
Operations											
Service Control SC	16.6	17.2	18.0	18.7	19.3	20.1	20.7	21.5	22.2	23.3	197.6
Service Delivery Unit	4.8	10.4	5.6	0.6	1.1	1.2	0.2	-3.1	-3.9	-4.8	12.1
FFFStations Overlay	-1.2	-5.6	-15.4	-17.1	-18.5	-19.8	-20.8	-22.0	-23.3	-24.1	-167.8
Stations	91.8	94.7	101.6	105.2	109.0	113.2	116.7	120.9	125.2	129.5	1,107.8
Trains	83.0	88.1	92.9	99.7	108.4	114.1	117.3	121.5	125.8	130.2	1,081.1
Total Operations	194.9	204.8	202.7	207.1	219.4	228.9	234.0	238.8	246.0	254.1	2,230.8
SSL Network Total*	983.9	889.5	892.0	797.9	690.7	659.1	632.6	630.1	641.1	663.4	7,480.2

*** Total includes costs not broken down by line**

Capital Investment: The costs presented here currently assume the cost forecast associated with the Sub-surface modernisation as at Quarter 3 (v2.09) and are therefore subject to change. Track costs include c.£150m to support the upgrade, including End State Track Layout works which look to reconfigure the railway to improve throughput and enable the network to hit the capacity targets set for the upgrade. Fleet costs include the rollout of the remaining S stock trains on the network and supporting depot works (e.g. Upminster).

Asset Maintenance: Fleet maintenance costs are suppressed during 15/16 due to the high value efficiency savings that are embedded within the plan relating to the TSSSA Contract.

Operations: Operations costs increase over the end of the plan as the SSR modernisation (and additional capacity) is delivered.

3

LU Asset Plans

Expected performance, cost, key deliverables, risks and asset condition by asset group

LU Asset Plans

Asset Base

Fleet & Depots

- 72TS (Bakerloo)
- 92TS (Central and Waterloo & City)
- 09TS (Victoria)
- S7 Stock (Circle and H&C andDistrict)
- D78S (replaced by S7 stock by 2016)
- S8 stock (Metropolitan)
- 96TS (Jubilee)
- 95TS (Northern)
- 73TS (Piccadilly)
- Fleet maintenance depots

Accounts for c.20% of Total LCH

Signals & Control Systems

- Traditional fixed block signalling with trainstop train protection (Bakerloo, Waterloo & City, Piccadilly, District ,Metropolitan and Hammersmith & City Line)
- Westinghouse Automatic Train Operation (ATO) and Automatic Train protection (ATP): (Central Line)
- Westinghouse Westrace electronic interlockings with Distance-To-Go Radio (DTG-R) (Victoria Line)
- Thales SelTrac S40 Transmission Based Control System (TBTC) (Jubilee Line)
- Traditional fixed block signalling with trainstop train protection / Thales SelTrac S40 Transmission Based Control System (TBTC) (Northern Line)

Accounts for c.15% of Total LCH

Track

- Rails
- Sleepers
- Fastenings
- Base
- Junctionwork (Points & Crossings)
- Conductor rail
- Track mounted equipment, including lubricators and friction modifier units
- Vegetation
- Lineside fences
- Walkways
- Train arrestors
- Track drainage

Accounts for c.6% of Total LCH

Stations

- Station buildings
  - Premises
  - Heating & cooling (mechanical)
  - Fire detection & supression
  - Gas & water supplies
- Electrical systems
  - Station drains & pumps
  - Communication assets (CCTV, PA)
  - Lifts, escalators and moving walkways
- Staff accommodation
- Line side buildings

Accounts for c.3% of Total LCH

Civils

- Bridges & Structures:
  - Underbridges, overbridges, viaducts, girderings, footbridges, underground structures(e.g. covered ways, subways etc), ancillary structures (e.g. signal gantries, longitudinal timbers, cable posts etc.) and earth retaining walls.
- Deep Tube Tunnels:
  - tunnels, cross passages between running tunnels, step plate junctions, shafts
- Earth Structures:
  - embankments and cuttings

Accounts for <1% of Total LCH

Power

- Bulk supply points
- Distribution High Voltage Cables
- Distribution Lower Voltage Cables drom Substation
- SCADA - Supervisory Control and Data Acquisition
- Switch Houses & Substations and Transformer Rooms
- Central Emergency Power Supply
- Offline Battery Invertor Systems
- Switches
- Depot Shore Supplies

Accounts for <1% of Total LCH

ICT

- Audio systems
- Visual systems
- Security systems
- Data storage & networks
- Customer information systems

Accounts for <1% of Total LCH

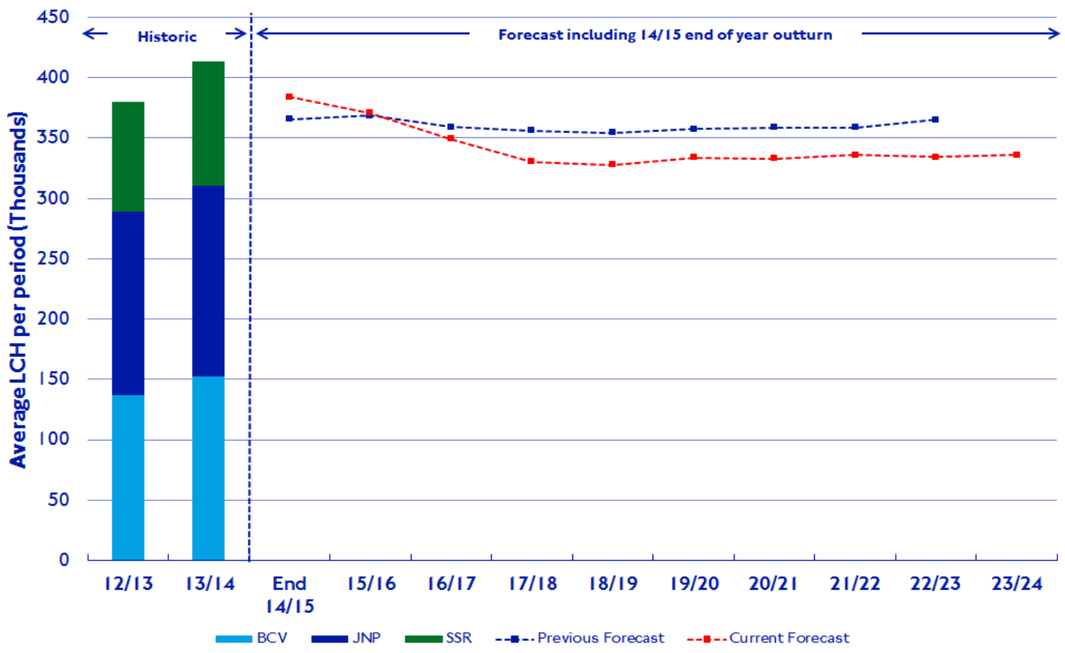
Cooling

- Station cooling
- Vents & fans

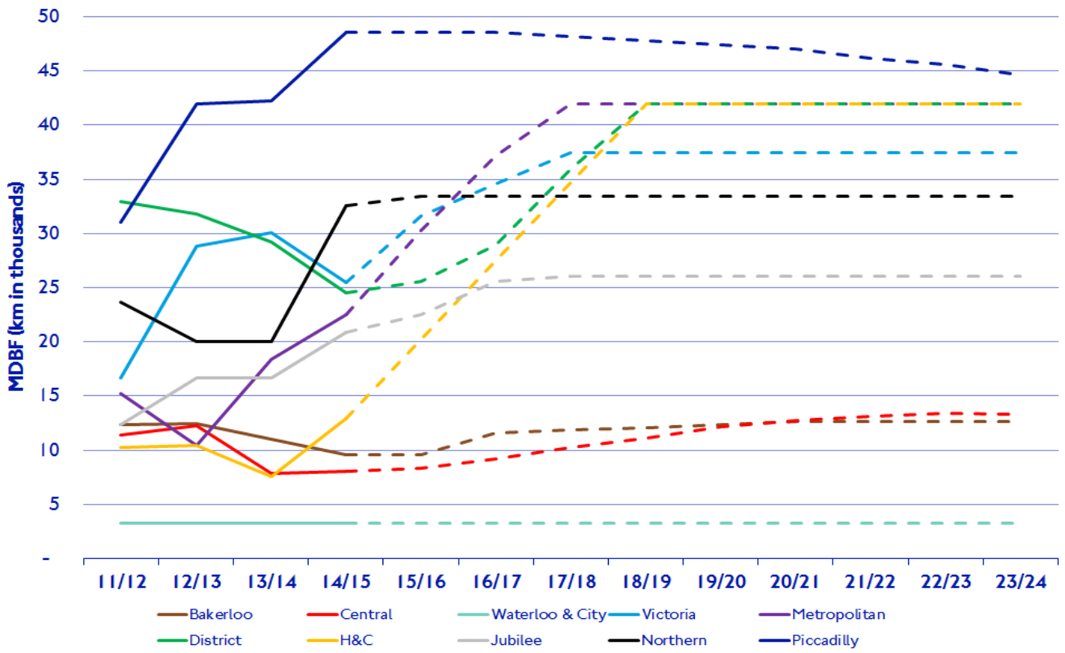
Covered in Customer /Other LCH

LU Asset Plan - Fleet & Depots

Reliability - Lost Customer Hours (LCH) - Fleet - Figure 28



Reliability - Mean Distance Between Failures (MDBF) - Figure 29



Fleet reliability is a significant contributor to overall LCH performance, accounting for c.50% of asset LCH (and c.20% of total network LCH). Although overall Fleet performance for 14/15 shows a 20k LCH per period improvement from 13/14 it has not met last year's business plan forecast. This shortfall is attributed largely to the poorer than expected performance of the Central line fleet and although a range of projects are planned to improve 92TS reliability, these will take a number of years to implement.

The Fleet LCH forecast over the plan shows a 6% improvement compared to last year's forecast. This is due to significant additional investment in the Central line fleet, RAMS improvements and the benefit from the MDBF reliability growth plans on the Victoria and SSR fleets now being included within the LCH forecasts.

The timetabled annual kilometres run by LU's Fleet will increase by 3% in 15/16 and a further 2% in 16/17. By the end of the plan, scheduled kilometres are planned to have increased by 16% from 14/15. In general, running additional kilometres will have an adverse impact on LCH but this will be mitigated, as far as possible, by reliability improvements. Contributing to the increase in Fleet kilometres is the introduction of Night Tube in September 2015. The LCH impact of Night Tube, which is assessed to be small, is currently forecast at the network level and has therefore not been included within the LCH forecast for each affected fleet.

Life extension and refurbishment works are underway on the Bakerloo line fleet and will be completed by 2020. These projects, combined with the introduction of a data recording system to aid fault diagnosis, will have a positive impact on the 72TS fleet performance.

Central line fleet reliability is forecast to improve progressively over the next five years as a result of RAMS initiatives, scheduled heavy maintenance and significant investment to replace the existing DC traction system with a modern AC traction system and to upgrade the now obsolete Data Transmission System.

Victoria line fleet reliability will benefit from continued reliability growth work towards an MDBF of 37,500 km.

S8 stock reliability continues on an improving trend towards an MDBF of 42,000 km. S7 stock is exhibiting a similar level of performance on the Circle and Hammersmith lines and is expected to follow a similar pattern as it replaces D-stock on the District line. The impact of the ATC upgrade on the S-stock's fleet reliability will need to be assessed once the implementation strategy has been developed.

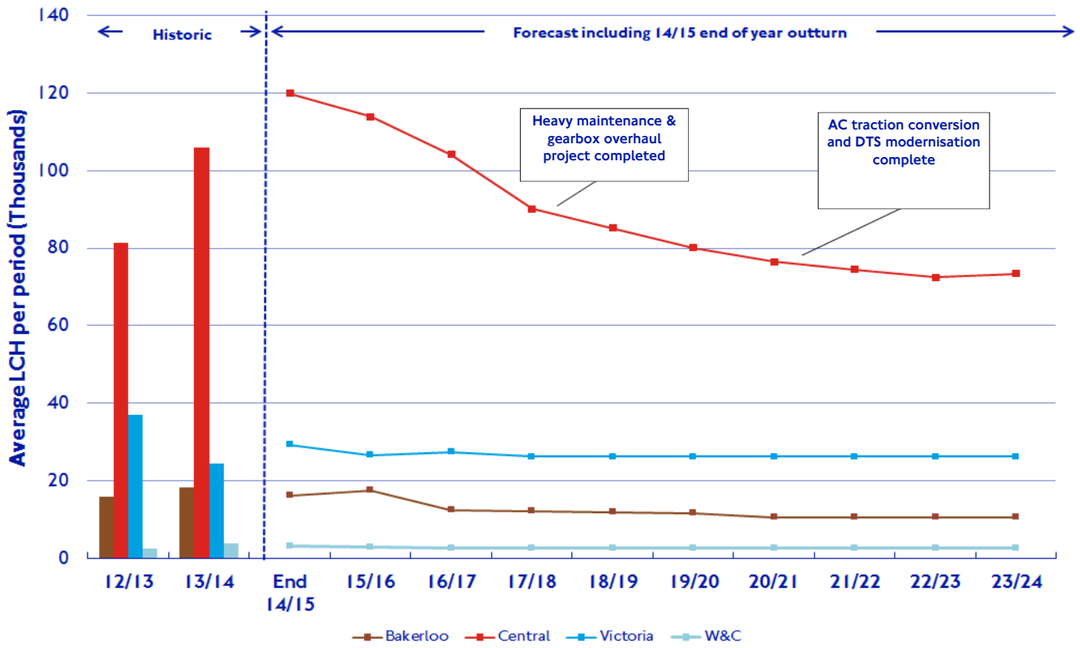
Jubilee line reliability will benefit from a range of RAMS initiatives and completion of the fleet's major overhaul. Traction resilience work and the replacement of obsolete electronic components are planned to be implemented by 17/18. These will help to offset the impact of the planned timetable changes.

Reliability improvement plans for the Northern line fleet (through Alstom contract variations) are in place to offset the impact of the timetable increases following completion of the upgrade. Increased line running speeds may drive changes to the maintenance regime but the MDBF is expected to remain flat from 2015.

Piccadilly line reliability is forecast to deteriorate after 17/18 as the fleet approaches its end of life. In availability terms, this is expected to have a limited impact on overall LCH and the new fleet is planned to be introduced by 2026.

The fleet performance forecasts do not include any benefits from the Predict and Prevent programme but the transition to a predictive maintenance regime offers the potential to significantly improve reliability.

Reliability - Lost Customer Hours (LCH) - BCV - Figure 30



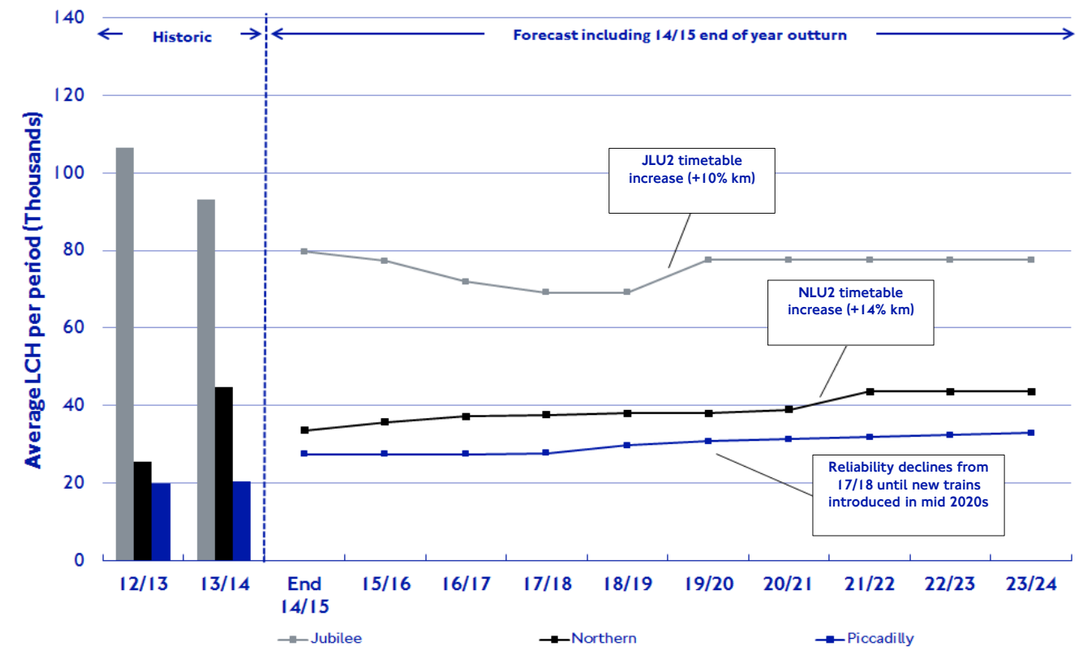
Bakerloo: A RAMS initiative to fit a Train Data Recorder to the fleet is expected to improve both reliability and availability from 16/17. A weld repair project to address structural fatigue and cracking has commenced but emergent work has increased the scope of the project and it will not now be completed until 19/20. Modest improvements in reliability will result from life extension works planned between 2017 and 2020.

Central: 92TS reliability continues to be a concern and the combination of unplanned works (e.g. gearbox overhaul to mitigate bearing failure), the motor containment programme and poor overall reliability is causing a high non-availability of trains. A timetable change (WTT 68) in September 2015 will reduce the peak service requirement by one train, affording some relief, but train availability will continue to be challenging as a series of heavy maintenance and upgrade projects are implemented between 2015 and 2021. Of these projects, AC traction conversion and replacement of the Data Transmission System (DTS) are expected to yield significant improvements in reliability.

Waterloo & City: Accumulates very low LCH and is expected to remain static over the plan. It is not currently proposed to fit AC traction or replace the DTS on the W&C but this position will be reviewed when the costs and implementation requirements are fully understood.

Victoria: Last year's forecast improvement in 09TS reliability has not been met due to ongoing issues with the door sensitive edge and train-borne signalling equipment. The resolution of these issues will contribute towards the fleet achieving a steady state reliability of 37,500km MDBF by 17/18. The LCH benefit from the improved MDBF is offset by the impact of a c.15% increase in timetabled kilometres by April 2016 when World Class Capacity comes into effect.

Reliability - Lost Customer Hours (LCH) - JNP - Figure 31

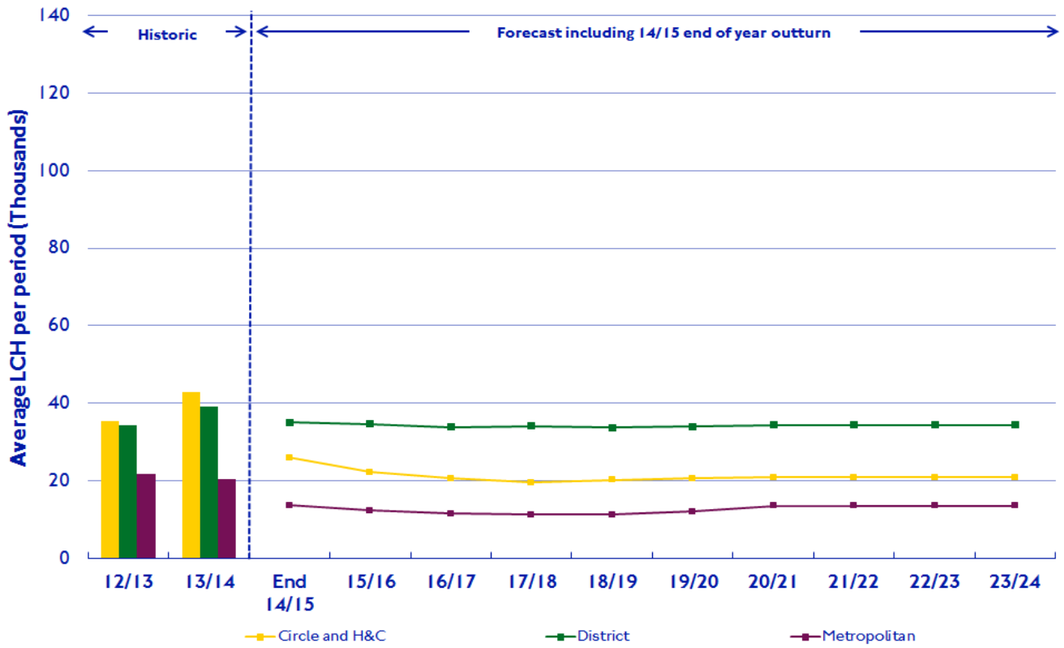


Jubilee: The improved reliability of the 96TS fleet in 14/15 has met last year's forecast. A comprehensive package of RAMS initiatives, including traction system improvements and the replacement of obsolete electronic components, has contributed towards this improvement and the MDBF for the fleet is now predicted to reach 26,000km. JLU2 will increase the total kilometres run by 10%, with an associated increase in LCH, and will require ten additional trains to be procured. Delamination of saloon doors is a fleet-wide concern and mitigation plans are being developed. Mid-life refurbishment is planned to commence in 2015 and presents a risk to train availability; this risk will be closely monitored.

Northern: Following completion of the NLU, peak fleet utilisation increased in December 2014 from 93 to 96 trains (and total kilometres run by c.9%). NLU2 and NLE contribute towards a c.27% increase in timetabled kilometres and require 30 additional trains. The accompanying increase in forecast LCH will be offset in part by a package of reliability improvements resulting in an MDBF of c.33,000 km.

Piccadilly: The 73TS MDBF figure has exceeded last year's forecast but fleet LCH has increased. Life extension works and enhanced maintenance are expected to enable current levels of fleet reliability to be sustained until 17/18. By December 2018, timetable changes will increase the kilometres run by c.12% producing an upward LCH trend in the forecast. Beyond 17/18, reliability is predicted to decline as the fleet nears replacement by 2026 but the impact of this could be contained by additional investment of c.£10m to overhaul or replace components that are approaching the end of their life. Additional Opex funding beyond 2020 (c.£25m) will be required for the scheduled overhaul of traction motors and for the replacement of wheel sets. These requirements will be considered during the 2015 Business Planning process.

Reliability - Lost Customer Hours (LCH) - SSL - Figure 32



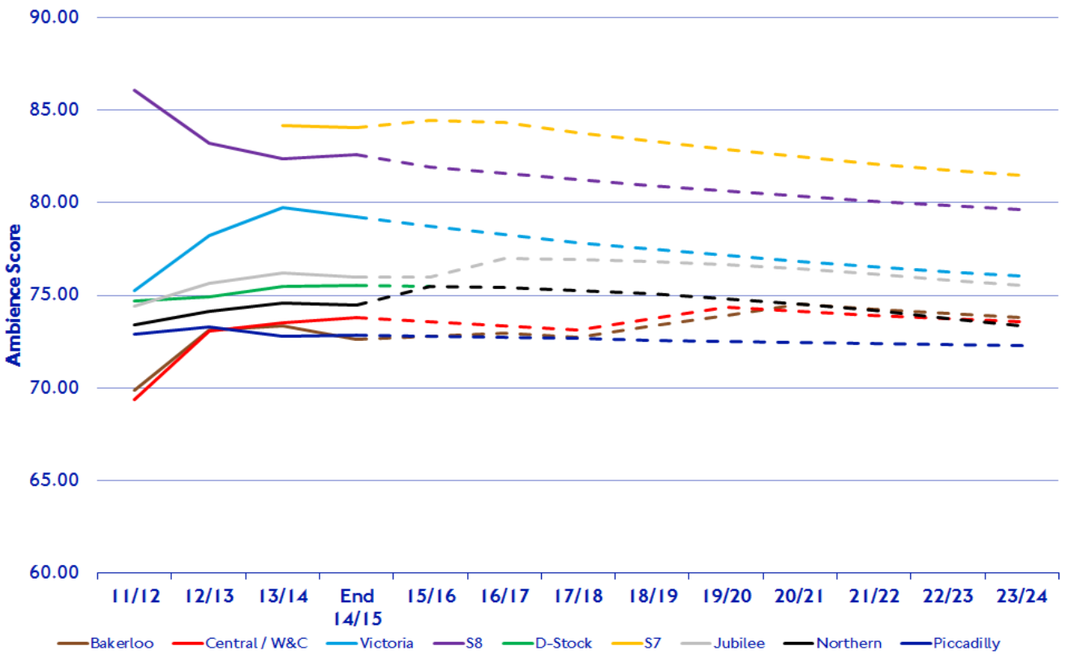
Circle and H&C (C&H): The replacement of the C-stock fleet with S7s was completed in June 2014 and a marked improvement in performance has followed. The S7s will continue to benefit from S8 reliability works and the fleet is expected to achieve a reliability of 42,000km MDBF by 18/19.

District: Additional S7s will be delivered from January 2015 at a rate of about one train per week. By June 2016, S7 deliveries will have been completed and D-stock will subsequently be removed from service. An additional ten maintenance staff will be employed to enable S-stock training to be delivered during the transition phase and the D-stock fleet is expected to sustain current performance levels. D-stock wheel cavities have been a concern during 14/15 but additional resources have been provided to mitigate this through 15/16. The improved reliability of the S7 stock will reduce LCH but the forecast benefit on the District line is less pronounced than on the C&H due to a c.16% increase in kilometres over the plan.

Metropolitan: S8 performance in 14/15 has bettered last year's LCH forecast and the modifications introduced to address OPO CCTV unreliability are proving to be effective. Although S8 MDBF has not increased in line with the forecast, it continues to improve and the fleet is expected to achieve the contracted reliability of 42,000km MDBF by 17/18.

SSR Signalling Upgrade: The installation project for train-borne signalling equipment will affect S-stock availability (with a possibility that trains will need to be returned to Derby) and ATC equipment reliability will affect performance. The impact of these factors has not been included in the current forecast but will be assessed once the SSR ATC upgrade implementation plan is agreed.

Ambience (MSS) - LU Fleet - Figure 33



Ambience scores are more heavily weighted towards cleanliness than condition so Fleet ambience scores tend to deteriorate slowly with the age of the assets. To comply with RVAR flooring colour contrast requirements, lighter coloured vinyl is being introduced which tends to become more heavily scuffed and marked, resulting in lower scores compared to older floors. The imposition of a 10% reduction in the train cleaning budget is expected to have an adverse effect on ambience scores but this effect has not been quantified.

Ambience scores on Piccadilly, Central and Bakerloo lines are lower than other fleets given their age. However, the Bakerloo line fleet will benefit from a refurbishment of the saloon seating in 15/16 and it is proposed to install LED saloon lighting. Refurbishment and RVAR compliance works are planned on both the Bakerloo and Central line fleets from 2017 and the internal condition of the saloons will be improved. The proposed works include new floor vinyl, car body filming and a saloon seating refurbishment for the Central line fleet. No refurbishment works are currently budgeted for the Piccadilly line but the saloon seating is likely to require replacement to enable the fleet to remain in service until 2026.

Victoria line and S-stock scores are high and in line with previous forecasts but will decline over future years. D-stock scores are expected to remain steady until the fleet is disposed of in 2016.

An improvement is expected in the Jubilee and Northern line scores as a result of mid-life refurbishment projects, which will refresh the saloon interior and exterior and also carry out RVAR works. The Northern line refurbishment is nearing completion and the Jubilee line fleet will follow.

Cost (£m, outturn) and Volume Summary - Maintenance - Table 11

Fleet & Depots Maintenance Costs (£m)	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Depots Security	5.7	5.7	5.9	6.1	6.3	6.6	6.8	7.0	7.3	7.5	64.9
Depots Maintenance	10.7	11.2	9.7	11.2	8.9	9.1	9.3	9.6	9.9	10.2	99.9
Fleet Maintenance	266.6	308.8	332.3	290.7	264.5	275.9	282.1	301.8	311.9	323.5	2958.0
REW	7.3	8.4	8.0	8.3	8.9	8.7	9.4	9.2	9.5	9.9	87.8
Total Outturn	**290.3**	**334.1**	**355.9**	**316.3**	**288.6**	**300.3**	**307.6**	**327.6**	**338.7**	**351.1**	**3210.6**
Total Constant 2014/15 Prices	**290.3**	**326.3**	**335.8**	**288.3**	**254.2**	**255.6**	**253.0**	**260.3**	**260.0**	**260.4**	**2784.1**

Tube Stock and Maintenance Measure Unit	Maintenance	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Bakerloo 72TS: 3- and 4-car units	Programme Lift	26	39	29	29	29	29	29	29	29	29	297
	Heavy Overhaul	3	19	8	8	8	8	8	8	8	8	86
Central and W&C 92TS: 2-car units	Programme Lift	-	133	157	60	-	-	-	133	157	60	700
	Heavy Overhaul	-	133	157	60	-	-	-	-	-	-	350
Victoria 09TS: 4-car units	Programme Lift	-	-	47	47	-	-	-	47	47	-	188
	Heavy Overhaul	-	-	-	-	-	-	-	47	47	-	94
SSR S-Stock (S7/S8): train	Programme Lift	-	-	-	29	29	-	30	30	59	59	236
	Heavy Overhaul	-	-	-	-	-	-	-	-	29	29	58
Jubilee 96TS: 3- and 4-car units	Programme Lift	42	-	-	-	-	-	-	42	42	42	168
	Heavy Overhaul	42	-	-	-	-	-	-	42	42	42	168
Northern 95TS: 3-car units	Programme Lift	-	-	-	-	-	70	71	70	-	-	211
	Heavy Overhaul	-	-	-	-	-	70	71	70	-	-	211
Piccadilly 73TS: 3-car units	Programme Lift	52	52	52	52	52	52	52	52	26	-	442
	Life Extension	52	52	52	52	52	52	52	52	26	-	442

The £123.2m cost of the 92TS combined heavy overhaul and programme lift (HOPL) project is included within the Fleet maintenance costs shown for 15/16 to 17/18. If the cost of this project is excluded, then annual fleet and depot maintenance costs across the 10-year period are broadly constant, increasing in line with inflation.

Heavy maintenance on the 72TS and 73TS fleets is equalised over successive years because this is the most efficient way of organising maintenance which is carried out an interval of 2.5 and 4.5 years respectively. It is anticipated that S-stock heavy maintenance will also be equalised over successive years because, although the maintenance interval is longer (approximately six years, depending on kilometres run), the size of the fleet (191 trains) will create a steady annual volume of work. In contrast, heavy maintenance on the 09TS, 92TS, 95TS and 96TS fleets is delivered on a project basis in which the maintenance is delivered over 2-3 years at an interval of between six and nine years.

Heavy maintenance of the Piccadilly line's 73TS fleet will draw down prior to the retirement of the rolling stock in 2026.

A review of heavy maintenance requirements beyond 2020 has identified a shortfall in the Opex forecast for the Central, Waterloo & City and Jubilee line fleets. The Opex forecast for heavy maintenance of the Victoria line and S-stock fleets includes funding transferred out from the TSSSA contracts but Victoria line costs are estimated to be greater than the forecast budget. The total budget shortfall, across all affected lines, is estimated to be in the region of £100m and this will need to be resolved through the business planning process in 2015.

Cost (£m, outturn) and Volume Summary - Projects - Table 12

Fleet & Depots Project Costs (£m, including risk)	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Legacy Train Systems	18.2	28.9	95.8	138.0	154.1	79.8	36.2	1.1	1.0	0.3	553.3
New Tube for London	1.9	0.1	65.6	99.3	122.7	163.0	220.0	260.1	374.5	712.3	2,019.7
Northern Line Extension	0.6	2.1	4.9	22.0	46.2	1.4	-	-	-	-	77.2
SSR Upgrade	332.6	146.5	58.9	15.1	5.7	12.6	12.8	6.9	-	-	591.2
World Class Capacity	21.9	43.4	54.6	11.1	83.0	146.6	95.5	36.5	43.6	-	536.0
Other Fleet & Depots	5.9	6.5	13.8	2.8	-	-	-	-	-	-	29.0
Total Outturn	**381.1**	**227.4**	**293.7**	**288.3**	**411.7**	**403.4**	**364.5**	**304.6**	**419.1**	**712.6**	**3,806.4**
Total Constant 2014/15 Prices	**381.1**	**222.1**	**277.1**	**262.8**	**362.6**	**343.3**	**299.7**	**241.9**	**321.7**	**528.5**	**3,240.9**

Project Delivery	Measure Unit	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Northern Line 95TS Mid Life Refurbishment	Train units	144	-	-	-	-	-	-	-	-	-	144
Bakerloo Line 72TS Weld Repairs	Train units	2	10	15	15	15	15	-	-	-	-	72
SSR - S-Stock Introduction	Trains	13	52	5	-	-	-	-	-	-	-	70
Jubilee Line 96TS Mid Life Refurbishment	Train units	-	52	52	22	-	-	-	-	-	-	126
Metropolitan Line D-Stock Rail Adhesion Train	Trains	-	-	1	1	-	-	-	-	-	-	2
Central and W&C Lines 92TS repairs and RVAR	Train units	-	-	120	120	110	-	-	-	-	-	350
Central Line 92TS AC Traction and DTS upgrade	Train units	-	-	-	120	120	100	-	-	-	-	340
WCC JLU2 - Additional Trains	Train units	-	-	-	-	20	-	-	-	-	-	20
WCC NLU2 / NLE- Additional Trains	Train units	-	-	-	-	-	48	12	-	-	-	60
NTfL- Introduction of New Fleet	Trains	-	-	-	-	-	-	-	-	-	42	42

The Legacy Train Systems budget includes a range of projects to refurbish and extend the life of the Bakerloo, Central and Waterloo & City fleets. The forecast includes:72TS weld repairs, 92TS floor corrosion repairs and RVAR modifications. It is proposed to convert the 92TS trains operated on the Central line to an AC traction system and to upgrade the Data Transmission System (DTS). Other fleet costs include mid-life refurbishment of the Jubilee and Northern line fleets. Since Q3, the cost profile for the Central line AC traction, DTS and RVAR projects has been re-phased, deferring £54m of investment by 12 months; this revision is not reflected in the cost tables presented within this document but is included in the performance forecasts.

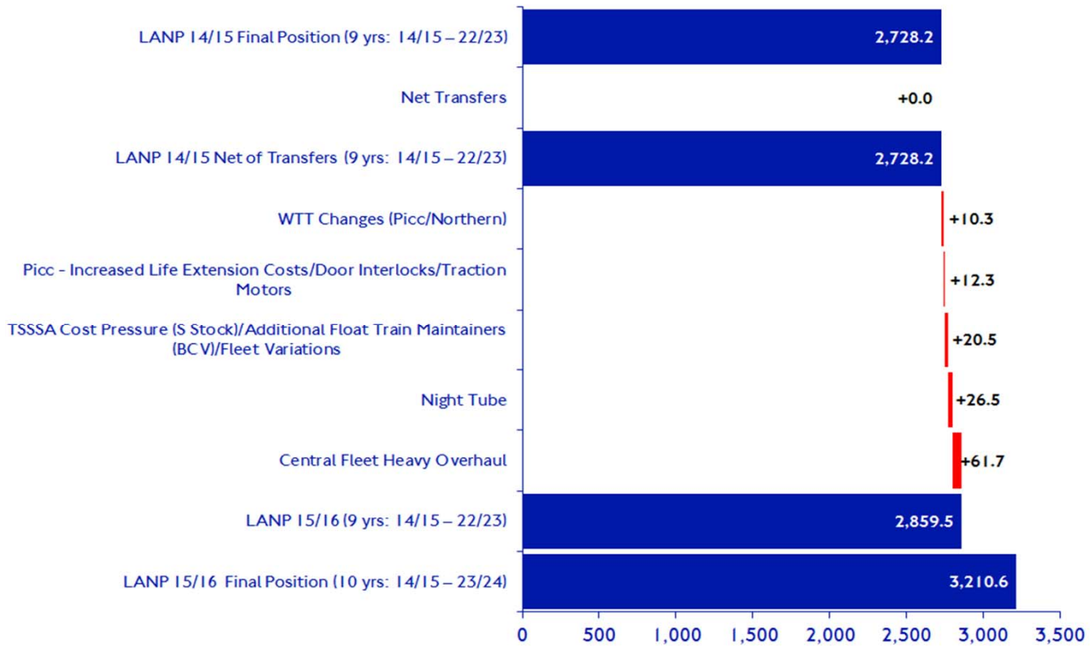
The New Tube for London costs comprise all programme and project management, engineering, procurement, build and delivery costs for a new energy efficient, lightweight fleet of trains with air-conditioning and through gangways for the Piccadilly line; all trains will be in service by 2026. The replacement of the Piccadilly fleet will be followed by the Bakerloo fleet (2026-2028) and the Central and Waterloo & City fleet (2029-2033).

The SSR upgrade is delivering new S-stock trains onto the SSR network. All 58 x S8s have been delivered into service on the Metropolitan line and 63 x S7s have entered service on the Hammersmith & City line, enabling C-stock trains to be retired. Deliveries of a further 70 x S7s between January 2015 and June 2016 will enable the D-stock trains to be retired from the District line by end 2016. Two of these retired vehicles will be converted for use as Rail Adhesion Trains on the Metropolitan line.

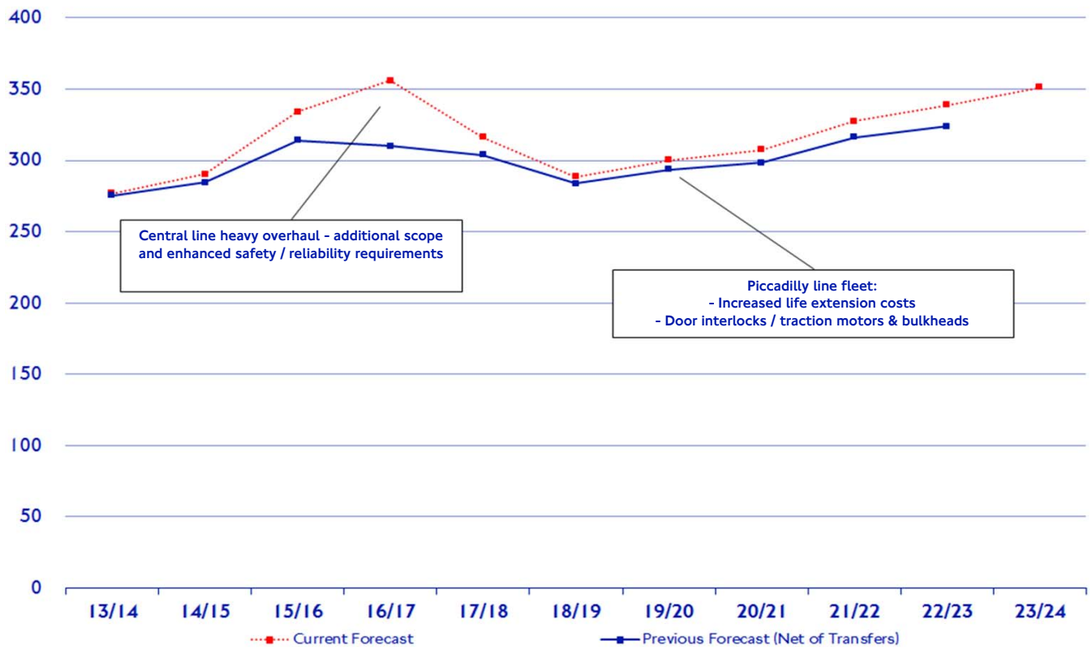
The World Class Capacity programme comprises costs necessary to enable up to 36 trains per hour operation on the Victoria, Jubilee and Northern lines. The Victoria line has sufficient trains to deliver this enhanced service, so the costs are mainly for signals and infrastructure; however, additional trains will be procured, in conjunction with the Northern Line Extension, for the Jubilee and Northern line upgrades.

LU Asset Plan - Fleet & Depots

Cost Variance Analysis - Opex - Figure 34



Cost Phasing Analysis - Opex - Figure 35



Fleet and depot maintenance costs comprise all planned and reactive maintenance on fleet, premises, electrical and mechanical systems and plant and equipment. Signalling, track and power maintenance costs are captured within the respective asset plan. Fleet and depot maintenance for the first nine years of the Plan have increased by a total of £131.3m from LANP 14/15; this is an increase of almost 5%. The reasons for this increase are as follows:

Piccadilly and Northern line costs have increased by a combined total of approximately £1m per year due to working timetable changes. It is forecast that the introduction of Night Tube in September 2015 will incur additional maintenance costs across the affected lines of approximately £3m per year.

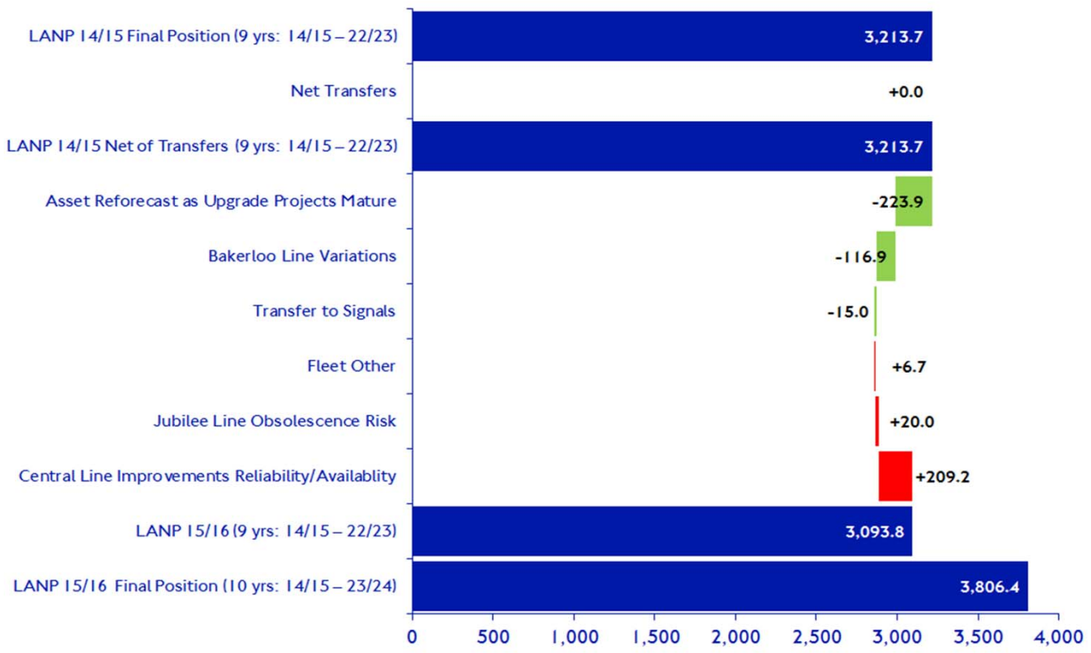
Timetable changes on the SSR have increased TSSSA contract costs (increased kilometrage incurs additional TSSSA material costs) and BCV has increased train maintainer staff numbers to improve asset reliability. The effect of these increases, in conjunction with a range of smaller variations, have increased Fleet Opex costs by £20.5m.

The Piccadilly line's 73TS fleet is currently undergoing life extension works to take the stock to 2022 but additional works will be required to extend the assets to the now planned replacement in 2026. The majority of these additional works are unbudgeted at present but provision totalling £12.3m has been included in the Plan to fund the following: overhaul of the saloon door interlocks, overhaul of the brake-heads and scheduled traction motor maintenance until 2020. It is estimated that the unbudgeted works to extend the life of the fleet to 2026 will total approximately £35m. This cost pressure will be addressed through business planning round in 2015.

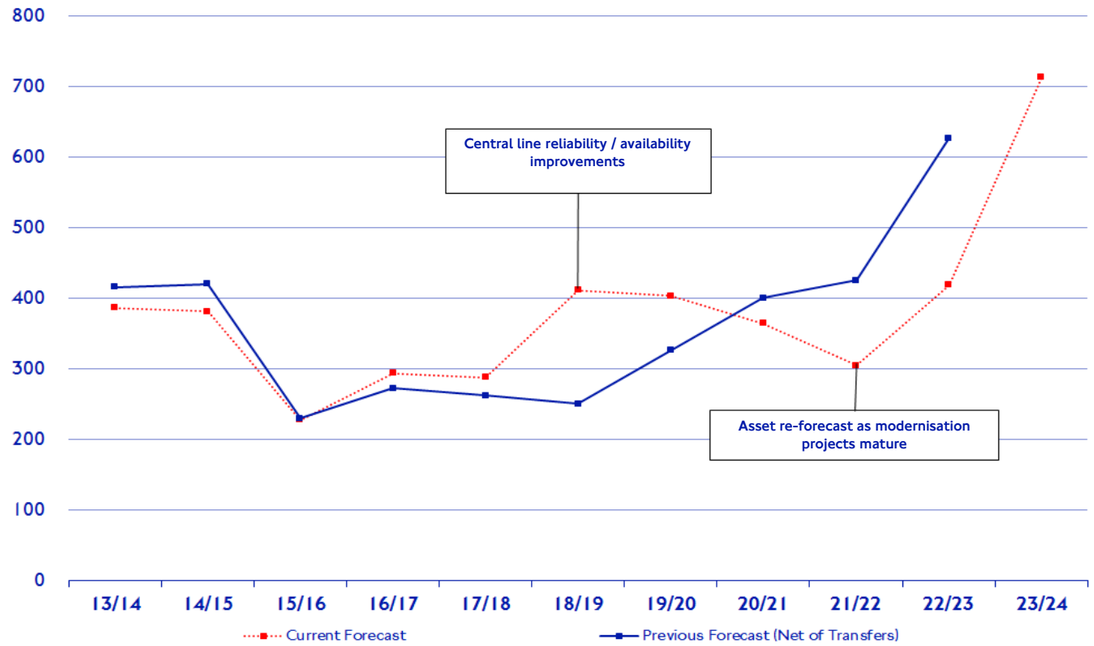
The most significant increase in costs from the LANP 14/15 position is due to the heavy overhaul and programme lift of the 92TS fleet operated on the Central and Waterloo & City lines. The initial cost estimate for this work was £61.5m but a detailed review of the scope and costs has led to an updated estimate of £123.2m, including £11.1m risk. The revised project scope includes those maintenance tasks omitted from the previous heavy overhaul, the replacement of life-expired components and the embodiment of critical modifications.

LU Asset Plan - Fleet & Depots

Cost Variance Analysis - Capex - Figure 36



Cost Phasing Analysis - Capex - Figure 37



Fleet capital investment over the ten-year period is dominated by costs associated with New Tube for London (NTfL), the Sub-surface Upgrade Programme and the procurement of additional trains for the Jubilee and Northern line upgrades. Legacy fleet costs have historically accounted for a small proportion of total investment but significant expenditure on the Bakerloo and Central line rolling stock is required to ensure that these fleets can continue to operate safely and reliably until they are replaced under NTfL.

The total effect of variations to the forecast cost of fleet upgrade projects is a reduction of £223.9m. In large part this is due to re-phasing of the NTfL costs for the replacement of the Piccadilly line fleet. The delivery schedule for the rolling stock has been compressed and the final Piccadilly line trains will be delivered in 2026, the spend profile has changed and costs over the forthcoming ten years have reduced by £381m. Partially offsetting this reduction has been an increase of £75m in Northern Line Upgrade 2 costs for the procurement of an extra six trains to enable the line to be segregated. The total number of additional trains planned for the Northern line is now 30.

An additional £20m has been budgeted over the period 2018-23 to address obsolescence risks on the 96TS fleet operated on the Jubilee line. An audit of the condition of the 96TS electronic systems and components will be carried out in 2015 and this will inform the development of risk mitigation plans as the fleet reaches the middle of its expected life.

Last year's Plan allocated £281m for life extension works and 72TS weld repairs on the Bakerloo line; all costs were attributed to fleet. This budget included £15m for life extension of the signalling equipment, £30m for the proposed conversion of two ex-Victoria line trains for use on the Bakerloo line and £30m for power upgrades. The decision has been taken not to enhance the Bakerloo service so the £60m budgeted for train conversion and power upgrade works has been removed from the Plan. The £15m budget for signalling life extension works has been transferred to the signal asset group and £10m has been allocated to fund essential depot works such as the replacement of the boiler at Northumberland Park Depot. The budget was reduced by a further £20m during the 2014 business planning process to address wider cost pressures but an £8m budget was added for RVAR platform-train interface work. These variations, combined with other adjustments, produce a revised Bakerloo fleet budget of £173m to fund the ongoing weld repair project, essential life extension works and modifications to achieve RVAR compliance.

A budget of £165m has been included in the Plan to upgrade the Central line fleet with a modern AC traction package. This investment will markedly improve reliability and asset availability whilst reducing ongoing Opex costs. The Plan includes £20m for the conversion of two ex-Victoria line trains to provide a shuttle service between Woodford and Hainault. This would release two 92TS trains to enable the existing Central line service to be maintained during the programme of 92TS works planned from 2017 to 2021 and presents an opportunity for the service to be increased from 2020 onwards. A budget of £30m has been allocated in the Plan for RVAR compliance works on the 92TS fleet and platform-train interface works. Since Q3, the Capex cost profile for Central line investment has been re-phased but this revision is not reflected in the analysis shown.

A large number of individually small cost variations have produced a net increase in 'other' fleet and depot costs of £6.7m.

Risk - Top Fleet and Depot Risks - Table 13

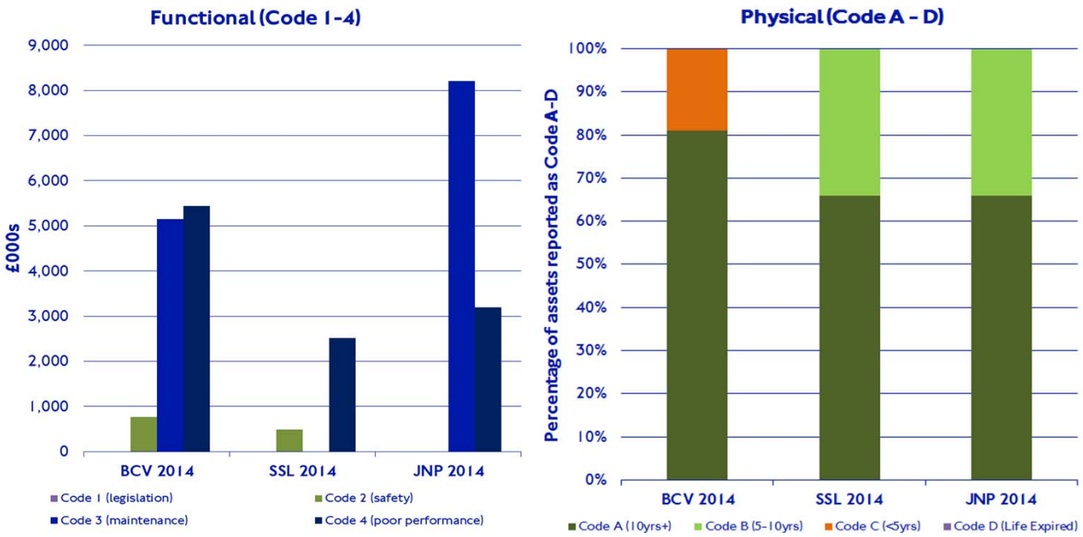
ARM	Line		Description	Mitigation	Current Exposure	Target Exposure
80723	1	Piccadilly	Unbudgeted life extension works to enable the 73TS fleet to remain in service until it is replaced by NTfL in 2025/26. It has been calculated that the total cost for undertaking activities deemed essential to keep the fleet operating to 2026 is £31.7m with a further £10m allocated to risk. If these works are not carried out, there is a risk that the 73TS fleet will be unable to deliver an acceptable operational performance until it is replaced.	Feasibility studies to be carried out to refine the cost estimates and develop the business case for the required life extension works. Funding to be sought through business planning in 2015.	21	12
SSD30011	2	Central / Waterloo & City	Degraded 92TS traction system electronic components (e.g. capacitors, life expired components, PCBs). These components may fail and be unrepairable and/or irreplaceable without significant time, cost and resource. Failure to adequately mitigate this risk could result in non-availability of trains for service.	Project authority granted to overhaul the three least reliable traction system PCBs. Subject to feasibility study, tendering and contract award, it is planned that AC traction will be embodied across the 92TS fleet by 2020, removing this risk.	20	8
SSD300205	3	Central / Waterloo & City	Obsolete 92TS electronic components (e.g. ASIIC chips, traction/brake control electronics, Data Transmission System (DTS)); DTS is unsupported beyond 2018. Obsolete electronic components may fail and be unrepairable and/or irreplaceable without significant time, cost and resource. Failure to adequately mitigate this risk could result in non-availability of trains for service.	Obsolescence working group established to review emerging issues and establish solutions. An electronics condition audit will be conducted to identify unmitigated obsolescence risks. A contract with BTUK is in place to manage traction electronic chip-set obsolescence. A pre-feasibility study has been commissioned to develop the requirements for a replacement DTS system; the Plan includes £22m for DTS upgrade.	19	14
74233	4	Piccadilly	Piccadilly life extension project disrupted as a result of poor supplier performance due to inefficient supply chain forecasting, planning and management. Failure to adequately mitigate this risk could result in non-availability of trains for service and additional costs of circa £1m.	Close management of the Supply Chain and prioritisation of workstreams. Proactive identification of alternative suppliers.	19	10
74546	5	Jubilee	Saloon door delamination due to poor build quality is leading to increased maintenance costs above budget. The safety risk has been mitigated but train availability could be impacted due to the low float of doors and a lead time of six months for additional doors.	Enhanced door maintenance is in place to mitigate this. The risk will remain until an alternate solution is developed and funded to provide a permanent fix.	19	10

The majority of fleet risks are due to the deteriorated condition of the older assets, including the effects of corrosion, structural cracking and component obsolescence. Last year's LANP highlighted the financial risk of needing to modify the 72TS and 92TS fleets to meet RVAR legislation if DfT exemption was not granted. This risk has materialised and funding for the required RVAR modifications has now been included in the Plan. The Plan assumes that RVAR exemptions will be granted for the 73TS fleet but the associated financial risk is low; a detailed RVAR assessment will be carried out in 2015.

JNP: The Piccadilly line's 73TS fleet is currently undergoing life extension works to take the stock to 2022. Additional works, which are currently unbudgeted, will be required to extend the assets further to the now planned replacement in 2026. The current works are experiencing supply chain issues that are threatening the project's timescales. Saloon door delamination is the highest risk affecting the Jubilee line and a long-term solution to this problem is being developed, although there is presently no funding provision for this.

BCV: The 92TS fleet represents the largest risk of the BCV fleets owing to poor design and build quality and the obsolescence and deterioration of electronic components. Although the Plan provides funding to address many of these concerns, there is a risk that the impact to service will worsen before the mitigations are in place. Traction motor reliability remains a significant issue which can only be contained at high cost. It is proposed to convert the fleet to an AC traction system by 2021 to resolve this issue and significantly reduce operating costs. A weld repair project to address structural cracking and corrosion on the Bakerloo line's 72TS fleet has commenced but the scope of work has increased markedly due to emerging issues.

Asset Condition (ACR) - Fleet - Figure 38



There are no Code 1 concerns affecting passenger rolling stock and the Code 2 safety concerns are being mitigated through control measures, including Cases for Continued Safe Operation (CCSOs) where appropriate.

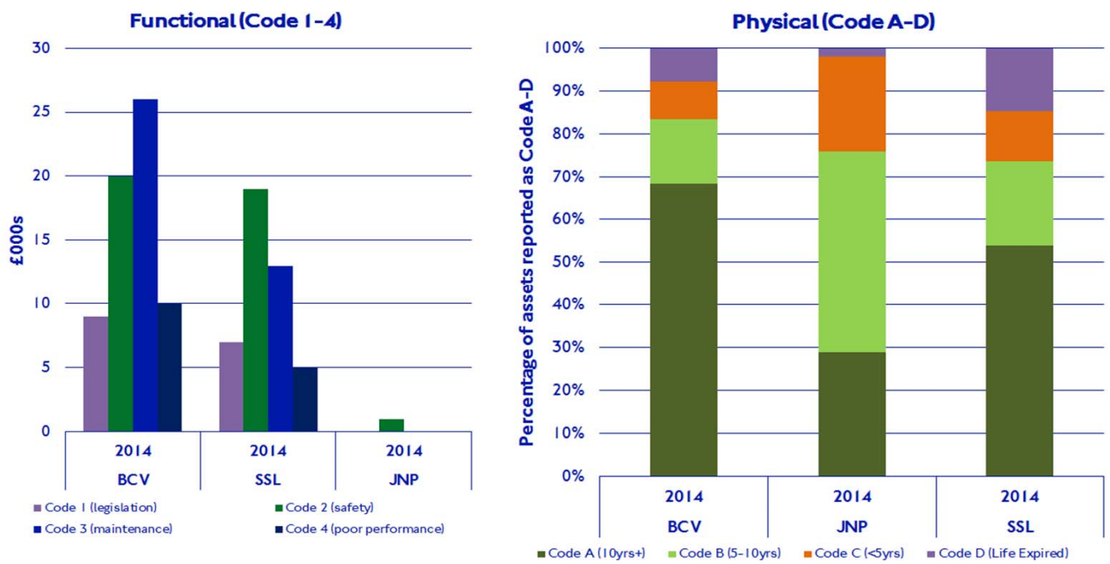
There are 31 Bakerloo line and 19 Central and Waterloo & City line Code 3 extraordinary maintenance cost concerns. Of these concerns, five incur additional maintenance costs greater than £100k each per year. These are being addressed by the 72TS weld repair project and the 92TS gearbox bearing replacement project.

There are no Code 3 concerns for S-stock and Code 3 costs have not been calculated for the D-stock fleet due to its imminent replacement.

The majority of the Code 3 concerns reported for JNP are attributable to the Piccadilly line and relate to 42 separate concerns. Life extension works will address many of these concerns and reduce ongoing operating costs.

The physical condition profile of the BCV and JNP fleets is unchanged from 2013. Life extension works are underway on the 72TS and 73TS fleets and life extension plans are in development for the 92TS fleet. The SSL condition profile has improved following the replacement of the C-stock with S7 trains; the D-stock fleet will be replaced by end 2016.

Asset Condition (ACR) - Depots - Figure 39



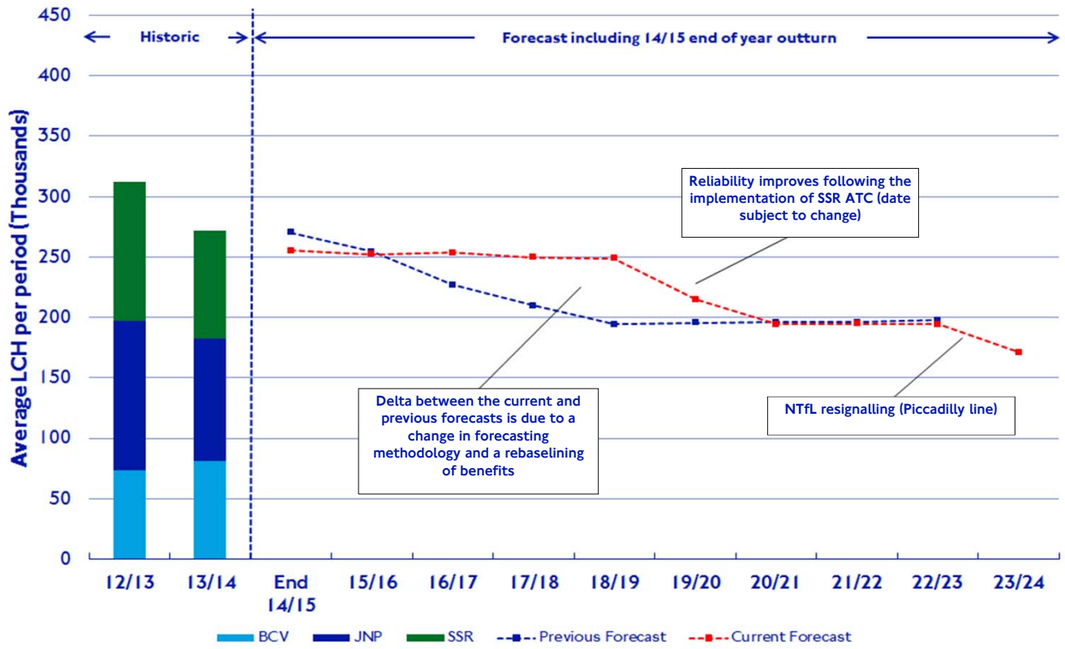
Code 1 concerns at BCV & SSL depots regarding lack of drawings for gas and water services are being addressed as work is undertaken within the depots; this has been agreed with the relevant professional heads. Code 1 concerns regarding electrical equipment are being addressed and managed by DMU. The Northumberland Park Depot boiler upgrade project will deliver a system that is fully compliant with legislative requirements. The JNP mechanical systems and electrical ACRs exclude depot equipment so no Code 1 concerns have been reported. There is a risk that the lack of a cross-asset management strategy for drainage could lead to Code 1 concerns arising in the future. To mitigate this risk, Depots will be represented within the working group set-up to develop a drainage management strategy. Changes to the classification of Bridges and Structures within the depots have caused a reduction in the overall profile of Depot Assets. However other individual asset areas have seen little change from 2013 to 2014.

BCV: Condition of the lifting systems on the Central line is deteriorating in line with expectations, and an overhaul is taking place to ensure availability for the duration of planned work on 92TS. The boilers at Northumberland Park are life expired, and are to be replaced in 15/16.

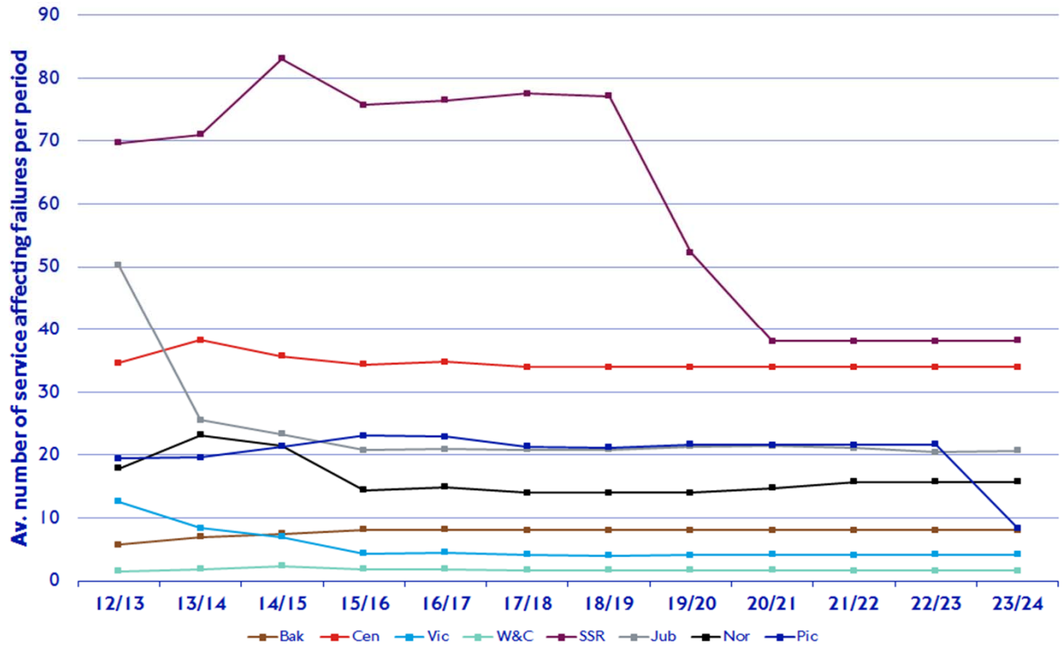
SSL: The asset condition profile on SSL has remained consistent across most asset areas, but is expected to improve as redundant equipment is disposed of following the introduction of S-stock

JNP: The condition of the train wash at Stratford Market is becoming a cause for concern and a business case is being produced for an overhaul of the equipment to ensure satisfactory ambience scores are maintained.

Reliability - Lost Customer Hours (LCH) - Signals - Figure 40



Reliability - Service Affecting Failures - Signals - Figure 41

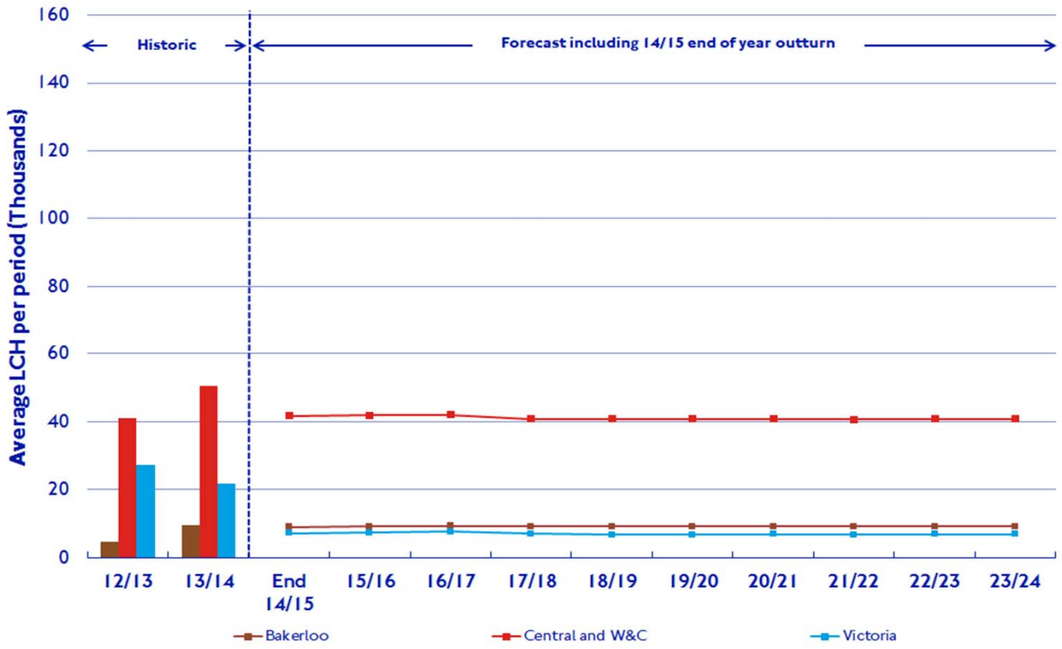


Signals and Control & Information assets account for circa 32% of asset related LCH and 15% of total LCH across the business. The priorities for the legacy assets are to ensure that the existing asset base remains safe and reliable, while introducing modern replacements to address degradation/obsolescence concerns and achieve improved capacity, performance and cost efficiencies.

Baseline performance has been taken as the period average in the 13 periods to P10 14/15 from Insight data. This is a key change from last year where baselines and the first two years of the plan were forecasts from the Asset Performance Directorate. Performance was then adjusted as necessary to capture the impacts of known maintenance initiatives, capital projects (including RAMS initiatives) and increased utilisation arising from planned timetable changes. Where traffic increase adjustments have been made, these are based on the historical proportion of LCH incurred by assets likely to be affected by the change, e.g. point machines. Again this approach to forecasting differs slightly from the last plan where there was greater reliance on historical forecasts. The change to baselines and forecasting has had noticeable effects on the performance profiles, especially at network level, but is more robust and auditable. No asset degradation impacts have been incorporated into the forecasts. The assumption being that these will be managed to keep performance stable unless a change initiative or traffic increase occurs.

The projected level of signals LCH in 14/15 is anticipated to be 5.5% lower than previously forecast due to concerted efforts to improve performance. The forecast network LCH level does not decrease steadily to 18/19 as per the 14/15 plan due to: a) many of the improvements have already been delivered for 15/16, and b) the SUP resignalling benefits are not expected to be realised as gradual as before. Instead, a relative steady state performance is now expected to 18/19 after which a steep improvement is expected due to delivery of the SSR ATC system though to 20/21. Performance stabilises again to 22/23 when performance improves sharply as the benefits of the NTfL programme start to materialise.

Reliability - Lost Customer Hours (LCH) - BCV - Figure 42



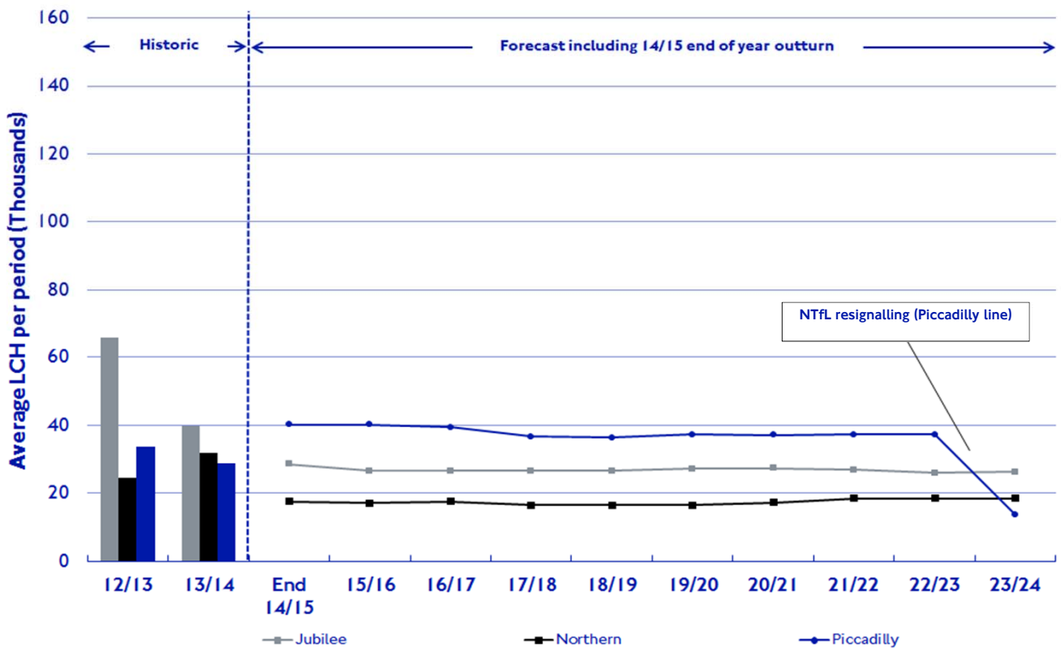
Bakerloo: LCH levels are forecast to increase marginally (2%) in 15/16 due to a rise in traffic levels. Condition monitoring from 17/18 will suppress LCH increases by stopping potential faults developing into service affecting failures. Performance is expected to remain steady for the remaining years with any potential asset degradation prevented by life extension works (planned for completion in 19/20) which will look to leverage the maximum benefits from the current available funds.

Central: Initiatives including the upgrade of the Intelligent Event Monitoring system, improving relay reliability and replacement of controller cards have all contributed to reductions in LCH. This will partly be offset by a small rise (<1%) from traffic increases in 15/16. Investment in implementing an Integrated Condition and Event Monitoring Tool (ICEMT), control system and lineside asset life extension works and point machine upgrades are expected to keep levels stable for the rest of the plan. Limited funds have been budgeted for the asset life extensions and work is in progress to determine the best utilisation of these funds.

Victoria: RAMS initiatives, in particular remote monitoring of track circuits and pin bonds for track circuits, have substantially reduced LCH. A series of traffic increases, including those following capacity improvements from the World Class Capacity (WCC) programme, over the period 15/16 to 16/17 is forecast to result in a 6% increase in LCH, partly offsetting the improvements made. Performance is expected to remain steady thereafter throughout the plan years by condition monitoring regimes.

W&C: Performance is expected to remain steady at current levels up to 17/18 when the ICEMT project is expected to be delivered and reduce LCH by 7%. Performance is then forecast to remain at this level.

Reliability - Lost Customer Hours (LCH) - JNP - Figure 43

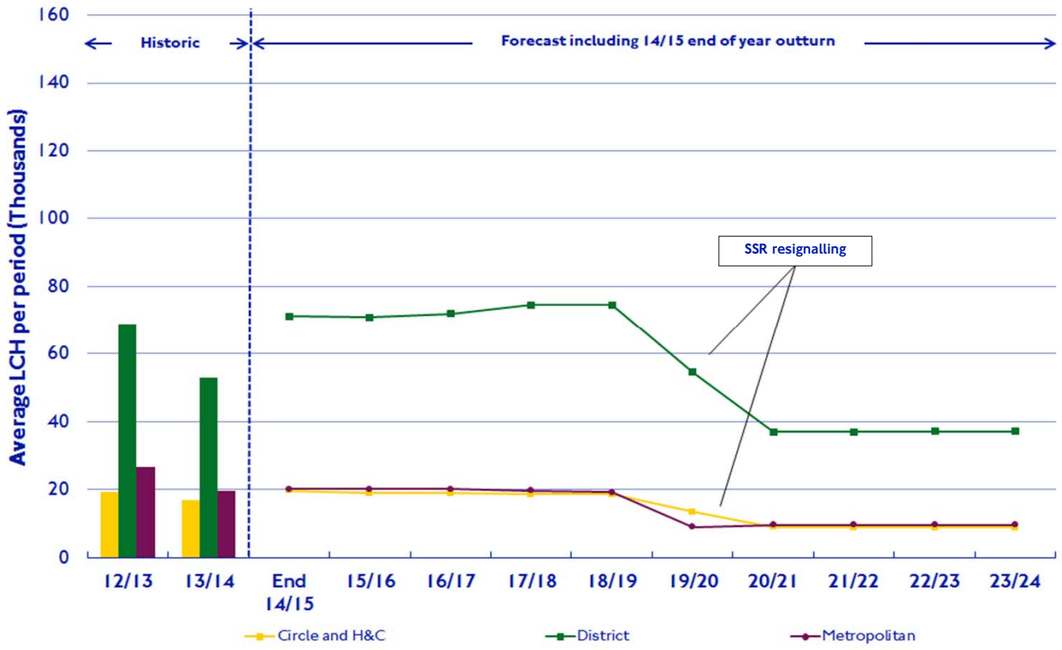


Jubilee: Maintenance initiatives such as 'point care' and TBTC loop failure reduction has helped to reduce LCH levels. The benefits of remote condition monitoring of axle counters at key open sections is expected to make a c.5% reduction in LCH from 15/16. An increase in traffic in 16/17 marginally offsets some of this improvement (<1%). 19/20 sees further traffic increases from JLU2, implemented as part of the World Class Capacity (WCC) programme, resulting in a 2-3% increase in LCH.

Northern: Maintenance initiatives such as 'point care' and the rollout of TBTC has eliminated various conventional signalling failures. Traffic increases in 15/16 and 17/18 are expected to increase LCH levels by c.3%. This is offset by a 7% reduction from 17/18 from remote condition monitoring of key point machines and axle counters and replacement of dated point machines with the modern 'Surelock' type. A 7% increase in LCH levels in 21/22 is explained by the resultant traffic increase from NLU2.

Piccadilly: RAMS initiatives, particularly the conversion of point machines to the 'Surelock' type at Acton Town have improved performance. 16/17 sees the obsolete Piccadilly line control system (captured as a top JNP risk) gradually replaced by an interim signalling control system and service control migrated from the obsolete Earls Court Control Centre to an interim control centre. This project is expected to eliminate many of the performance issues associated with the current control system and a 10% gradual reduction in Piccadilly line signalling LCH is expected from 16/17 to 18/19. A 5% increase in LCH is forecast from 18/19 owing to increased kilometrage from timetable changes following completion of the SSR ATC. The end of the plan years see a substantial performance improvement from resignalling to a new Railway Control System under the NTfL programme.

Reliability - Lost Customer Hours (LCH) - SSL - Figure 44



SSL: RAMS initiatives such as the replacement of filament lamps with LED types and the replacement of mechanical Programme Machines with electronic models have delivered performance improvements. The consequence of additional traffic on all lines of the SSL up to 20/21, which includes increases to utilise the additional capacity enabled by the SSR signalling upgrade, is expected to be an increase in LCH levels.

The rollout of the new SSR ATC system, which as well as eliminating many of the risks associated with SSR legacy signalling assets, substantially improves performance and more than offsets the rise in LCH from the traffic increase. The 17/18 LCH increase is due to the higher traffic levels while still operating on legacy assets particularly on the District line which sees a 7% increase. The end state forecast assumes the implementation of an ATC contract which adheres broadly to the same delivery schedule as the terminated Bombardier contract. Performance improvements have been based on LCH reductions from TBTC implementation on the Jubilee line and further reductions from reliability driven system changes to the TBTC design anticipated for the SSR.

Cost Summary (£m; outturn) - Maintenance and Project - Table 14

Signals Maintenance Costs (£m)	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
ATC	3.4	4.1	4.3	4.5	4.6	4.8	4.9	5.1	5.3	5.5	46.5
C&I	2.4	2.5	2.6	2.6	2.7	2.8	2.9	3.0	3.1	3.2	27.9
Overheads	13.8	17.2	17.6	18.1	18.0	18.6	19.1	19.7	20.3	20.1	182.7
Other Signals Maintenance	61.5	61.2	54.5	55.2	54.1	56.8	59.9	62.1	64.4	66.7	596.4
Total Outturn	**81.0**	**85.2**	**79.0**	**80.4**	**79.5**	**83.0**	**86.9**	**89.9**	**93.2**	**95.5**	**853.5**
Total Constant 2014/15 Prices	**81.0**	**83.2**	**74.5**	**73.3**	**70.0**	**70.6**	**71.4**	**71.4**	**71.5**	**70.8**	**737.8**

Signals Project Costs (£m, including risk)	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Legacy Train Systems	2.3	8.5	23.5	28.3	16.5	-	0.3	-	-	-	79.3
Infrastructure Renewals	3.7	4.3	4.0	0.6	-	-	-	-	-	-	12.6
New Tube for London	-	-	0.9	32.9	117.0	189.0	290.8	310.1	309.7	195.6	1,446.1
Northern Line Extension	0.2	0.7	4.6	6.1	8.4	8.9	2.9	-	-	-	31.8
SSR Upgrade	36.8	99.8	172.2	126.8	86.2	62.6	24.0	-	-	-	608.4
World Class Capacity	76.5	12.4	53.1	30.0	12.6	19.2	14.2	- 0.6	0.0	0.0	217.5
Total Outturn	**119.4**	**125.7**	**258.4**	**224.8**	**240.7**	**279.7**	**332.3**	**309.6**	**309.7**	**195.6**	**2,395.8**
Total Constant 2014/15 Prices	**119.4**	**122.8**	**243.8**	**204.9**	**212.0**	**238.0**	**273.2**	**245.9**	**237.7**	**145.0**	**2,042.9**

Opex: The SSL has a gradual reduction in operating expenditure between 15/16 and 18/19, after which the new signalling system starts operation and the benefits of a less maintenance intensive system start to materialise and come through in the maintenance costs. BCV sees a reduction in opex from 15/16 as the Maintenance Unit Reduction savings start to be realised. The reduction on the Victoria line is much less due to the savings being partly offset by increases to operate WTT 37, which commences service from 15/16. JNP shows a sharp reduction in costs to 18/19, having increased in 14/15, to deliver life extension maintenance activities on the Piccadilly line and for overhauling PEDs on the Jubilee line. Costs increase from 20/21 due to the operation of additional assets from the Northern Line Extension.

Capex: Investment in renewing/life extending legacy assets (under legacy train systems and infrastructure renewal programmes) steadily builds up with a peak in 16/17, after which time it decreases to nil spend by 21/22. By this time the SSL ATC system will have been completed and the NTfL's resignalling programme will firmly be in its delivery phase starting with the Piccadilly line. Life extending the Central, Bakerloo and Piccadilly line signalling and control systems comprises the majority (70%) of renewal expenditure. Such renewal works resolve many of the asset condition and risk concerns on these lines.

Expenditure on the NTfL programme during the Plan years is predominantly for the design and installation of a new ATC system on the Piccadilly line. Design commences in 16/17 and installation will be substantially complete by 2023/24. The Plan years also capture the Bakerloo line resignalling in full implementation and the front end of the Central line resignalling. This differs from the last plan when the Central line was to be resignalled before the Bakerloo. Expenditure on NTfL comprises 60% of total signalling investment.

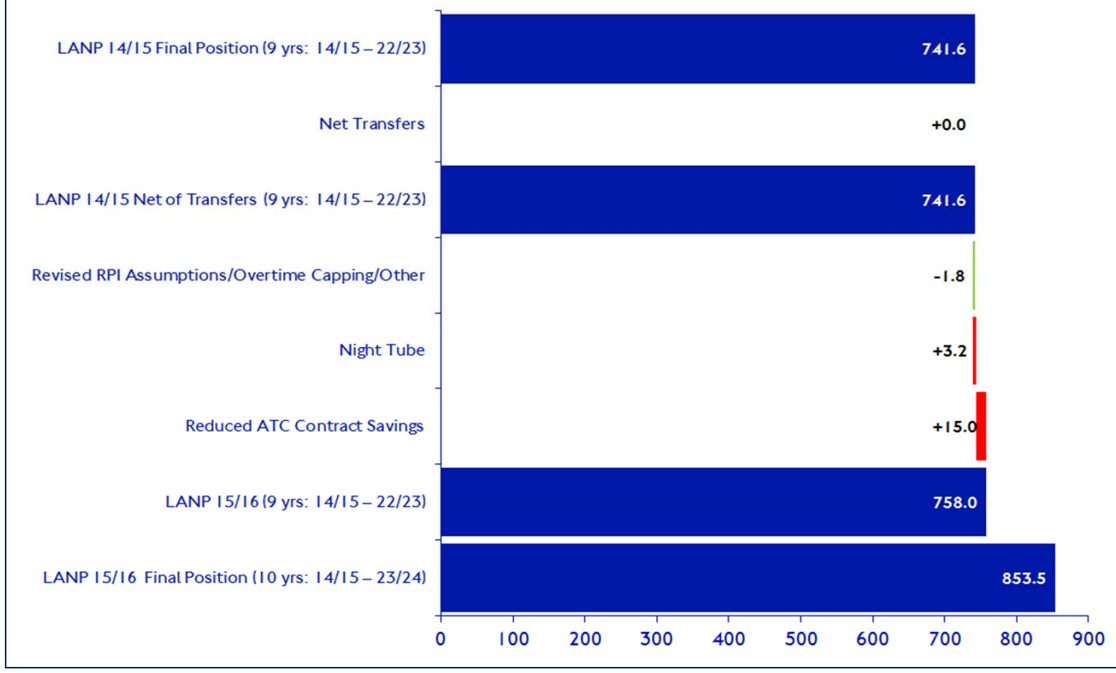
The SUP ATC programme, peaking in 17/18, reflects the emerging expenditure profile of the new ATC system. The cost of the supply and testing/integration of the new ATC system comprise over 97% of the SUP signalling costs. Auxiliary works such as cable route management are minor in comparison.

The World Class Capacity programme has a number of projects aimed at enhancing the performance of recently upgraded signalling systems. The Thales SelTrac S40 system on the Jubilee and Northern lines and the Invensys DTG-R system on the Victoria line will be tuned to deliver frequencies of up to 34.3 - 36, 30+ and 36 trains per hour respectively. On the Northern line, the signalling system will be extended to include the line extension by 20/21.

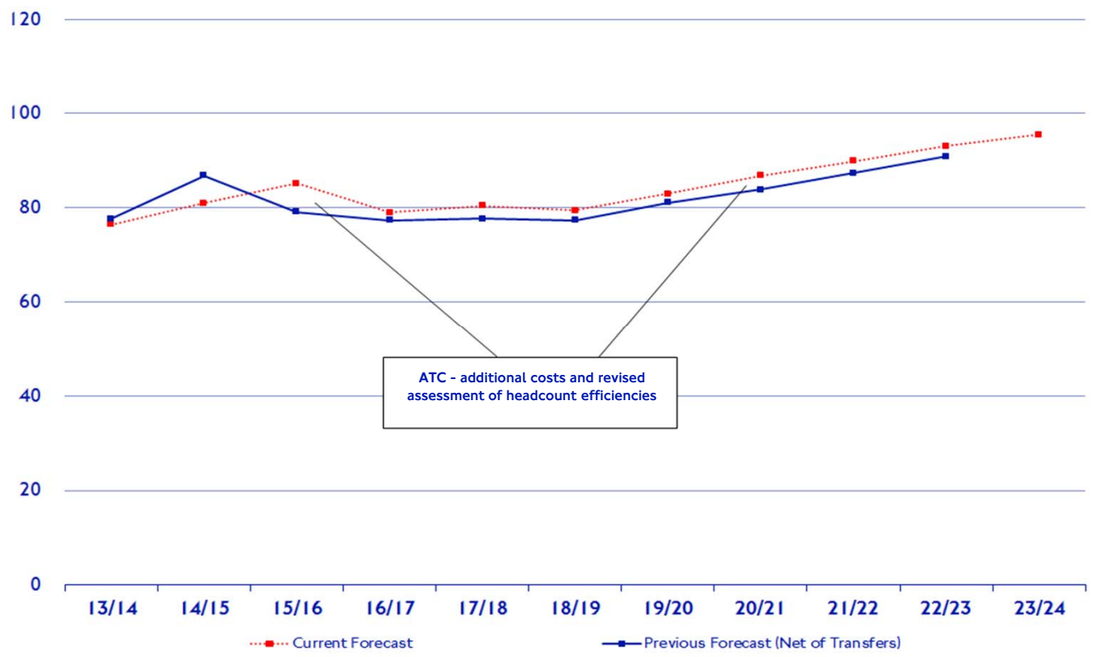
Over the period 15/16 to 23/24, £2,395m (outturn) has been committed to upgrading, safeguarding and optimising the operation of signalling and control assets. Together, the SUP and NTfL resignalling comprises 85% of this investment.

LU Asset Plan - Signals & C&I

Cost Variance Analysis - Opex - Figure 45



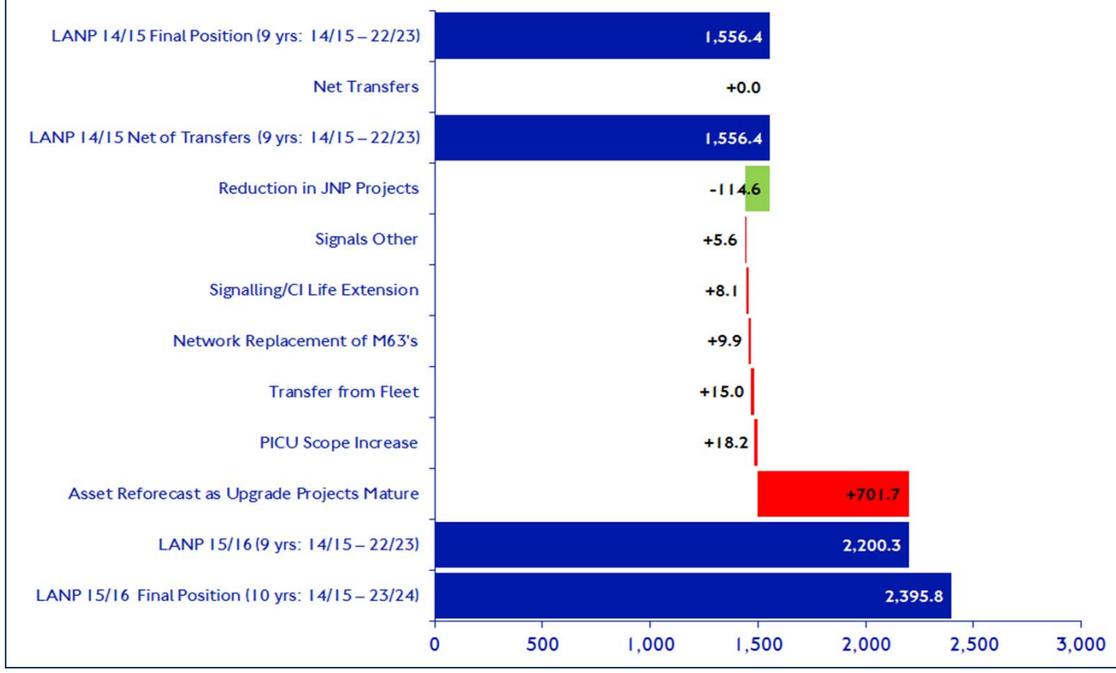
Cost Phasing Analysis - Opex - Figure 46



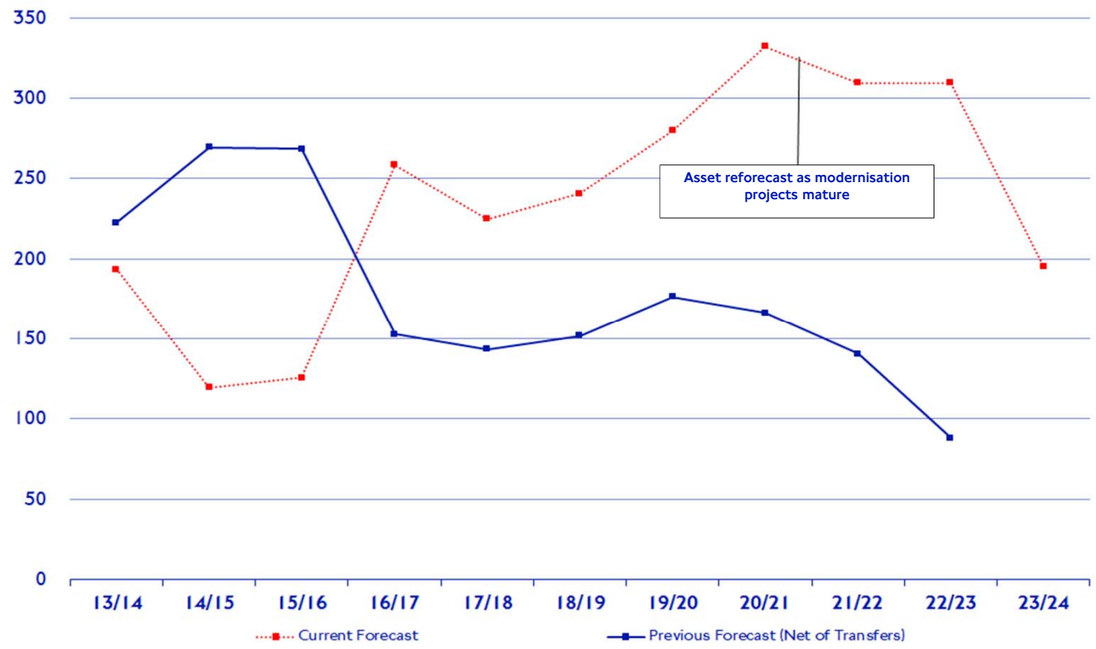
£3.2m has been allowed for the operation of Night Tube commencing in September 2015 but the main change of £15m arises from cost increases to reflect the emerging delayed start and operational impact of the Sub-surface Upgrade ATC system compared to the previous plan.

LU Asset Plan - Signals & C&I

Cost Variance Analysis - Capex - Figure 47



Cost Phasing Analysis - Capex - Figure 48



There has been significant movement in capex attributed primarily to the £700m increase for the NTfL's railway control systems as this major programme matures. The Piccadilly line interim control system upgrade (PICU) has incurred a cost increase of £18m due to additional works necessitated by the cancellation of the previous SUP ATC contract.

Following the decision not to increase the Bakerloo line service from 22 to 24tph, the funds set aside for this capacity improvement have been redistributed amongst the business and £15m has been transferred to life extend signalling and control assets in addition to a further £8m for this purpose.

£10m has been consolidated from various provisions to replace legacy M63 point machines with the modern 'Surelock' type. These increases have been partially offset by £115m of savings identified from reductions in JNP capital expenditure.

Overall, funds against signalling assets have seen a net increase of £640m (40%).

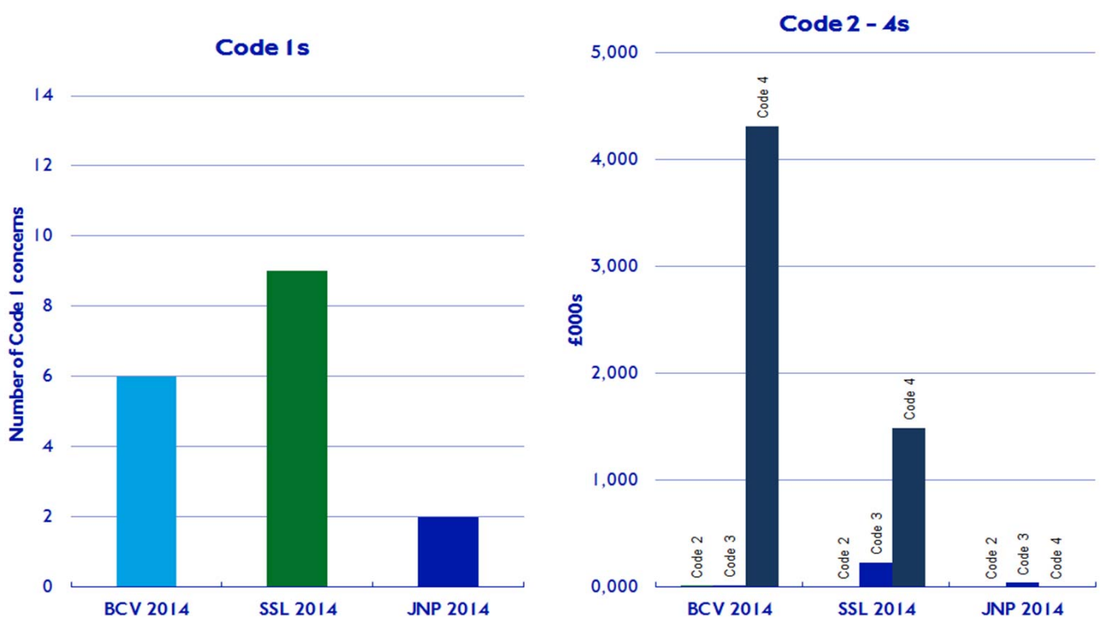
LU Asset Plan - Signals & C&I

Cost

Risk - Top Signals and C&I Asset Risks - Table 15

Business Group	Operational Risk Description	Mitigation	Current Risk Value (£k/yr)	Target Risk Value (£k/yr)
JNP	Signal assets: Increased rate of degradation.	Remedial works programme in place. Ongoing inspection and repair.	4,890	650
SSR	Signalling equipment: Life expired.	Ongoing inspection and repair. SUP resignalling by 2019/20 will remove life expired assets from service.	3,500	438
JNP	Loop cable damage.	Improved trackside procedures, ongoing inspections and repair.	2,502	1,365
SSR	Design configurations - too many, resulting in high maintenance costs/knowledge retainment.	Tolerate. Resignalling under SUP by 2019/20 will remove/reduce the number of configurations.	2,500	438
BCV	Baker Street Control Room computers: Not fit for purpose.	Life extension project currently in development, will remove computers from service.	1,531	613
SSR	Signals structure condition: Non-compliance with H&S, maintainability and reliability consequences.	Safe systems of work in place, staff training, structures tagged to denote safe/unsafe. SUP resignalling by 2019/20 will remove structures from service.	1,400	350
BCV	Obsolescence: Signalling equipment.	Life extension project currently in development, will address obsolescence issues.	1.094	219
BCV	Signals structure condition: Non-compliance with H&S, maintainability and reliability consequences.	Safe systems of work in place, staff training, structures tagged to denote safe/unsafe. Surveys in progress to identify conditions and action plan.	1,094	31
JNP	Piccadilly Line East End Signal Computer: Failure risk.	Spares and support contract procured. Computers will be removed from service as part of life extension project. New signalling system in place under NTfL by 2023/24.	438	49

Asset Condition (ACR) - Functional Concerns - Figure 49



BCV: Risks relating to BCV are predominantly associated with the obsolescence of the Bakerloo and Central line's signalling and control systems. Both hardware and software for these systems are outdated and predicted to be increasingly difficult to economically maintain. Life extension works are already under development to replace obsolete components, ensuring that the systems are able to remain in service until replacement in circa 25/26 for the Bakerloo line and 28/29 for the Central line, as part of the NTfL programme. The condition of signal structures will be assessed under a network wide survey, currently in progress, and the results will be used to inform decision making on whether to repair or replace those structures deemed in need of intervention.

SSL: The SSL risks are the consequence of obsolescence and equipment degradation. The many design configurations on the SSL network are the result of piecemeal repairs and localised upgrades undertaken over the years to keep the system operational. A strategy of tolerate and 'fix when broken' has been adopted for SSL signalling and control assets as the risks are manageable, assuming replacement by circa 18/19. It is considered neither economic or efficient to renew the assets concerned as a campaign change when the SSL is to be resignalled between 17/18 and 19/20 under the SUP. The signals structures are an emerging issue. As per BCV, a network wide survey is in progress and the results of this will be used to inform decision making on whether to repair or replace those structures deemed in need of intervention.

JNP: The top risk relates to the condition of signalling assets and in particular, the air main. A condition assessment of the air main is planned to be undertaken in 15/16 to formulate an action plan. Interventions on the loop cables such as track maintenance activities, particularly on the Northern line, are causing a risk to the reliability of these cables. The target risk value remains relatively high because although the probability of occurrence can be reduced through improved working procedures, the impact of damaged cables on service disruption remains high. As a medium term measure, the PEECS computer system will be completely removed from service as part of the Piccadilly line Interim Control Upgrade project, from circa 16/17. In the long term, the Piccadilly line will be resignalled as part of the NTfL by 23/24.

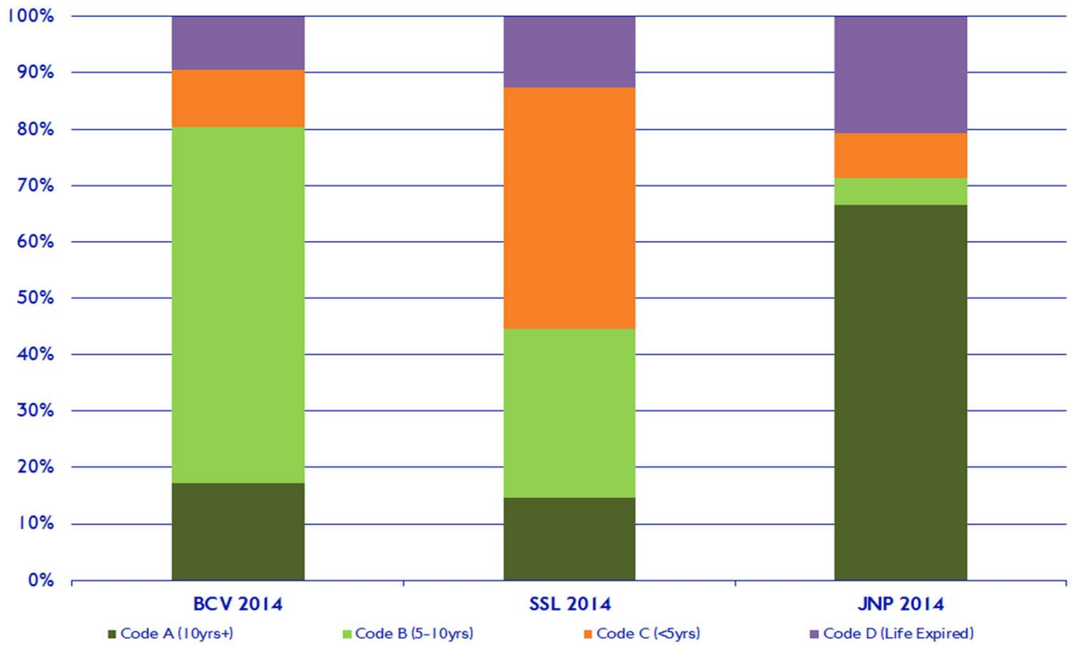
Functional concerns:

BCV: There is one less code 1 due to the removal of earthing concerns on the W&C line. A minor increase in code 2s has arisen from the potential fire hazard surrounding the redundant Train Describer equipment left on power in CERs. Although reduced, code 3 still exists predominantly owing to works needed on Victoria line track circuit connections and maintenance of Central line customer information equipment. Code 4 has increased due to Central line point failures and Jointless Track Circuit design issues.

SSL: Two code 1s added; one due to adjacent electrical systems (LUL and NR) at the east end of the District line not being equipotentially bonded; the other from the configuration of the LU/NR traction boundary which can result in stray traction currents. A decrease in code 2 is due to the near completion of rectification works to provide keyed connectors to certain point machines. Code 3 has decreased due to improvements in control equipment obsolescence/maintainability but was offset by increase from the need to monitor and adjust track circuits in the Finchley Road to Baker Street area following heavy rain, resulting in a net code 3 increase. Implementation of a slab track solution with integrated drainage will remove this concern by 17/18. Code 4 has reduced following works to replace point stretchers, relay changes and prints for floodgates being made available to rectify faults.

JNP: Reduction in code 1s; one from Sykes plungers not being earthed and the other from Polychlorinated Biphenyl (PCB) in oil leaking from slow speed scanning card capacitors. Code 2 has been reduced to zero through the introduction of TBTC on the Northern line and replacement of drive clip screws on Interlocking Machines and code 3 has decreased, again due to TBTC on the Northern line. There remain no code 4 concerns.

Asset Condition (ACR) - Physical Condition (Code A-D) - Figure 50



A comparison of asset condition against last year has not been provided as the approach to assessment this year differs and therefore does not provide a like-for-like comparison. Furthermore, the approach taken by JNP is not consistent with BCV and SSR and therefore JNP's condition assessment should not be compared against that of BCV/SSR.

BCV: Asset condition on all lines of this business group has generally worsened since last year. The Bakerloo and Central lines now have negligible assets in the 'A' category with the majority classed under the 'B' category. It is only due to the recently upgraded Victoria line that BCV assets have any classification in the 'A' category. The Victoria line itself, which last year had 85% of its assets in the 'A' category, sees a worsening with most of its assets now also in the 'B' category. The prime cause of this is downgrading of Signalling Equipment Room (SER) and gauge detector condition from As last year to B and D respectively as they have been deemed to be in a worse state than before. Work is in progress with Stations Asset Management to address the SER concerns. Equipment Obsolescence is a growing concern on the Bakerloo and Central lines and life extension works are being planned and scoped to safeguard their operation until resignalling under the NTfL in 25/26 and 28/29 respectively.

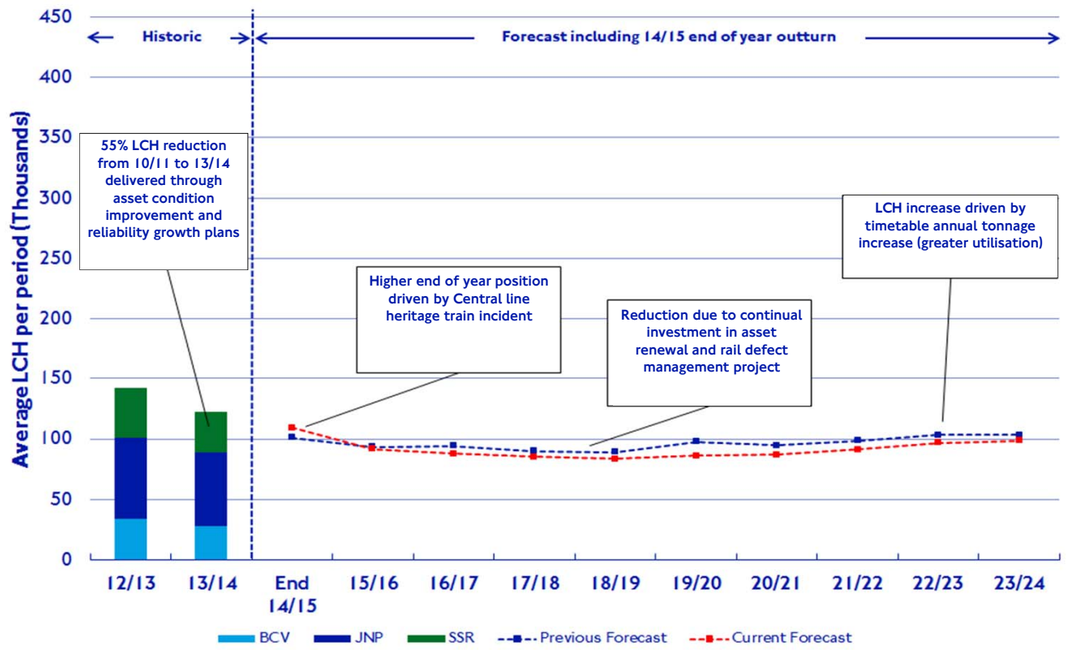
SSL: Signalling assets in this business group, in particular signal posts, cabling, auxiliary signals and the air and AC mains continue to degrade with age and their condition is becoming a concern. The reliability of overhauled trainstops from REW and new equipment from the suppliers has contributed to the worsening in asset condition rating. New axle counters and maintenance improvements to air powered point machines have been overshadowed by the general degradation of assets. However, the availability of electronic signal prints and new jointless track circuits and position detectors on the north end of the Metropolitan line have contributed to an overall net improvement in signalling asset condition from last year. A more comprehensive assessment of C&I assets is the primary reason for the movement in C&I condition assessment being re-categorised to be in a better state than previously thought, i.e. centralised control was 100% in the 'D' category last year but now spread across categories 'A' to 'D'. The SUP resignalling will result a significant change in asset condition but not 100% into the 'A' category as assets such as point machines will not be renewed/upgraded as part of the resignalling.

JNP: The Jubilee line has seen an overall worsening in asset condition rating with the main changes being attributed to the control system and wayside signalling which has seen movements of percentage changes from 'A' to 'C' and 'D' respectively due to emerging obsolescence of electronic components as declared by the supplier (Thales). This concern also applies to the Northern line. A review of this concern will be undertaken to determine an action plan. The Piccadilly line has also suffered condition worsening with assets such as the control system, customer information servers and air main 100% re-classed into the 'D' category. A network wide survey into air main condition is planned for 15/16 to determine a course of action. A control system life extension project is due to commence covering 90% of the Piccadilly line route and migrate its Service Control Centre to a newly refurbished building. The recently upgraded Northern line bucks this trend with most of the assets improving their condition ratings. The exceptions to this are those assets excluded from the upgrade such as air powered point machines and the air main which now sit 100% in the 'D' category. The Points and Crossing programme will include renewal of point machines to address this concern. Overall, JNP sees an improvement in asset condition due to the effect of the Northern line upgrade to the SelTrac S40 ATC system which removed many assets in poor condition from service. The removal of the remaining redundant assets to comply with signalling standards over the coming years combined with life extension works on the Piccadilly line signalling and control assets will continue to improve the asset condition of this business group.

LU Asset Plan - Track

Performance

Reliability - Lost Customer Hours (LCH) - Track - Figure 51



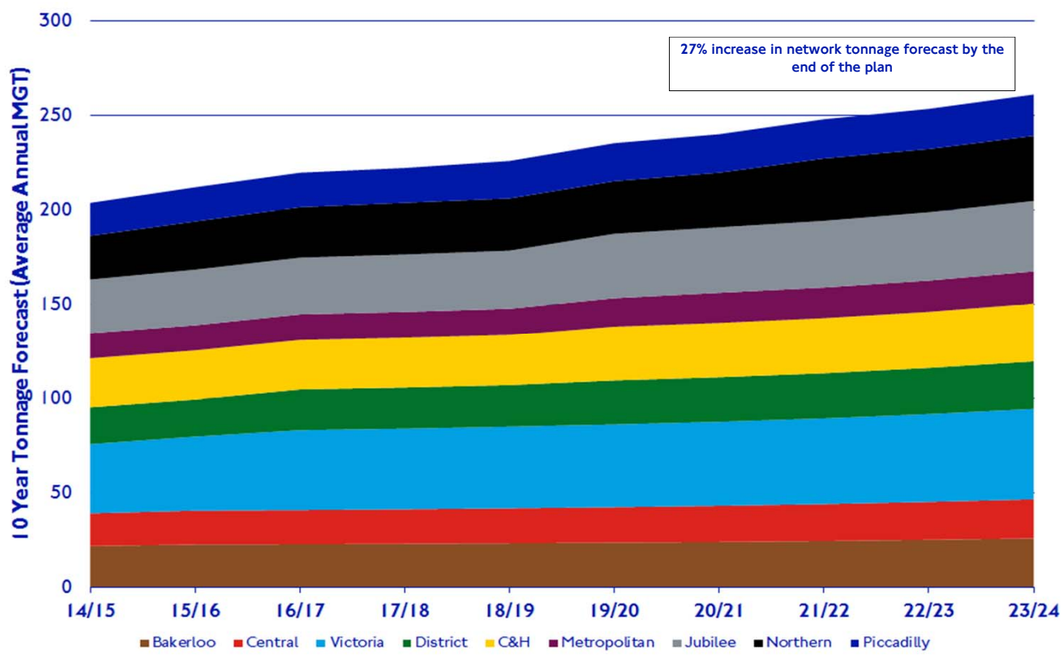
Track Asset LCH Performance has been steadily improving for a number of years with a reduction of 75% since 06/07 due to improving condition delivered through the Track Renewals Programme, Reliability Growth Plans and more recently the various RAMS projects. The projected end of year position is higher than was forecast in the 2014/15 LANP, with a major incident on the Central line involving the shoe gear on a heritage train being the main driver for this increase. However, this was an unexpected incident and therefore considered to be a one-off. It is predicted that performance will drop below 90k LCH by 15/16.

The Rail Defect Management programme has re-profiled a large proportion of the network along with removing a large quantity of rail joints, reducing the risk of track failure. These activities will continue to be delivered by COO under business as usual. The introduction of a bespoke LU grinding machine will further improve performance.

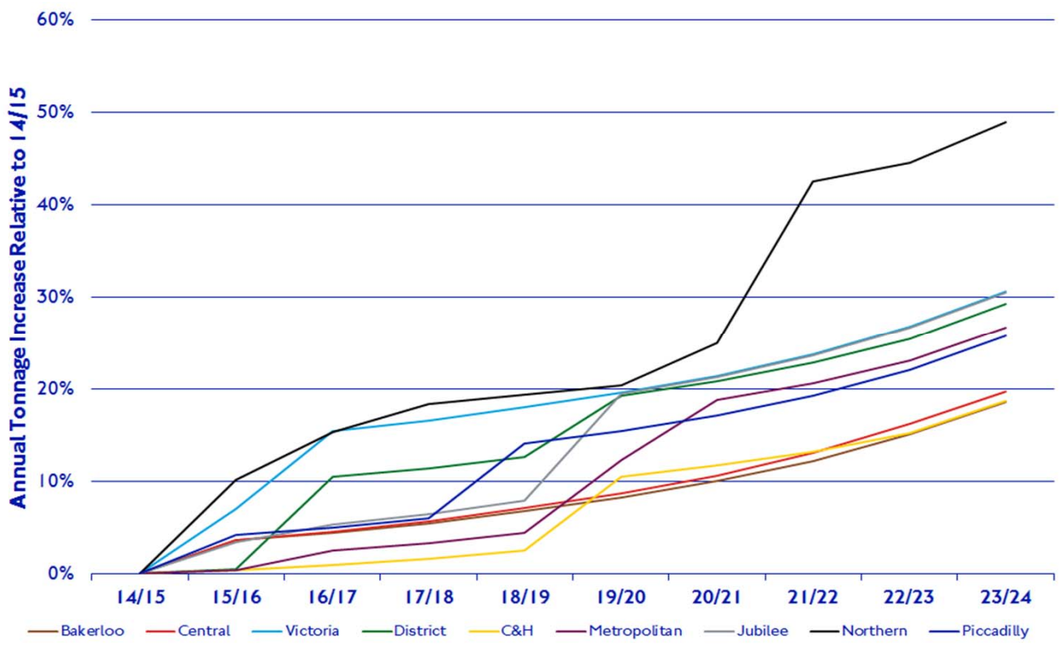
Bull Head fabricated crossings that have caused reliability issues on the Victoria line have been successfully targeted by the RAMS programme and replaced with cast crossings. In addition to this the Automatic Track Monitoring System (ATMS) programme has been extended to cover JNP lines and therefore a further reliability improvement is expected. A refresh of the benefits of the SUP programme instigated a reforecast of LCH reductions due to fewer units of junction work planned to be removed from the SSR lines. However, the elimination of Insulated Block Joint failures on these lines can be realised on delivery of the new signalling system, removing this failure mode.

The impact of passenger growth and timetable changes on annual tonnage is evident with the forecasted decline in reliability towards the end of the plan reinforcing the need for continued investment to maintain high levels of reliability.

Tonnage Forecast -Track - Figure 52



Annual Tonnage Increase Relative to 2014/15 - Track - Figure 53



Cost (£m; outturn) and Volume Summary - Maintenance and Projects - Table 16

Track Maintenance Costs (£m)	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Rail Grinding	0.3	9.6	9.6	9.9	10.2	10.6	10.9	11.3	11.7	12.1	96.2
Other Track Maintenance	130.7	122.6	125.5	128.0	130.4	134.4	138.9	143.3	149.7	151.8	1,355.3
Total Outturn	**131.0**	**132.3**	**135.2**	**137.8**	**140.6**	**145.0**	**149.8**	**154.6**	**161.4**	**163.9**	**1,451.5**
Total Constant 2014/15 Prices	**131.0**	**129.2**	**127.5**	**125.7**	**123.8**	**123.4**	**123.2**	**122.8**	**123.9**	**121.6**	**1,252.0**

Maintenance Delivery		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
PM1 and PM2 Manual Patrolling	No.		26,971	24,912	24,494	24,548	24,191	23,884	23,882	23,884	23,882	220,648
Rail Grinding	km		463	463	466	463	463	463	462	465	468	4,177
Plain Line Tamping	km		117	128	128	128	128	128	128	128	128	1,143
P&C Tamping	No. units		135	135	135	135	135	135	135	135	135	1,215

Track Project Costs (£m, including risk)	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Infrastructure Renewals	222.4	232.8	195.1	214.5	153.7	127.1	187.0	172.0	186.5	143.2	1,834.3
New Tube for London	-	-	0.8	6.6	13.6	19.6	37.7	50.8	67.5	88.6	285.1
Northern Line Extension	-	-	-	8.6	4.1	-	-	-	-	-	12.6
Rail Defect Reduction	32.3	15.3	-	-	-	-	-	-	-	-	47.5
SSR Upgrade	8.0	42.1	42.4	38.2	21.4	1.9	-	-	-	-	154.0
WCC - JLU2 - Track Infrastructure & Stabling	0.2	1.6	9.5	6.1	0.8	-	-	-	-	-	18.2
WCC - NLU2 - Track, Infrastructure & Stabling	-	-	-	-	13.2	34.8	21.6	-	-	-	69.5
Total Outturn	**262.8**	**291.7**	**247.8**	**273.9**	**206.7**	**183.4**	**246.2**	**222.8**	**254.1**	**231.8**	**2,421.3**
Total Constant 2014/15 Prices	**262.8**	**284.9**	**233.8**	**249.7**	**182.1**	**156.1**	**202.5**	**177.0**	**195.0**	**171.9**	**2,115.8**

Project Delivery		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
BTR (including reballast)	km		19	19	13	6	11	12	11	8	8	108
DTR (Class 1 and 2)	km		18	8	9	12	12	10	11	11	10	101
Track Drainage Renewals	km		13	10	10	7	7	6	6	6	6	70
P&C Renewal (including Heavy Mtce)	No. units		44	37	23	42	16	3	22	27	29	243
P&C Renewal (End State Track Layout)	No. units		9	11	22	24	17	16	-	-	-	99

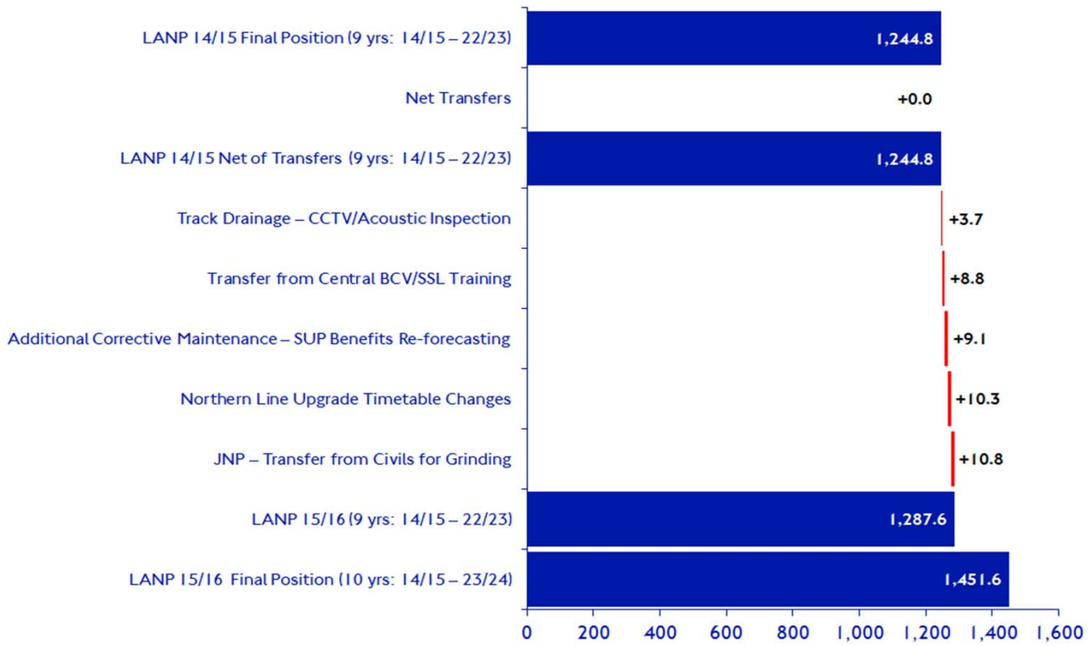
Maintenance Cost Forecasts: The RAMS Rail Defect Management Programme is now reaching completion and from 15/16 will become a business as usual activity within COO. The continual investment in maintaining the rail condition and extending asset life will be carried out by using a 'little and often' strategy. These activities will be funded from the Track maintenance budget based on a reduction in spend required to measure and rectify rail defects. A new electric grinder is being procured to enable sections with poor ventilation to be maintained as the plant currently available on the market is unable to operate in this environment. This rail management activity is critical to the operation of a reliable service based on progressively higher tonnage and speeds required by the rolling stock.

Maintenance Work Volumes: The ongoing conversion to modern trackform (70% modernised to date) and roll out of the Automatic Track Monitoring System (ATMS) will allow for a reduction in the volume of manual patrolling. Extra routes to be included with the addition of the Croxley Rail Link in 2016 and the Northern Line Extension in 2018. The impact of ATMS reflects the Q3 position with the Central line solution in feasibility stage and the forecast benefits held centrally. New tamping machines delivered under the Plant Programme will enable higher volumes to be delivered with increased quality. Revised grinding volumes have been forecast following a detailed assessment of the network and value engineering analysis.

Project Cost Forecasts: Towards the end of the plan, infrastructure renewal investment will decrease to under £150m per year. This may prove a challenge when faced with the significant increases in track tonnage across the network but careful planning supported by degradation modelling and utilisation of the track asset optimiser tools are expected to ensure that the investment is distributed across the assets to give the best balance of risk, cost and performance. This risk is mitigated by the lower unit rates made possible by investment in mechanisation with new Ballasted Track Renewal (BTR) and Deep Tube Renewal (DTR) trains and also due to much of the network having been converted to modern trackform offering an extended asset life.

LU Asset Plan - Track

Cost Variance Analysis - Opex - Figure 54



A provision of £3.7m has been added to the Track budget to cover outstanding survey activities comprising of both CCTV surveys and Sewerbat acoustic inspections of track drainage assets. This will allow an improved preventative maintenance regime and further improve the renewals workbank.

An increase of £8.8m has shown against BCV/SSL training however this has been transferred from a central allocation.

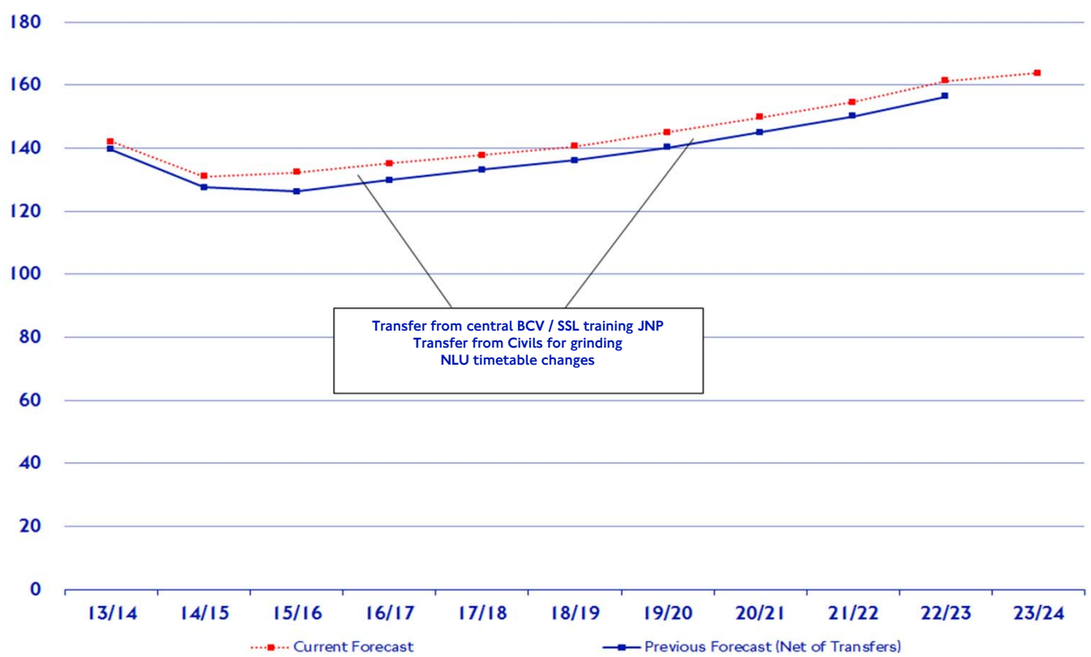
Provision of £9.1m has been made to fund additional corrective maintenance. This is a combination of the result of a refresh of the benefits management report for SUP and additional maintenance in preparation for Night Tube.

The Northern Line Upgrade sees a significantly higher level of tonnage across the assets. After an assessment of the timetable was carried out, provision for this higher degradation rate has been made.

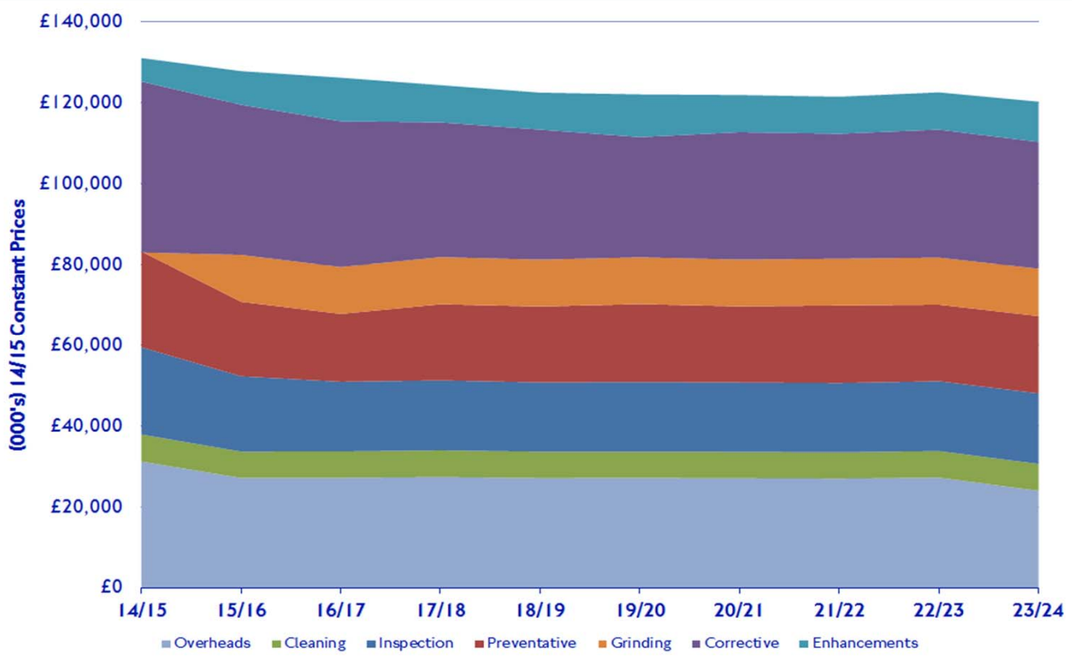
A transfer of £10.8m was made from JNP Civils to fund the additional volume of grinding on those lines.

The current plan continues a glide-path towards a fully modernised track asset (of a more reliable design with an inherently longer service life) by 2030. This modernisation along with continual investment in the asset renewals programme will continue to drive a reduction in maintenance costs and improved asset reliability.

Cost Phasing Analysis - Opex - Figure 55



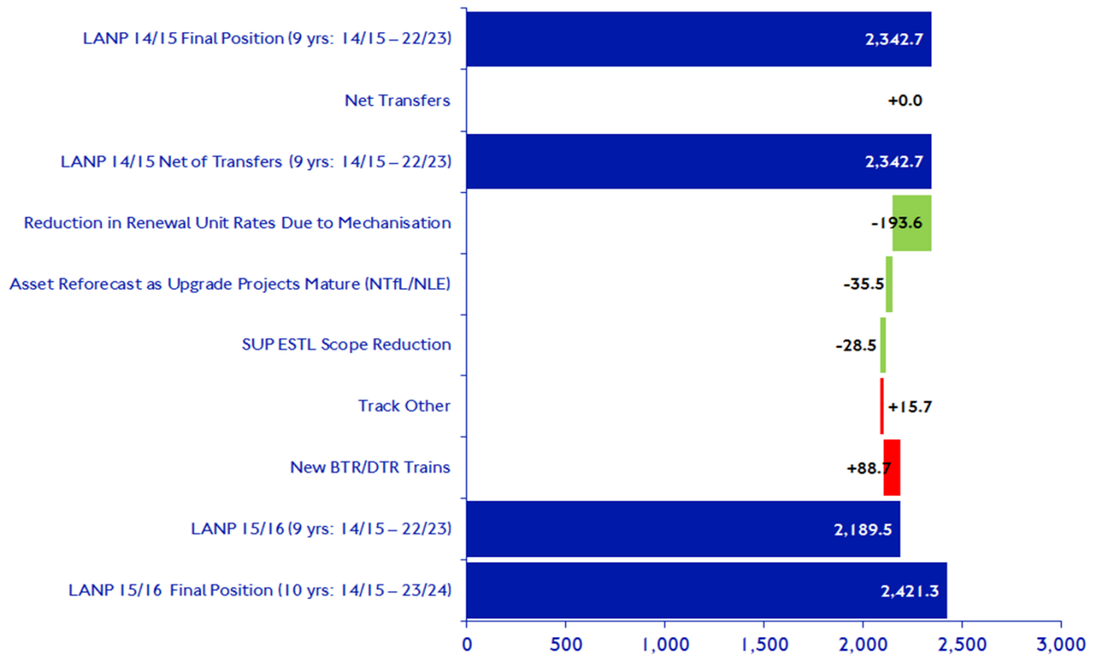
Cost Phasing Analysis (by maintenance type) - Opex - Figure 56



LU Asset Plan - Track

Cost

Cost Variance Analysis - Capex - Figure 57



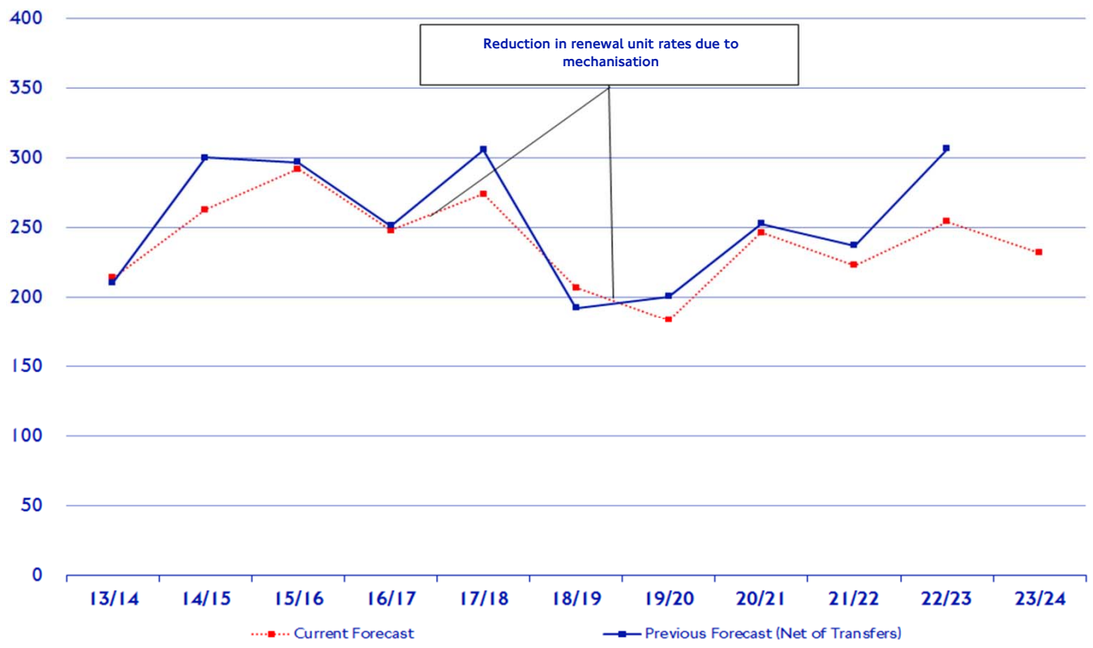
Investment in new specialised renewals plant will make a considerable reduction in renewal unit rates achievable over the duration of the plan and beyond. The cost of a midweek Ballasted Track Renewal (BTR) is projected to decrease from £4k/m in 14/15 to £1.5k/m in 21/22 facilitated primarily by the introduction of a new BTR train. Points & Crossings (P&C) renewal costs per unit will have reduced from £1.5m in 09/10 to £0.75m in 15/16, based on mechanisation and the adoption of a modular approach. Deep Tube Renewals (DTR) have also gone through a continual efficiency drive with the introduction of a new DTR train further supporting this. These benefits help reduce the overall size of the Capex budget, even when the New Tube for London programme infrastructure works commence.

In the Business Planning round additional budget was allocated to the Automatic Track Monitoring System (ATMS) project to cover additional cost of roll-out on JNP lines. A feasibility project is currently being commissioned to review whether this roll-out should occur as part of the NLU2 and JLU2 upgrades or be delivered on the legacy fleet.

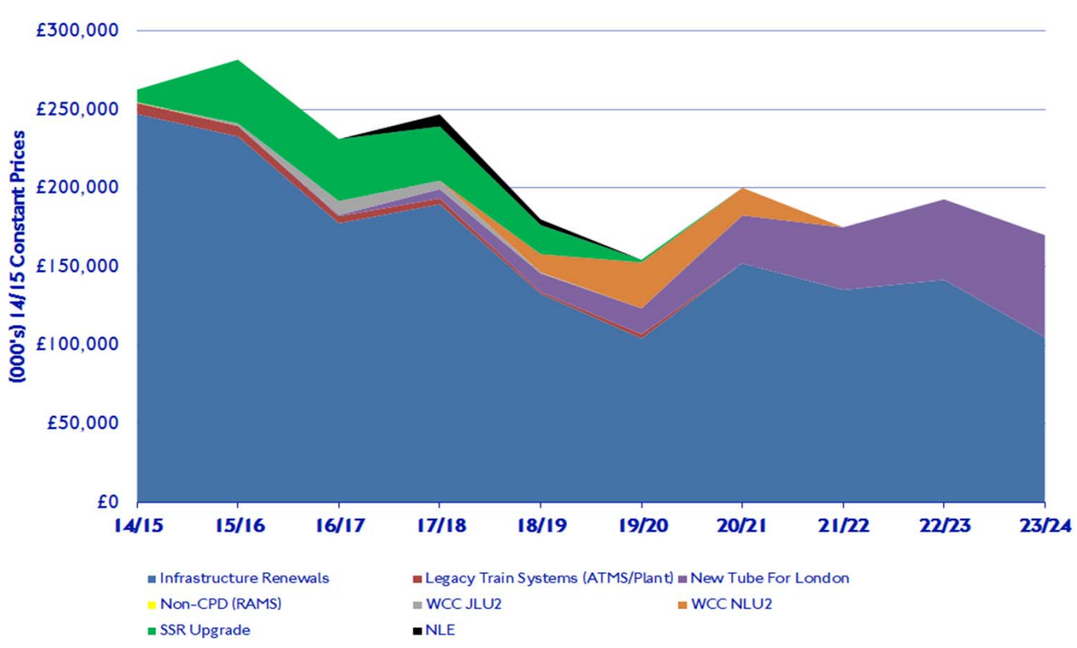
A consequential increase in Opex was put in place due to the reduction in SUP End State Track Layout (ESTL) scope. It is recognised that further amendments to the upgrade may occur and the condition renewals may be further constrained.

NTfL/NLE Track asset spend has changed due to further scope and estimate refinements throughout the year.

Cost Phasing Analysis - Capex - Figure 58



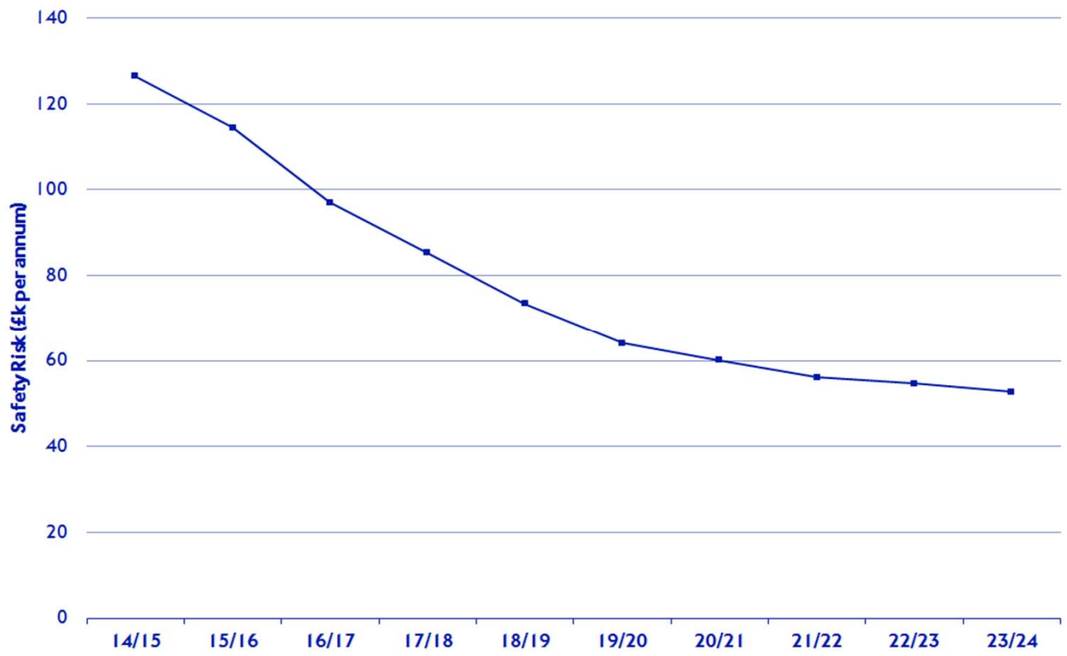
Cost Phasing Analysis (by project type) - Capex - Figure 59



Risk - Top Track Asset Risks - Table 17

	Description	Mitigation	Impact (£k per year)
1	Lack of access to the track due to the effects of Major Projects, Engineering Vehicle running, Night Tube etc. leading to inefficiencies in delivery.	Access Transformation Programme in place to deliver improved methods of accessing the railway. Increased mechanisation of major works allowing more to be delivered within less access. Modernisation of track and mechanised measurement systems leading to a reduction in the need to access the track.	£4,426
2	Water ingress causing accelerated deterioration of track assets and increased maintenance requirement (e.g. Baker Street to Finchley Road and Embankment to Waterloo).	Renewal of Baker Street to Finchley Road starting in 2015/16. Detailed investigation of Embankment to Waterloo site underway to identify works required to prevent water ingress.	£4,250
3	Scaling of the Running Rail	New rail grinding regime preventing build up of material on the rail edge. Line upgrades removing the need for insulated block joints and hence the impact of scaling.	£2,351
4	Risk of Rolling Contact Fatigue (RCF) on rails in areas with inadequate ventilation for Rail Grinding.	New rail grinding regime in place to manage this issue going forward. New grinding plant being specified for areas which cannot be mitigated through use of plant currently available on the market.	£2,153
5	Track Recording Vehicle's (TRV) supply of inaccurate information might affect Tracks ability to be compliant with the LU standard	Roll-out of ATMS on other lines and introduction of Asset Inspection Train (AIT) as direct replacement for TRV.	£2,001
6	Squat Defects	New rail grinding regime being rolled out to provide a reduction in the probability of defects being generated and growing. New ultrasonic measurement equipment will allow defects to be managed more efficiently.	£1,746
7	Degrading timber sleepers	Track renewals programme progressively replacing timber sleepers with concrete.	£1,450
8	Impact of ESTL programme on wider renewals programme leads to poorer P&C condition.	Targeted heavy maintenance to manage the P&C on SSL for which renewal has been deferred to allow for delivery of ESTL.	£1,313
9	Impact of S stock on the track circuits (as a result of brake block shelling)	New brake block design implemented to reduce impact of this issue.	£1,313
10	Lack of support due to wetbeds or sleeper integrity	Track renewals programme delivering improved condition of ballast and improved track drainage performance.	£1,191

Risk - Safety Risk (£k per annum) - Figure 60



The highest risk on the network is the constraint on track access by the various essential upgrade and renewals works combined with the additional pressure of Night Tube from September 2015. The Access Transformation Programme is helping to mitigate this risk by introducing improved and more flexible methods for accessing the track.

The conversion to modern trackform will continue to decrease the need for high frequency manual patrolling.
In addition to this the roll out of the Automatic Track Monitoring System (ATMS) will provide the business with timely and accurate track quality data which will assist the maintainer with work planning, leading to a reduction in the need to access the track.

A full renewal of the problematic section of track between Baker Street to Finchley Road on the Metropolitan line will commence in 15/16. This will involve installation of a new track form designed to suit the environment and resilient to the high levels of water ingress currently experienced in this location. This will relieve the difficulty faced by the maintainer in keeping the signalling system reliable.

The water and slurry ingress occurring on the Embankment to Waterloo section of the Bakerloo line is in the process of a detailed investigation by Civils Engineering. Regular monitoring of the rate of ingress is in place and the potential root causes are being analysed to identify a long term rectification.

A track drainage model is in the final stages of completion and will enable a strategic view linked to the criticality of track location. This will allow the Asset Manager to target renewals more effectively to provide an optimal balance of cost, risk and performance.

A new 'little and often' grinding strategy is in place to help to mitigate the risk of scaling, Rolling Contact Fatigue (RCF) and squats on the running rail.

The high volume of grinding will provide a reduction in the probability of defects being generated with new grinding plant being specified for areas which cannot be mitigated through use of plant currently available on the market.

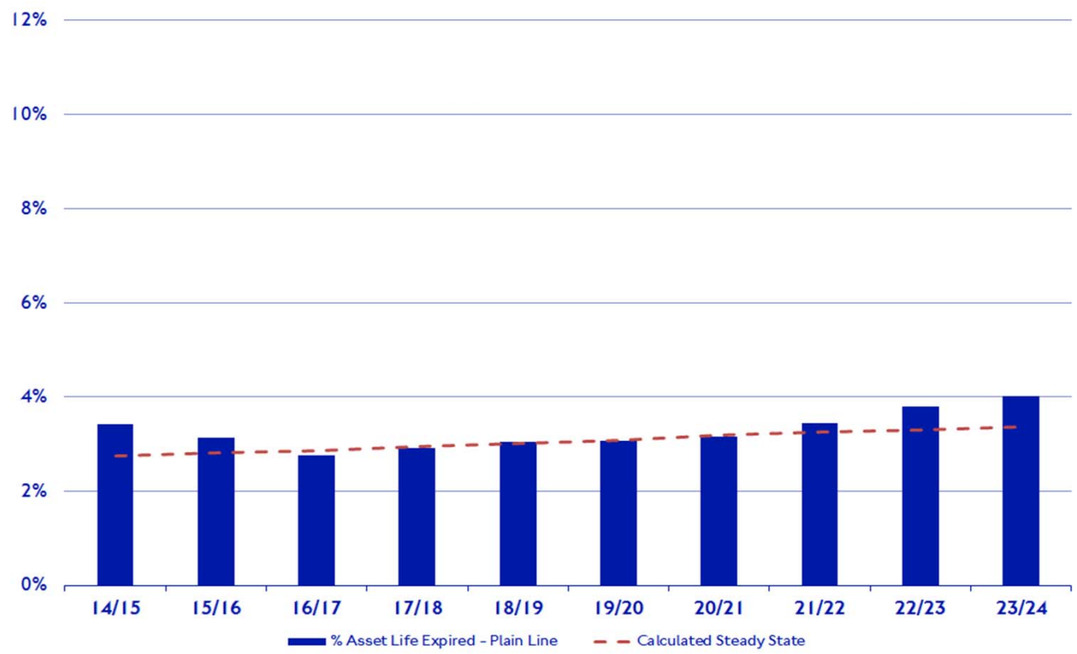
The modernised signalling system for SSR lines will eliminate the risk of insulated block joint failures when completed.

A programme of track and track drainage renewals continues across the network converting the assets to modern trackform. Where potential risks on delivery are predicted through the ability to secure access, heavy maintenance will be used to target any areas with reliability concerns. It is recognised that as some unknown SUP scope may be transferred into the condition workbank, the Asset Manager will seek to best prioritise renewals with careful consideration of the associated risks of deferral.

A new brake block for the S-stock has been developed and is being rolled out with its effectiveness under review.

LU Asset Plan - Track

Asset Condition (ACR) - Plain Line - Figure 61

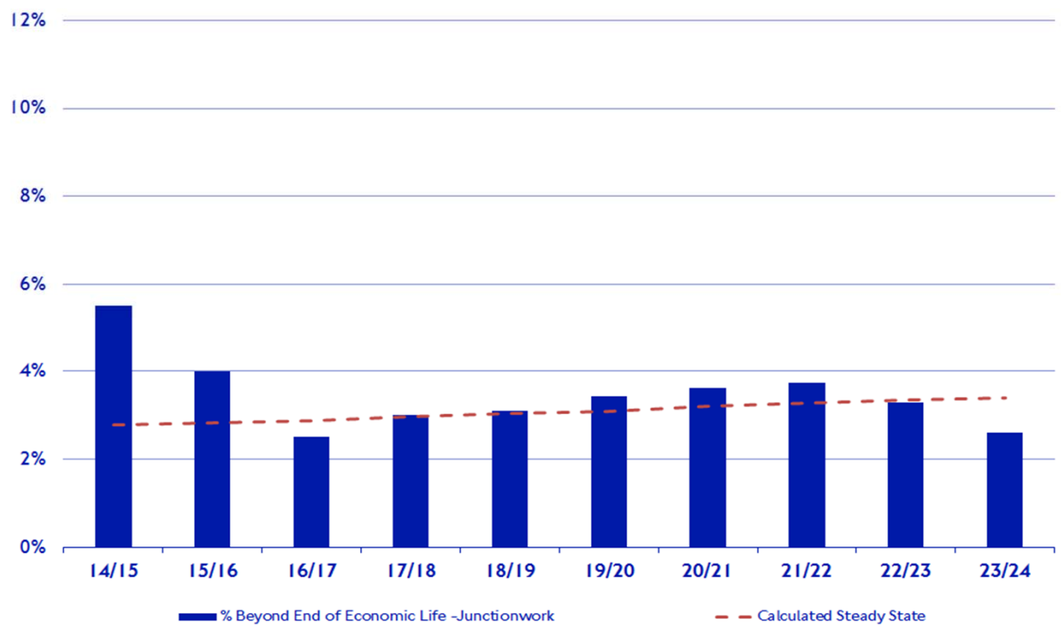


Plain Line: The condition of the plain line assets continues to improve over the initial years of the plan however fails to keep pace with the extra loading due to the progressive timetable changes. A continual investment in track is critical to the operation of a safe and reliable service. Work is being undertaken by the Asset Manager to further optimise the workbank to focus on areas with high tonnage and high criticality to the service. It is expected that this deterioration can be largely mitigated.

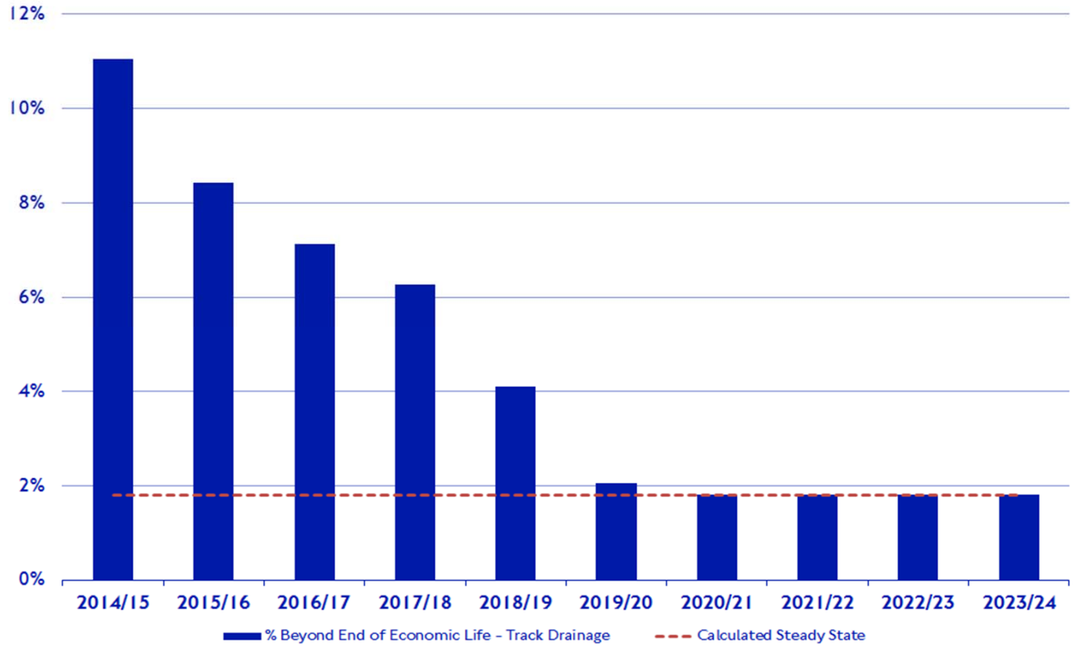
Junctionwork: Intensive investment in junctionwork assets in the early years of the plan sees an initial period of recovery however the ability to maintain steady state is affected by utilisation of resources by the End State Track Layout programme. On completion of these upgrade works the plan currently regains steady state in 22/23. However this recovery is at risk due to scope still emerging for New Tube for London and Northern Line Upgrades which may mean that heavy maintenance is required to prolong the life of the assets until a full renewal can be carried out. Current options for SUP see some unknown scope being transferred into the condition workbank. Combined with emerging scope for NTFL, JLU2 and NLU2 there is a risk that this may significantly worsen Points & Crossings condition forecast in the back half of the plan however the Asset Manager will seek an appropriate balance.

Track Drainage: A ten year continuous recovery programme for Track Drainage has seen improvements in asset condition and is on course to reach steady state by 20/21. The continuation of hydraulic assessments has highlighted locations of criticality to the track environment. A drainage model is in the final stages of construction and will enable further optimisation of the workbank.

Asset Condition - Junctionwork - Figure 62

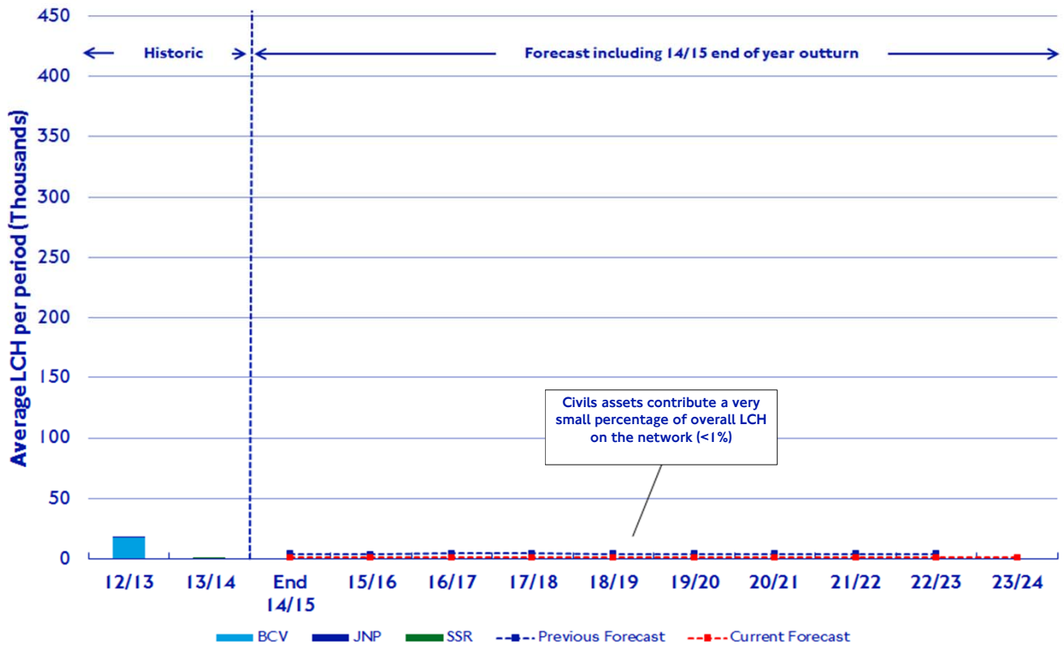


Asset Condition - Track Drainage - Figure 63

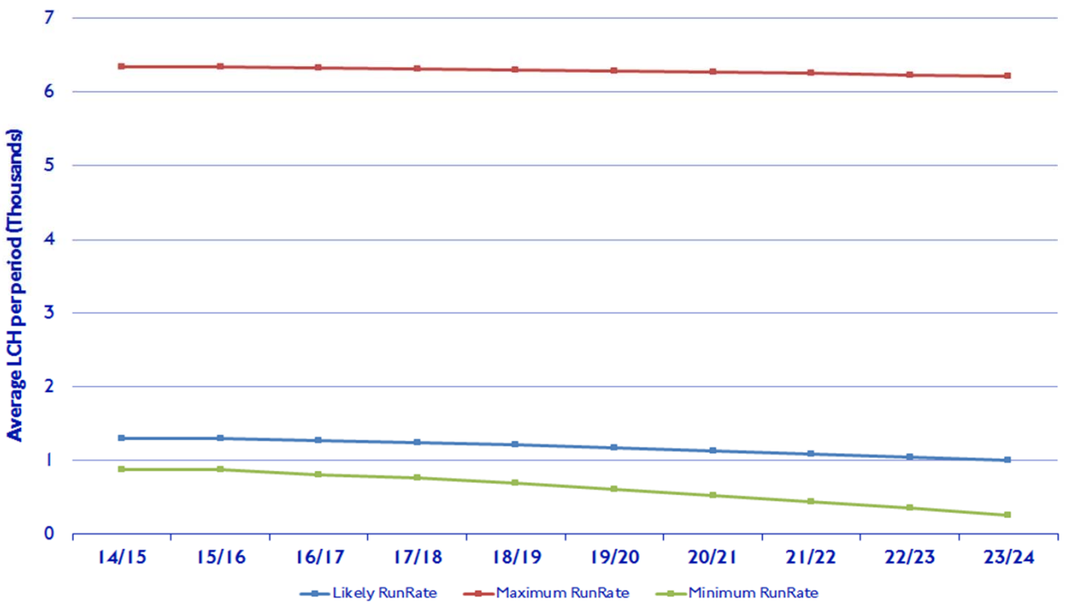


LU Asset Plan - Civils

Reliability - Lost Customer Hours (LCH) - Civils - Figure 64



Reliability - Lost Customer Hours (LCH) Sensitivity - Civils - Figure 65



Civils assets contribute only a very small percentage of overall asset LCH across the LU network (<1%). This is categorised by a small number of high LCH incidents, which means the run rate may be skewed in any given year by one or two incidents. Therefore, the LCH forecast for Civils is more of a three to five year rolling average rather than an outturn prediction for a given year.

Figure 65 shows the result of sensitivity analysis on the LCH forecast and demonstrates this volatility in the forecast.

A slight decrease in LCH is forecast to account for improvements in reliability from project works completed. Since the 14/15 LANP, Track Drainage LCH has been re-assigned to the Track Asset Plan and the forecast and historic LCH levels have been reduced to reflect this position.

Amongst the most notable incidents this year have been falling material from a cased beam at Mile End and from a filler joist slab at King's Cross. This has prompted a network-wide review of vulnerable structures and assessment of behaviours and failure mechanisms. This review will identify any further risks and appropriate works which need to be undertaken to resolve or mitigate this issue.

Water ingress is a contributory factor to falling elements, in particular as regard to material degradation and surface spalling. A combined strategy will be developed to identify the best options for managing this issue and this will be reflected in future Asset Plans.

On the Bakerloo line between Embankment and Waterloo slurry ingress is causing a risk to the performance of the Track and Signals assets. This issue is being managed collaboratively by the Track and Civils teams to keep this risk low. A feasibility study is currently underway to identify an appropriate long-term solution to this problem.

The London Underground Comprehensive Flood Risk Review (LUCFRR) will be completed in June 2015. Flooding vulnerability remains a high long-term risk to performance, as demonstrated by the Old Ford Vent Shaft incident in June 2012, which resulted in the flooding of the Central line and c.400k LCH incurred.

Although recorded in the Civils Asset Plan, flooding has direct impact on other asset groups such as Track and Signals. LUCFRR will identify locations on the network at risk of flooding and work will be undertaken to identify appropriate mitigating measures. These works will be included in future Civils Asset Plans.

Cost (£m; outturn) and Volume Summary - Maintenance and Projects - Table 18

Civils Maintenance Costs (£m)		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Bridges & Structures		16.0	14.6	14.5	15.2	15.5	15.9	16.2	16.6	17.2	17.8	159.6
Deep Tube Tunnels		1.2	1.2	1.4	1.6	1.7	1.7	1.8	1.8	1.9	1.9	16.2
Earth Structures		0.4	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	4.4
Overheads		2.4	2.7	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	31.0
JNP Maintenance		6.4	6.9	5.9	6.2	6.4	6.6	6.8	7.1	7.3	7.6	67.1
Total Outturn		**26.3**	**25.8**	**25.1**	**26.4**	**27.1**	**27.8**	**28.6**	**29.4**	**30.4**	**31.5**	**278.3**
Total Constant 2014/15 Prices		**26.3**	**25.2**	**23.7**	**24.0**	**23.8**	**23.7**	**23.5**	**23.3**	**23.3**	**23.3**	**240.3**

Maintenance Delivery		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Bridges & Structures Inspections	No.		10,321	7,449	9,056	8,872	9,337	7,404	9,066	8,874	9,344	79,723
Earth Structures Inspections	No.		440	423	407	460	456	459	418	450	403	3,916
Deep Tube Tunnel Inspections	No.		310	334	353	346	355	358	357	345	384	3,142
Bridges & Structures Planned Preventative	No.		5,240	5,129	5,001	4,865	5,240	5,129	5,001	4,865	5,240	45,710
Earth Structures Planned Preventative	No.		36	36	36	36	36	36	36	36	36	324
Bridges & Structures Corrective + Enhancements	No.		573	553	415	360	310	310	310	310	310	3,451
Earth Structures Corrective + Enhancements	No.		33	34	34	34	34	34	34	34	34	305
Deep Tube Tunnel Corrective + Enhancements	No.		30	30	32	32	32	32	32	32	32	284
Reactive (All)	No.		780	660	575	496	436	436	436	436	436	4,691

Civils Project Costs (£m, including risk)		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Bridges & Structures		14.6	19.6	29.4	13.0	10.3	10.0	10.2	10.0	11.7	11.7	140.5
Deep Tube Tunnels		10.6	8.2	0.7	0.6	0.7	0.7	0.7	0.7	0.0	0.0	22.8
Earth Structures		9.7	4.8	3.2	3.5	0.1	3.6	5.0	2.0	6.3	6.3	44.5
Pumps & Drainage		0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Risk		0.1	2.7	1.5	1.8	1.4	1.2	1.2	1.3	0.0	0.0	11.1
Northern Line Extension		12.8	33.8	80.7	56.5	13.3	1.8	0.6	0.0	0.0	0.0	199.5
Total Outturn		**47.9**	**69.1**	**115.5**	**75.4**	**25.8**	**17.3**	**17.6**	**14.1**	**18.0**	**18.0**	**418.7**
Total Constant 2014/15 Prices		**47.9**	**67.4**	**109.0**	**68.8**	**22.7**	**14.7**	**14.5**	**11.2**	**13.8**	**13.3**	**383.4**

Project Delivery		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Northern Line Extension	No.		0	0	0	0	0	0	1	0	0	1
Bridges & Structures	No.		25	23	23	23	23	25	25	25	25	217
Deep Tube Tunnels	No.		3	2	2	2	2	2	2	2	2	19
Earth Structures	No.		4	2	2	3	3	4	4	4	4	30

Maintenance Costs: Costs overall show a slight variation across the ten year period but this is reflective of the volumes. The additional inspections for Signal Posts (signals assets) are assumed to be deliverable within existing inspections and hence have nil cost. This position is under review as the delivery of these works develops. Table 18 does not include additional costs to BCV COO of inspecting and clearing the slurry levels in the Bakerloo tunnel between Embankment and Waterloo, (projected to be £52k/year), as this was not included at Q3.

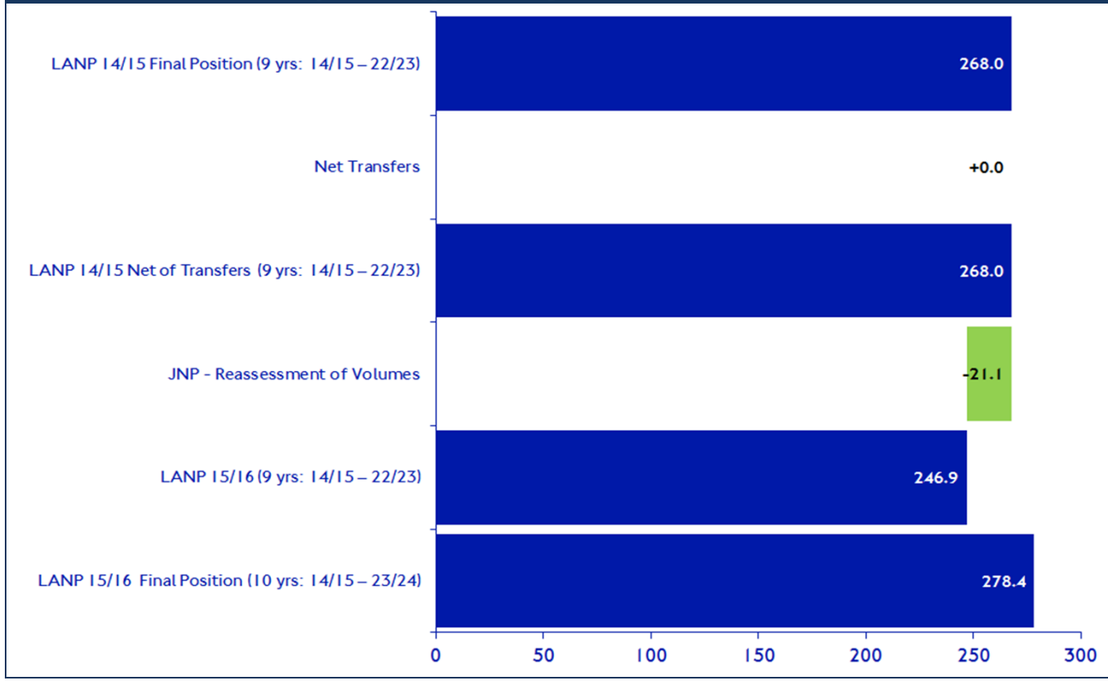
Maintenance Volumes: The inspection of Signal Posts (a non-Civils asset) has been included in the Bridges & Structures volumes for the first time. Due to different delivery approaches on BCV and SSL this contributes to a four-yearly peak in Principal Inspections, whilst on JNP it drives an increase in annual General Inspections. A standardised approach for all areas is currently being pursued. The first step towards this is to establish the immediate maintenance and strategic asset management requirements for managing Signal Posts until they are removed by line modernisation projects. A cross-discipline Asset Working Group will address this issue.

Capital Costs: At the 2014 Business Planning round a review was undertaken on the budget provision in the later years in the JNP Bridges & Structures budget forecast against predicted work volumes. This identified an opportunity to reduce the budget, allowing just over £60m to be removed from the Civils Asset Plan.

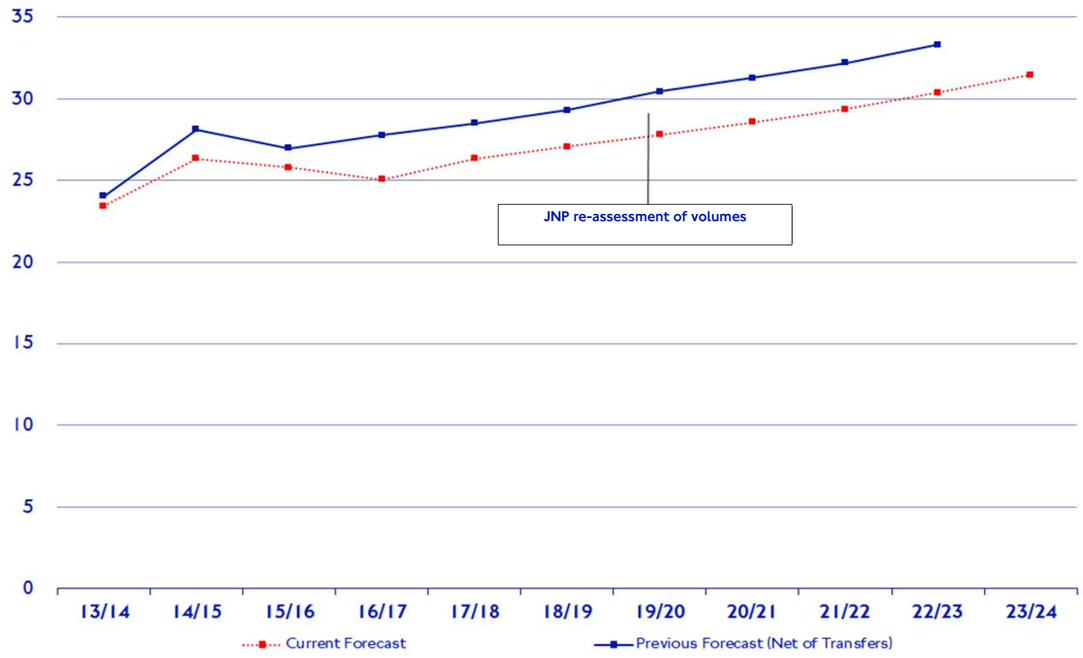
Capital Volumes: The Capital Volumes reflect the fact that a steady state has been achieved. This will be maintained through appropriate investment, informed by cyclical re-assessment of assets and external risks such as vehicle incursion.

LU Asset Plan - Civils

Cost Variance Analysis - Opex - Figure 66



Cost Phasing Analysis - Opex - Figure 67

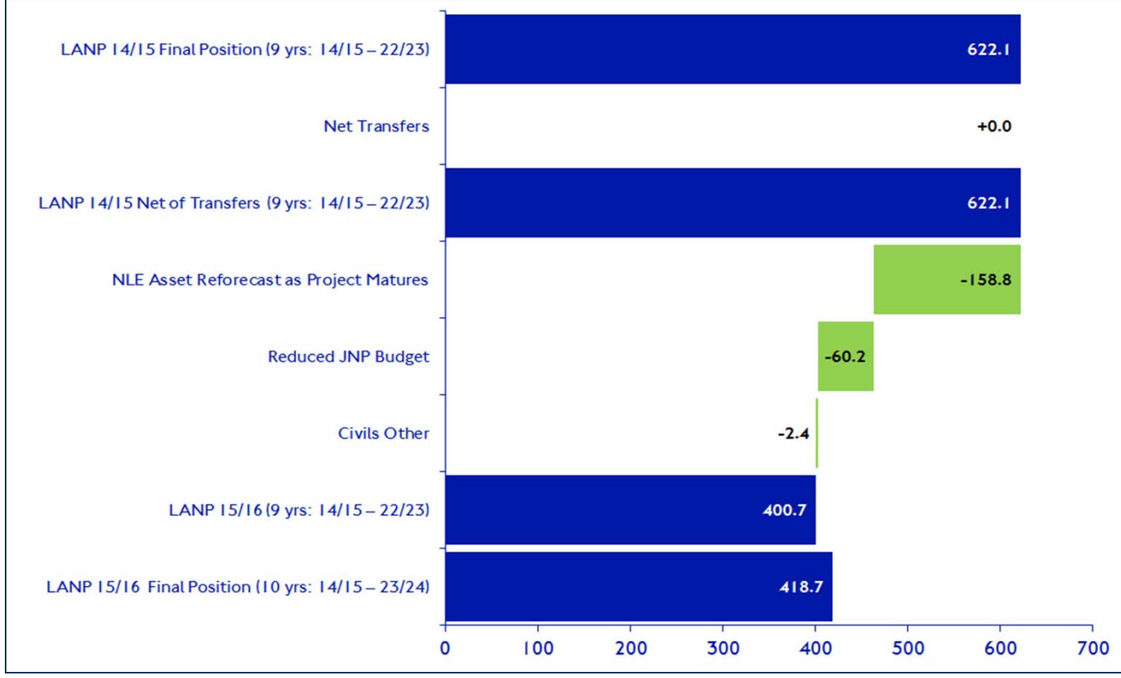


JNP COO have identified a cumulative £21.1m reduction in cost through efficiencies against the Q3 13/14 forecast. This includes:

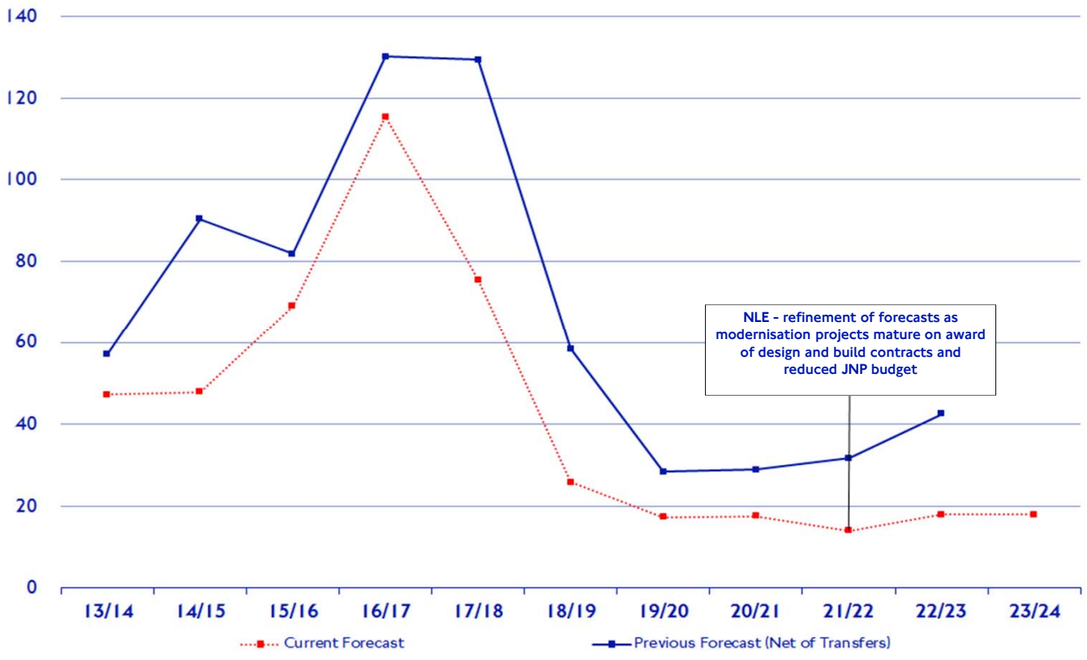
- Packaging of works for procurement, achieving discounts over delivering works individually.
- The new Civils Framework allowing competitive tendering between five suppliers to deliver price reductions.
- Scoping improvements minimising and reducing cost variations & risks
- Utilisation & planning works within existing possessions
- Bringing key assurance into COO
- Efficient planning and delivery in conjunction with third parties

LU Asset Plan - Civils

Cost Variance Analysis - Capex - Figure 68



Cost Phasing Analysis - Capex - Figure 69



During the 2014 Business Planning round a review was undertaken on the budget provision in the later years in the JNP Bridges & Structures budget forecast against predicted work volumes. This review identified that a budget reduction could be made without detrimental impact on expected asset condition, performance or maintenance cost.

Significant change is seen in the Civils asset spend within the Northern Line Extension project as detailed scoping and estimating has reduced the expected spend on assets which will form part of the Civils asset portfolio once constructed.

Risk - Top Civils Asset Risks - Table 19

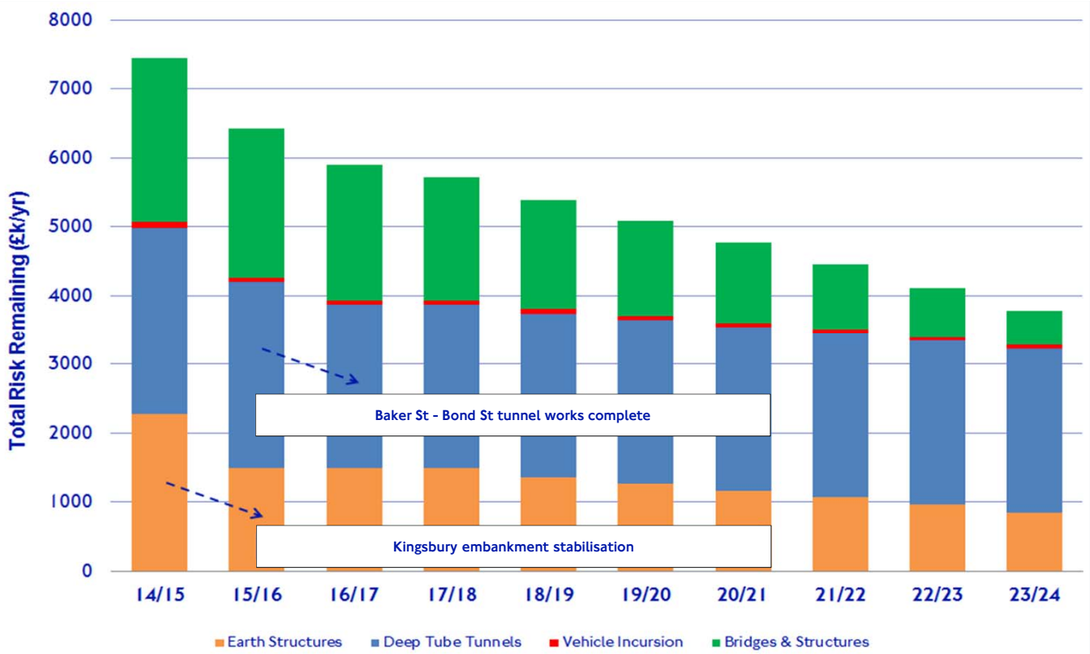
	Description	Mitigation	Impact £k/yr
1	Jubilee line - Kingsbury to Wembley Park - Earth Structures instability	Risks kept ALARP by monitoring regime. Project in design stage but with a fast-track to progress to site	£357
2	Network Flooding Vulnerability	London Underground Comprehensive Flooding Risk Review, (LUCFRR), due for completion 2015/16. LUCFRR will identify flood mitigation works which will require funding	£332
3	Jubilee line - Deep Tube Tunnel Southbound (Baker Street to Bond Street) Expanded Concrete segment failure and tunnel collapse.	Temporary steel straps and monitoring in place. Re-lining project well under-way, and risk level has been lowered to reflect this	£329
4	District line - Stepney Green to Mile End - cast iron tunnel sections under river yielding high risk values.	Risk under review as very localised concern. Safety risk is minimal, with the majority Service Loss Risk	£207
5	Metropolitan line - Northwood to Moor Park - Earth Structures instability.	Project Works completed on site, awaiting close-out and risk reduction sign-off	£134
6	Central line - Fairlop to Hainault - Earth Structures instability	Project Works completed on site, awaiting close-out and risk reduction sign-off	£133
7	Central line - Northolt to South Ruislip - Earth Structures instability	In Projects workbank for 2018/19. Safety Risk ALARP	£96
8	Jubilee line - Deep Tube Tunnel Northbound (Baker Street to Bond Street)	Risk under review to determine details of concerns and what mitigation required	£83

Risk is the main driver for Civils asset decision-making, incorporating condition and degradation together with impact on safety and performance. The value of projects or maintenance activities is derived from the reduction in risk that those works are expected to deliver. Civils asset risks are managed in the STRATA Civils Risk Model. The risk profile is delivered as a result of planned remediation works. Were these works not to proceed the quantified risk in the latter years of the plan would be higher and would not represent good whole life value.

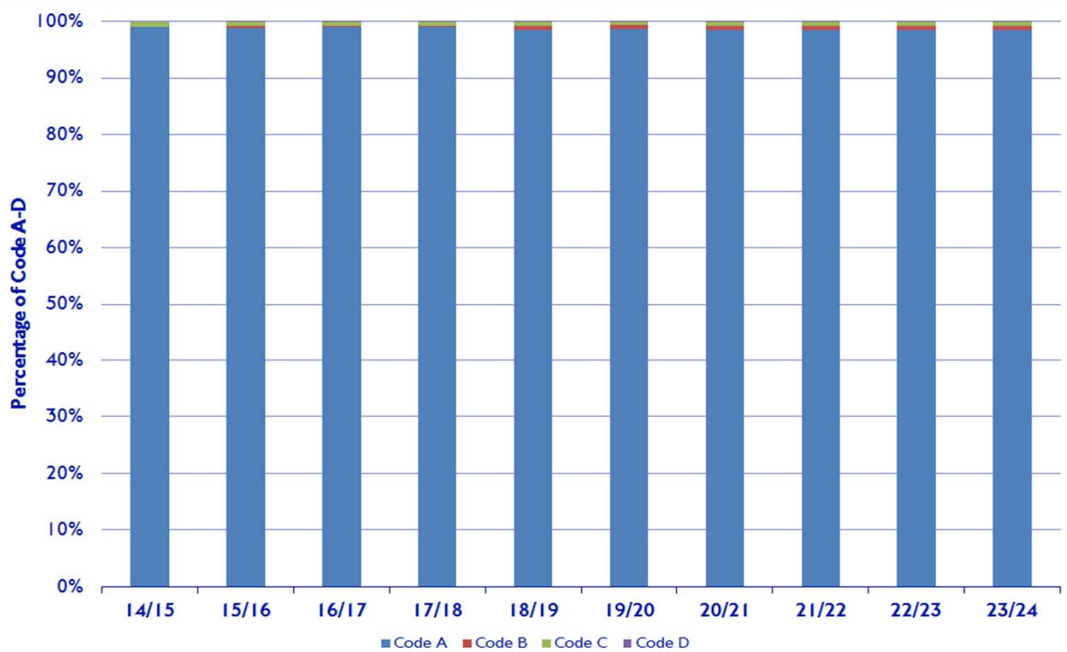
The following emerging risks and concerns have not yet been fully quantified in STRATA and hence are not shown in the risk table (QRAs for these risks are in progress):

- **Bakerloo clay slurry entering tunnel** - Root Cause Analysis and feasibility in progress, risk currently being mitigated through close collaboration between Civils and Track teams.
- **Cable Management** – Strategy under review to prevent cable management systems becoming over-loaded, e.g. the Whitechapel Station underbridge.
- **Falling Elements** – Material detaching from overhead structural assets. Network wide risk assessment underway to identify exposure, value and develop management strategy.
- **Hidden Components** – Some assets have parts which cannot be inspected, meaning that the asset may be in a worse condition than thought. A working group is identifying alternatives to conventional inspection.
- **Signal Posts** – Cross-Asset Working Group set up to assess the risks of failure affecting safety and service and define the management strategy.
- **Drainage** – it is believed that a single drainage maintenance team across discipline and organisational boundaries might afford efficiencies and reduce risk, e.g. coverage of slope drainage in BCV and SSL has recently been raised as a concern by Engineering. A working group has been set up to review the One Team proposal further.

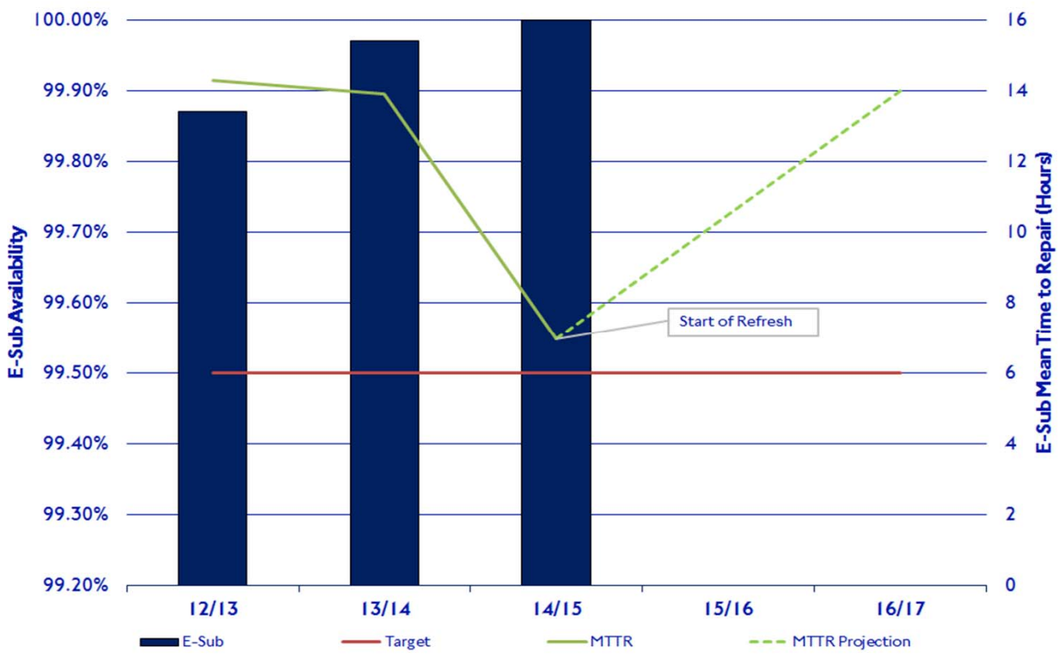
Risk - Safety & Performance Risk Profile - Figure 70



Asset Condition (ACR) - Functional Condition - Figure 71



Performance - Railway Information Systems - Figure 72

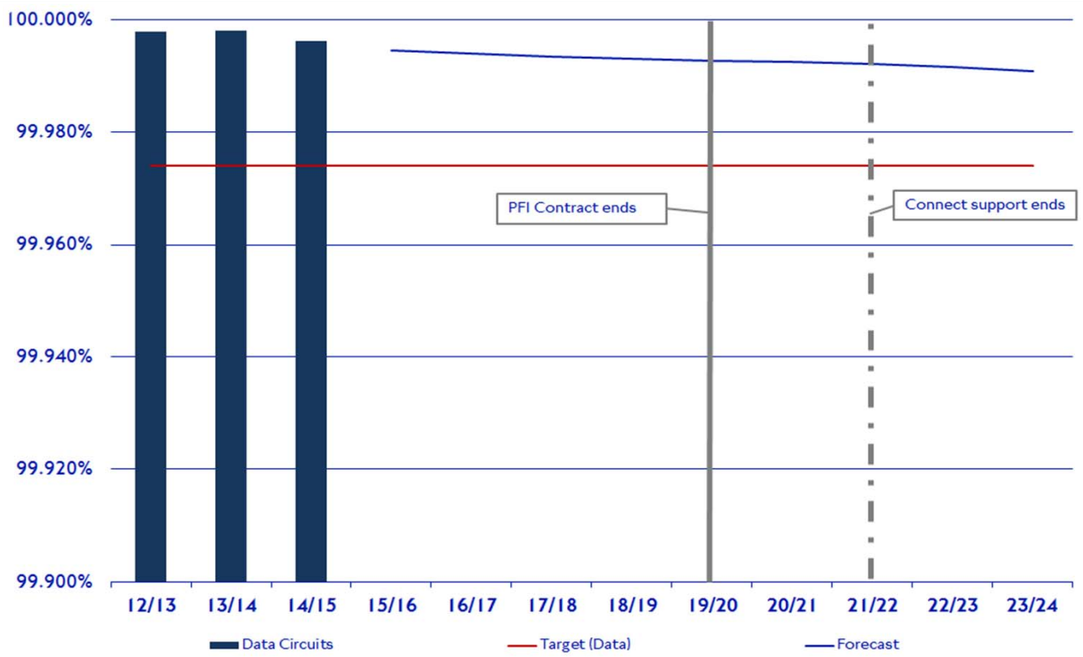


Performance issues relate to the availability of ESUBs and the reliability of the TrackerNet data feed, together with system obsolescence and technology change. Most of our Railway Information Systems, DMIs and ESUBs are, or soon will, be life expired. Some legacy systems are in excess of 40 years old and require replacement. Projects are in place for the progressive replacement of systems between 2015 and 2025. These have been prioritised by location, age, performance and integration with other programmes of work such as SUP MAGIC box roll out. Tactical improvements to ESUBs to provide refreshed screens and processing capability will be complete by 2016.

Suitability of the ESUBs for the increasing amount of information to be provided is also a concern with the addition of Crossrail and further Overground lines. Work is on-going with Customer Experience and IM to determine the long term proposals for ESUBs. Scope definition will be completed with Customer Strategy and COO on future requirements during 2015.

Investment in Railway Information Systems is split between the need for on-going refresh as well as enhancements to support the Fit for the Future-Stations programme. This will include replacement and alteration to station management systems, digital voice announcers and the provision of visual displays at stations where not currently provided. This is being integrated with roll out the SUP Customer Information System into existing visual displays and public address systems. This includes the provision of MAGIC boxes to interface between the SUP Train Control Systems and the local station systems. Installation is underway and will be completed by 2018 at SUP served stations. Opportunities exist to link the maintenance of common information systems installed across R&U such as ESUBs and other visual displays as they are installed or replaced. Discussions have commenced with rail on realising these opportunities.

Performance - Network Infrastructure & Data Storage - Connect Data Circuits Availability - Figure 73

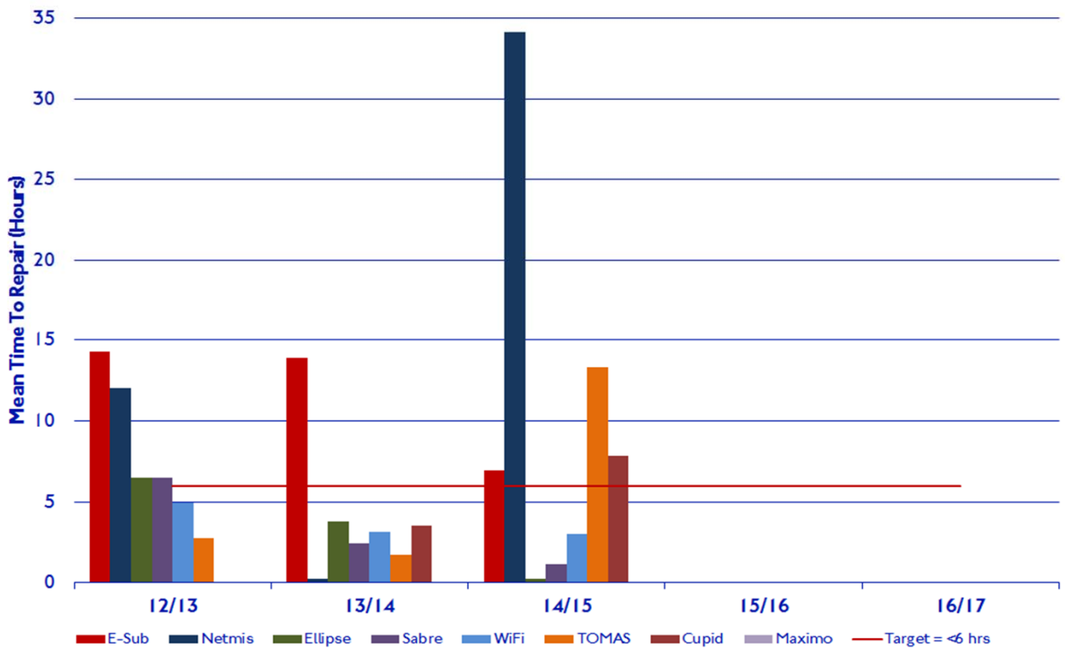


Performance data is recorded for the Connect PFI networks and for the Wi-Fi service. The Connect PFI has operated within its Service Level Agreements during the last year. The forecast is for the system to continue to operate within the contractual obligations of the PFI to the end of the contract due to the inherent resilience of the system and the refresh works completing in 2017 by the PFI Contractor. Performance will remain in-line with acceptable business targets beyond revision of the contract in 2019. Targeted improvement plans will be completed to address end of life issues to the radiating infrastructure and to obsolescence of the system ahead of full system upgrade commencing in 2021.

There is extensive investment in networks across R&U. However, what we have now is variously outdated and fragmented. Work has started to improve this through a pan-R&U data-networking group, and within six months a strategy covering both the form of networks and the management arrangements will be recommended. This will deal with the proposed future of the data-networks that form part of Connect. This will give guidance to ongoing investments including: the refresh of the Connect PFI network to a IP MPLS based network, the Croydon Tramlink data network and completion of the LU Wi-Fi network and also new investment including the provision of new networks for Power SCADA , SUP Train Control Systems and JNP integration. Connectivity will also be provided to customers on stations and trains that meets their expectations, as soon as technically and financially viable ways of doing so can be devised, potentially with the use of the replacement Airwave system.

Data integration is an emerging topic which needs cross business ownership. Two elements of work are underway, completing in 2015; data structuring and labelling, which provides a "single source of truth" and how to find data, and an integration layer, providing an effective and consistent means to pull data and use it in multiple applications; moving data into a central library.

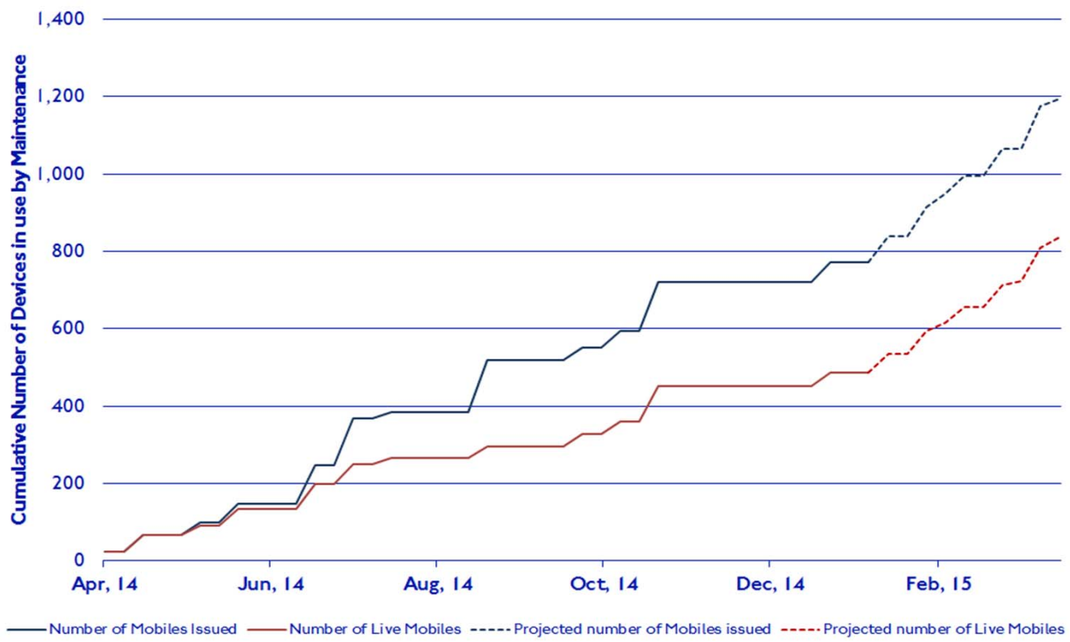
Performance - Business Operational Software - Figure 74



Business Operational Software is generally reliable and most issues result from other factors such as failure of the network or the host servers. However, this sector contains in excess of 100 software applications and most of our key applications such as CuPID and NetMIS do not have clearly agreed upgrade paths. Whole life management has not been applied to business operational software. These have generally grown organically to meet the immediate needs of the business without due consideration for the future. Work on improving this has started with the formation of a pan-R&U business operational software group with the aim of devising a strategy covering both business as usual and improvement or enhancement within six months. This will deal with the integration and optimisation of software as well as the potential for further automation, giving guidance to ongoing investments including: visualisation of business performance, modelling and analysis of source data and rationalisation of information sources.

The Maximo update will be completed by Asset Performance JNP in 2015 to provide life extension to 2020. Extension of Fieldreach software providing the mobile application for Ellipse across the remainder of Asset Performance BCV and SSL and critical updates to CuPID and CTAC software will also complete during 2015. Improvements in management of licences and commercially available software such as CAD and GIS applications are also underway. In the medium term development of applications supporting the Predict and Prevent programme including roll out of BIM, a rules engine and dash boarding for maintenance optimisation, will be a priority as will development of the integration platform for advanced data analysis by COO and Insight. Development of an update to NetMIS to take advantage of improved data from train control systems, Oyster Card data and other external sources will be scoped during 2015 for implementation during 2016. In the longer term plans are advanced in the replacement of our current asset management information systems in 20/21 and their potential for integration with other systems such as Crossrail and DLR / Tramlink.

Performance - Mobile Systems - Roll out of Maintenance Devices in Support of Mobile Asset Management Applications - Figure 75



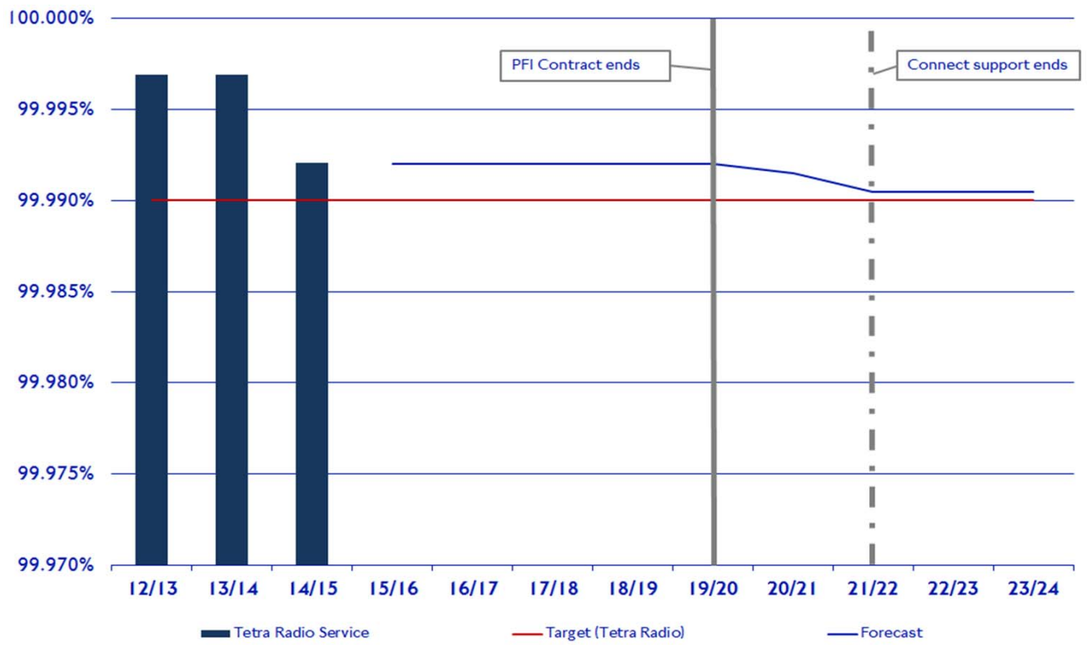
In support of TfL's goal to keep 'London working and growing and make life in London better', R&U business areas will have access to mobile services that:
- Allow R&U staff and partners to perform their role in ensuring that every journey matters, by providing them with access to the information, systems and tools they need, at the time they need them, wherever they need them.
- Enable our people to better collaborate and communicate as a part of their role.
- Represent value for money by providing a flexible service that provides digital access to information services needed to perform a variety of functions and roles with users being asked to carry as few devices as appropriate.

Coverage - To support these objectives, Wi-Fi coverage will be extended to all our stations by early 2015 for operational staff. Public access to Wi-Fi is currently available at 150 stations, and this will be expanded by a further 100 stations during 2015. In addition to stations, the extension of Wi-Fi to operational locations is a fundamental part of the programme to move asset maintenance through the journey from 'Find and Fix' to 'Predict and Prevent' through enabling further coverage for remote monitoring of critical assets.

Devices – in excess of 1,200 mobile devices will in use in use by COO maintenance teams by mid 2015 to support the roll-out of mobile asset management applications. COO Operations staff are also being issued with mobile devices as part of business change programmes. By the end of 2015 8,670 devices will be in use across COO.

Applications - An initial roll-out will complete during 2015 to automate many existing processes such as incident and fault reporting, accessing information from TfL Document Manager to facilitate mobile working. This will be supplemented during early 2015 by additional applications being provided as part of the Fit for the Future - Stations programme.

Performance - Railway Operational Systems - Figure 76

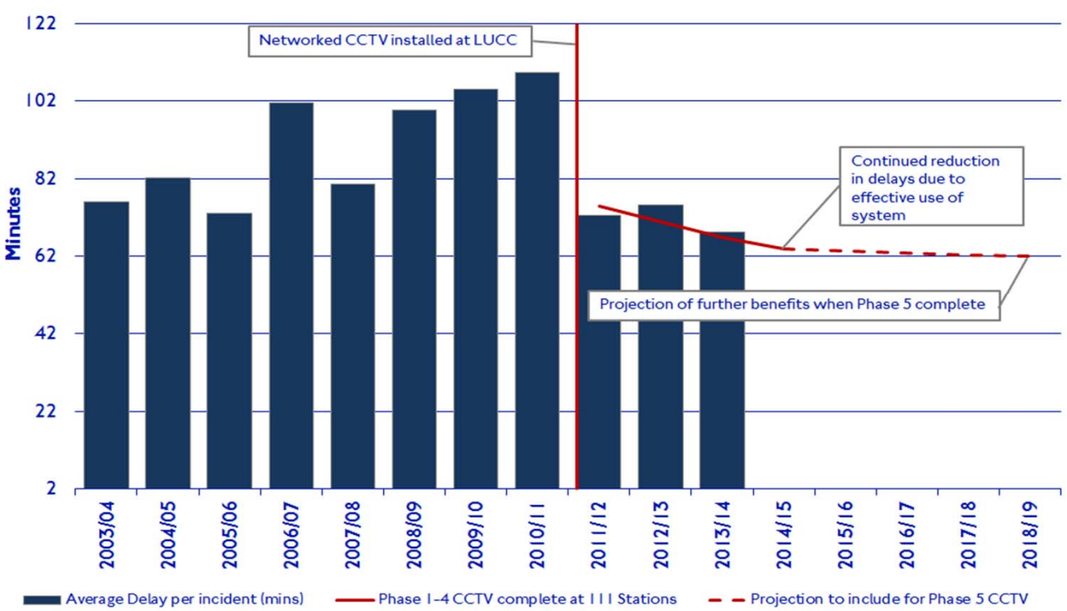


The Tunnel Telephone system remains the biggest risk to performance with degradation of wires the main concern. The proposal to remove wires while retaining the headwall / tailwall isolation on station platforms will remove both a performance and maintenance delivery risk. Prioritised wire removal will be completed ahead of migration to a new DC power isolation system by 2018. Obsolescence of the Track to Train CCTV systems on Central, Northern and Jubilee lines is also a major concern. Failure of the Jubilee line in-cab systems is considered the highest risk. Options for replacement are being considered in a feasibility study to report in late 2015. The replacement of the systems will be integrated with the purchase of additional Jubilee and Northern line trains between 2015 and 2017.

Reliability of TrackerNet has been improved by the completion of re-platforming in early 2015. TrackerNet will be modified to accept data feeds from the SUP ATC system as well as completing the Northern line upgrade. Further work is required to the Victoria line feeds to optimise performance of the system and for the integration of line extensions at Croxley and Battersea. Potential to integrate Crossrail and DLR will be considered in a feasibility study in 2015.

The Connect PFI contract continues to meet performance targets and the refresh programme will ensure targets continue to be met until the contract ends in 2019. The strategy for replacing Connect radio is still open, with expected replacement in c2020-2025, with either "next generation TETRA", 4G/LTE, or ETSI PMR. There is an expectation to wait until the capability of 4G/LTE becomes clearer before a recommendation is made. The Home Office will not extend the Airwave system that currently shares the same platform as our Connect radio system; we expect to undertake a £100m+ programme to provide new 4G/LTE radiating infrastructure throughout stations and tunnels, funded by Home Office. The ongoing feasibility study will complete in June 2015 with an Invitation To Tender (ITT) in Autumn 2015, on-site early 2016, finishing in 18/19.

Performance - Security Systems - Suicide Attempts (Person Under Train) Average Delay Trend Figure 77



The extension of "networked" CCTV coverage to a further 119 stations (taking the total to 230), will commence during 2015 completing in 2017. The trend shown in Figure 77, to reduce the average delay time resulting from service disruption including suicide attempts, will be accelerated by providing additional CCTV views to LUCC giving a potential 300k LCH per year benefit.

During 2015 a "back to basics" review to determine the purpose and need for surveillance CCTV will start: who uses it, for what, how it relates to the Fit for the Future-Stations target operating model and how long images need to be retained etc. This will be used to inform future investment in CCTV up to 2025. A great deal of CCTV equipment is approaching the end of its useful life, and replacement with modern equipment, providing the same coverage and storage as now will be unaffordable; the "back to basics" review is intended to provide a reasoned, risk justifiable, focused reduction in the quantity of equipment.

60% of help point systems are at end of life and require replacement, with the last purchase of spares already, or about to be, completed. Replacement of the existing help point systems will commence during 2015 where aligned to the Integrated Stations Programme. Plans are under development to ensure that the current systems satisfy the need for more flexible station operation as the ability to forward calls to radio or mobile phone is not a feature of the current systems without modification. Additionally, 65 stations do not currently have help point systems. Projects are currently being scoped to install help and information points at these stations, ensuring that these meet the requirements of flexible station operation.

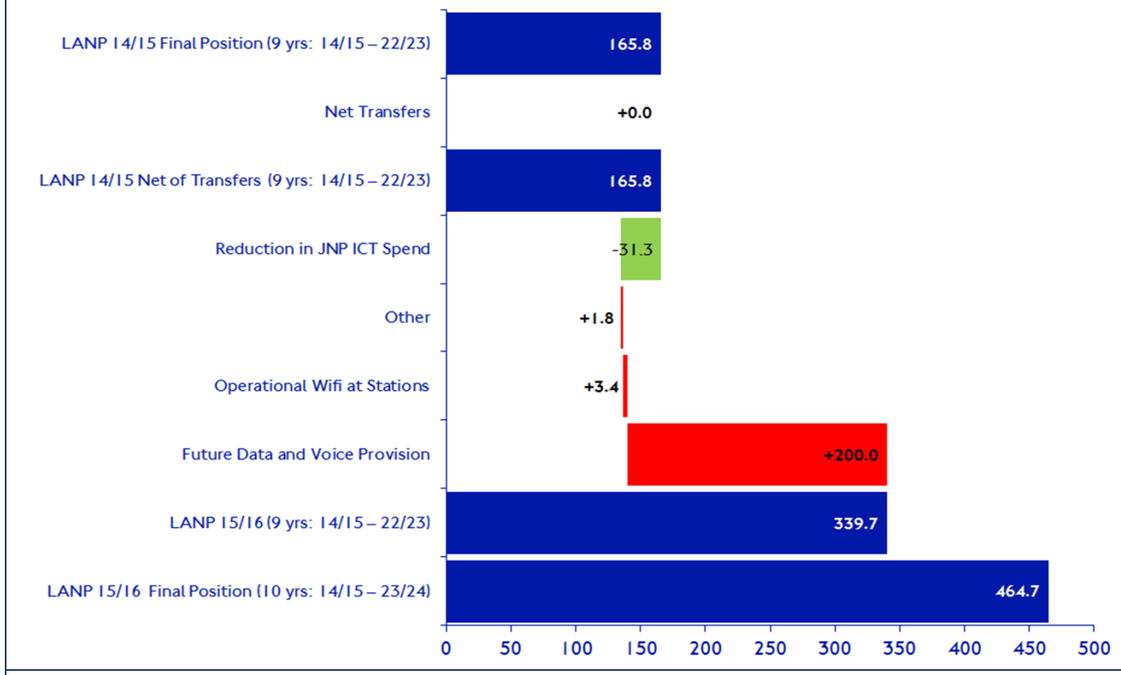
LU Asset Plan - ICT

Costs

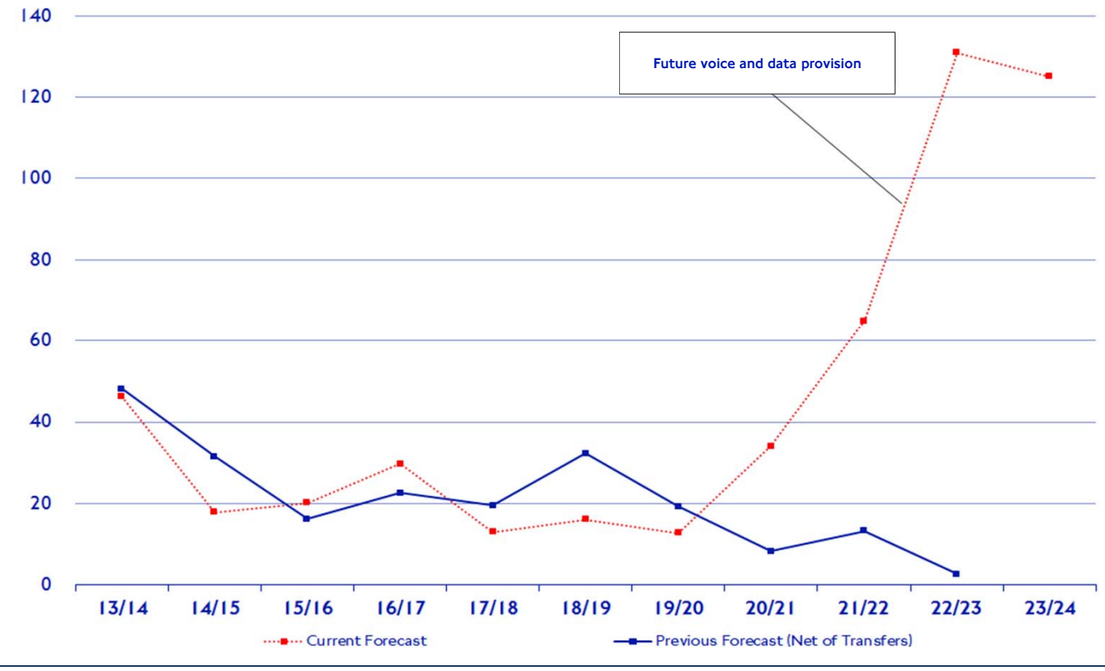
Total ICT Programme Costs (£m outturn including risk as at Q3 2013/14) - Table 20

ICT Project Costs (£m)	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Future Voice and Data Provision	0.0	0.0	0.0	0.0	0.0	0.0	25.0	50.0	125.0	125.0	325.0
Northern Line Extension	0.1	0.4	0.9	2.8	6.2	5.5	0.6	0.0	0.0	0.0	16.5
SSR Upgrade	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5
Other ICT	14.3	19.8	28.9	10.2	9.9	7.3	8.4	15.0	6.0	0.0	119.6
Total Outturn	**17.9**	**20.1**	**29.8**	**13.0**	**16.0**	**12.8**	**34.0**	**65.0**	**131.0**	**125.0**	**464.7**
Total Constant 2014/15 Prices	**17.9**	**19.7**	**28.1**	**11.9**	**14.1**	**10.9**	**28.0**	**51.6**	**100.5**	**92.7**	**375.4**

Cost Phasing Analysis - Capex - Figure 78



Cost Variance Analysis - Capex - Figure 79



Only ICT costs under the authority of the ICTT Programme Board have been included in this section of the plan. Significant other ICT expenditure exists outside of the Programme Board authority which is detailed elsewhere in this plan. Following the 2014 Business Planning round a review of cost pressures has taken place. These have materialised either through better knowledge of obsolescence issues or by projects developing to a greater level of detail which has confirmed original estimates were inaccurate. The significant variances to the plan are as follows:

- Replacement of the Connect Radio system (£200M).
- Modification to TrackerNet to accept revised data feeds from SUP ATC (£6M)
- Replacement of Jubilee and Northern line Track to Train CCTV systems (£12M)

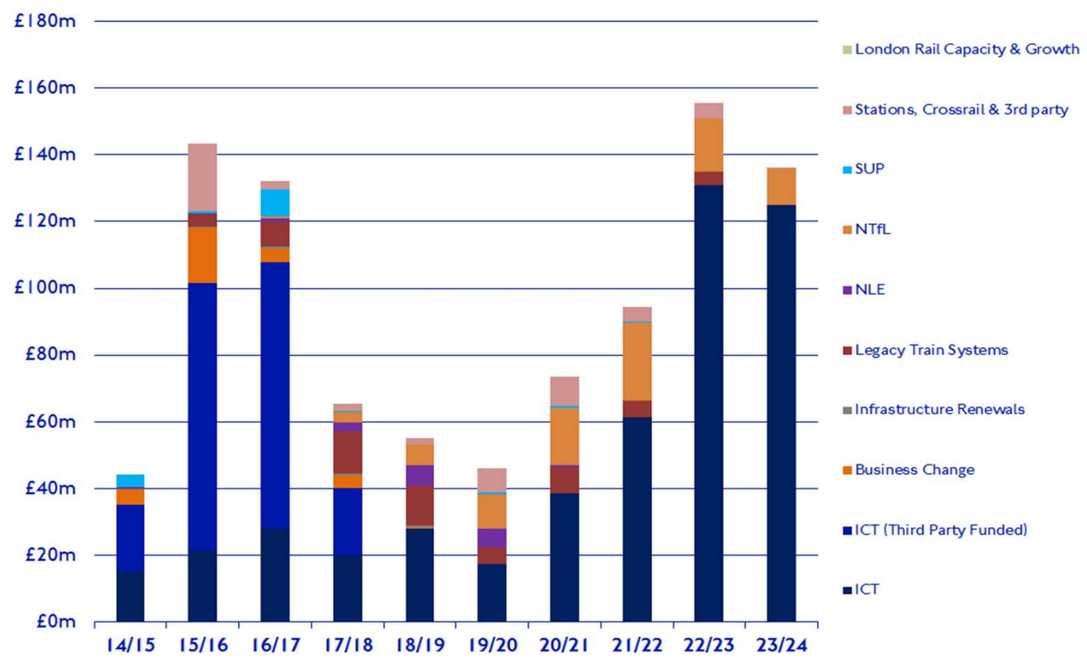
Variations to existing projects include:

- Expansion of the scope of the Wi-Fi project to include stations currently under major enhancement to ensure all stations are provided with Wi-Fi (£3.0M)

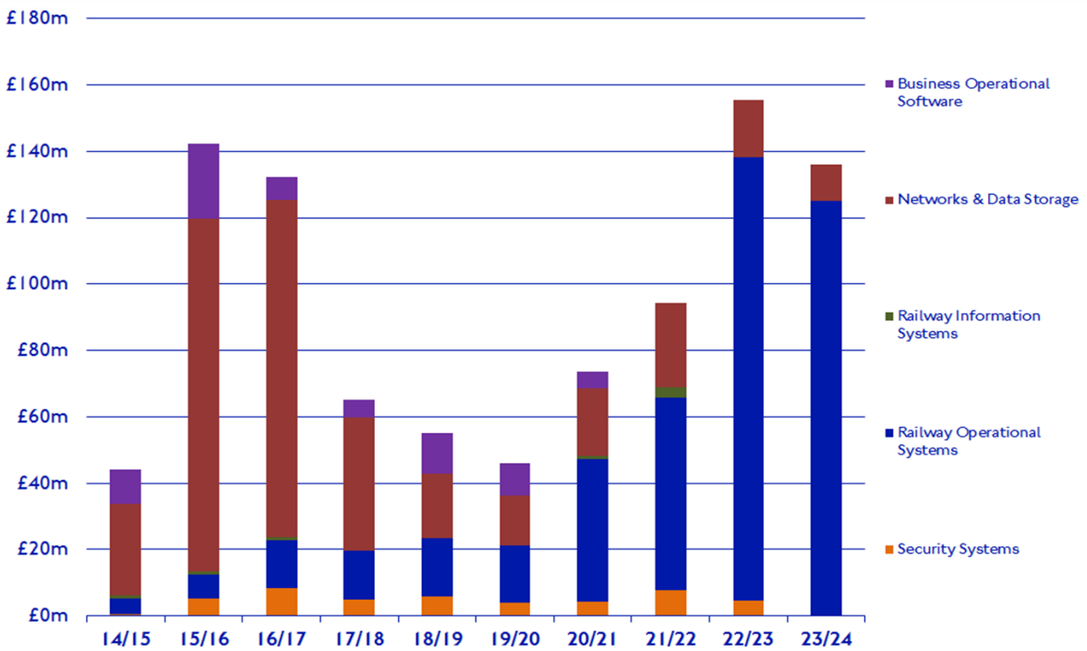
Opex costs are not included in the ICT plan and are in (a) the Stations Plan for cost of maintenance delivered by Stations COO (b) the Signalling Plan for cost of maintenance delivered by C&I DLO in COO (c) The maintenance costs associated with the Connect PFI contract is integral to the contract and included in Opex costs (d) The IM Investment Plan (detailed in the plan taken to the Chairman's Briefing Meeting on 7th January 2015).

LU Asset Plan - ICT

Overall ICT Investment by Programme - Figure 80



Overall ICT Investment by Theme - Figure 81



ICT as an asset group is still maturing. Very few projects or programmes within R&U can be delivered without some form of ICT content, e.g. data processing, storage or connectivity.

In order to give a closer understanding of the extent of ICT capital works being delivered across R&U an extensive review has been completed with Sponsors, Projects and Asset Managers to assess the extent of ICT related capital works being completed in other programmes. Figures 80 and 81 show that just under 50% of ICT investment is currently outside the authority of the ICT Programme Board. The process of engaging with programmes and projects outside of the ICT Programme needs to be refined to ensure both scope and costs are captured more accurately. The plan to improve this information capture is as follows:

- Engaging with Sponsors at an early stage of project development.
- Re-writing the ICT strategy to reflect the five themes (Railway Information Systems, Network Infrastructure and Data Storage, Business Operational Software, Railway Operational Systems and Security Systems) to give programmes a better understanding of the systems and assets impacted.
- Improve information capture through the use of OPPM and improvements to Pathway (to ensure early visibility of ICT works within projects to ensure scope and requirements are captured early and can be planned accordingly)

Through the ICT strategy groups the work contained in each theme will be analysed for gaps and overlaps as well as conflicts in use or application of technology. This work is intended to be completed by July 2015 with recommendation to ICT Programme Board on improvements to project scoping and control. The revised ICT strategy is seen as key to implementing change as a consistently agreed approach to each theme will prevent the multiple solutions that exist across ICT at present.

The costs exclude investment made by IM in R&U related projects. For 15/16 IM will spend £11.1m on R&U projects. These include:

- Replacement of the Railway Timetabling System (£3M)
- Electronic Service Update Boards (ESUBs) Technical Refresh (£1.0M)
- Computerised Track Access Control (CTAC) Technical Refresh (£1.0M)
- Victoria Line Upgrade (VLU) Data feed improvement (£1.1M)
- Back up power control room at Long Acre replacement of touchscreen telephony (£0.7M)
- Wi-Fi resilient data centre (£1.5M)
- Multi-modal integrated command and control system (MICCS) (£1.5M)

R&U also gains indirect benefit from IM investment in the End User Computing Programme, Data Centre Rationalisation, Remote access Consolidation and the pan TfL Mobile Programme.

LU Asset Plan - ICT

Condition

Risk - Top ICT Asset Risks - Table 21

Ranking	Description	Mitigation	Current Risk Level	Current Risk Score	Target Risk Level	Target Risk Score
Railway Information Systems						
1	Train position data feeds are either missing or unreliable	Connect Radio is used to supplement missing or inaccurate data	Medium	15	Low	9
2	Customer facing assets may not meet emerging requirements from change programmes for future operational concepts	Complete user studies to determine future needs and complete a feasibility study to establish options for future solutions	Medium	15	Low	9
3	ESUBs cannot be modified to accommodate additional lines (Overground and Crossrail) without significant modification	ESUI working group established to agree future requirements for disruption information beyond current refresh project	Medium	15	Low	9
Network Infrastructure & Data Storage						
1	Impact of ESN installation in running tunnels and stations affecting maintenance and capital programmes	Ensure scope and phasing of work is coordinated fully between ESN and other infrastructure projects	High	20	Low	9
2	Increased risk of external interference from compromising networks, software or data storage. Management of interface between operational railway and enterprise networks.	Ensure a robust Cyber-Security policy and process is in place with both physical and virtual protection in place on at risk systems and assets	High	20	Low	9
3	Lack of configuration control of network assets leads to poor performance of network system. This may result in LCH savings not being realised	Ensure a robust network change control process is in place and integral to the governance of projects	Medium	12	Nil	0
4	Failure of the PFI to provide a refreshed data network meeting the residual requirements of the PFI contract ensuring correct asset health and performance to the end of November 2021. This includes failure to upgrade core sites and software	If revisionary conditions cannot be agreed alternative providers will be used and costs recovered where possible through PFI contact	Medium	17	Medium	15
Business Operational Software						
1	Operational software applications have not kept pace with the business changes or operational strategies of COO. Applications may no longer be fit for purpose or meet availability or resilience requirements	Feasibility study to review all related software packages and create both an operational and software relationship map that can be converted in to a roadmap for all railway operational software	Medium	12	Very Low	1
2	Multiple Asset Management Information Systems are inefficient, difficult to extract and use common data and give high operational costs.	Feasibility study being completed to provide roadmap and end state for Asset Management Information Systems across R&U	Medium	12	Very Low	1
Railway Operational Systems						
1	External stakeholders (Home Office, Emergency Services and DfT) forcing a change in emergency services below ground provision due to the end of the Airwaves contract in 2019	Continued dialogue with external stakeholders influencing their strategy	High	20	Low	9
2	Central & Northern Line Track to Train CCTV system obsolescence	Obsolescence plan until train replacement to be developed by stations and fleet teams. Additional cost developing alternative suppliers	High	18	Very Low	3
3	Loss of integrity of Tunnel Telephone system due to wire breakage	Enhanced maintenance is the only available mitigation without removal of wires	High	20	Low	9
4	Failure of the Connect PFI contractor to maintain integrity of systems and software	Ensure Commercial and Legal are aware of all issues arising to influence City Link in their fulfilment of the obligations of the Connect PFI Contract	High	20	Medium	12
5	Disparate mechanisms to request updates or changes to software systems leading to inefficiencies and duplication of effort.	Governance mechanism set up through strategy group and communications with all stakeholders	Medium	12	Nil	0
Security Systems						
1	Obsolescence of CCTV assets increasing liability on maintainers.	Develop and agree transition plan with maintenance and projects to ensure continued spares support	Medium	15	Low	9
2	Obsolete station CCTV DVRs reducing effectiveness of incident management at LUCC.	Limited replacement of DVRs with buffering issue prioritised by historical incident locations	Medium	15	Low	9

The grouping of assets and systems as ICT is still along way from maturity and many of the challenges for the future are not fully understood. Therefore, the main risks to assets and systems are:

1. Obsolescence and technology change
2. Change of operational functionality and requirements
3. Failing to meet customer and staff expectations
4. Third party risks from delivery of the Airwave replacement system for the Home Office
5. Failing to have the delivery organisation, resource and capability to match the assets and systems and their use.

Operational Risks - Substantial parts of the railway operating and information systems are obsolete and are only kept in service by enhanced maintenance and the continued ability to source spares. The impact of Night Tube is only just being fully understood; workshops have highlighted a number of maintenance and operational challenges to be resolved or mitigated. This work has also confirmed that the issues exist around the ability to deliver a 24/7 ICT service. Concern exists around first line maintenance response and the ability of systems to deliver the required duty. Protracted delay in consultation of the removal of Tunnel Telephone wires may result in a drop in system performance, increasing the risk of a service impacting failure.

Networks and data storage - Failure to agree the future road map for networks and data storage within R&U or with IM will result in continued inefficient delivery and interoperability issues. The impact of the ESN programme with TfL is not fully understood and the requirement to install more than 400 miles of leaky feeder by 2017 will impact ICT projects plus the operational railway and capital programmes. Additionally, cyber security and information security policy for data networks is not adequately defined within and interoperability issues between systems and networks are not fully understood. The future requirement for storage, hosting and transmission has not previously been modelled across R&U. The rapid growth in transmission and storage requirements requires a new approach to prevent not fulfilling the needs of the future capital programmes and operations.

Business operational software - Poor requirements capture across the business results in sub-optimal software solutions compounded by the continued use of tactical fixes to prolong current applications and not fix underlying problems. Similarly, the failure to capitalise on the availability of data to improve analysis leading to business efficiencies. The scale of the task to amalgamate the data sets supporting Ellipse and Maximo is also a considerable risk to the implementation of any replacement programme as is the integration of Crossrail into the future AMIS solution.

Railway operational systems – Due to changes in requirements and budget constraints, end user requirements for NTfL, NLE, SUP and Crossrail are not matched by available funding. Fit for the Future-Stations makes significant ICT systems obsolete and, unless removed, a maintenance liability and a hindrance to realising efficiencies, e.g. telephones and Station Management Systems. The suitability of the TrackerNet platform and its data feeds is a reducing risk as improvement of the servers is completed by IM and the number of data feeds reduced by the delivery of line upgrades.

Security Systems - The high level of expectation for the use of networked CCTV is not matched by the performance of existing assets and is hindered by complicated operational and maintenance arrangements. The security of networked CCTV systems and vulnerability to hacking or unauthorised downloading of images remains a concern unless we have a integrated process across TfL and better configuration control. The integration of Crossrail and other capacity projects needs to be managed to ensure compatibility of systems. This is being addressed by the production of reference designs but will need to be managed by those projects already in delivery. There is a continued proliferation of CCTV via minor works variations with approximately 200 cameras a year added . A new procedure is providing a review process to demonstrate the need prior to authority to proceed. Standards have not been modified to keep pace with technology or integration of systems. This is being addressed in the ICT work plan project.

LU Asset Plan - ICT

Condition

Organisational Capability

Capability to deliver ICT maintenance and investment works is currently spread across R&U as well as IM along with our suppliers. Completing in March 2015, a review of the competence needs and availability (in house and supply chain), across the whole asset life cycle, will lead to recommendations about recruitment and training practices and / or organisational arrangements. In parallel, capability requirements are also being mapped against the ICT workbank. Our skills base as an organisation is not keeping up with the technology, and superficial examination suggests we are lagging behind most significantly in the "maintain" area, where it is unclear whether the competence exists to specify contract maintenance appropriately, let alone undertake maintenance in-house. Gaps in expertise exist in both traditional communications and emerging IT / IM areas. Expertise in radio and cellular telephone is a particular challenge. These gaps will be addressed by 2015.

An exercise has started to outline the skills and capabilities that are currently available in-house and through our suppliers, and to compare them with likely future requirements. This exercise is expected to reveal significant gaps and highlight the need to make significant decisions about areas such as training, recruitment and our organisation. The findings of this study will be presented to ICTT Programme Board in mid 2015.

Using the consolidated work plan and requirements a capability plan for programme delivery will be produced. This will map capability to the requirements of the Business Plan, ensuring staff are in place to deliver the investment programme. This will involve:

- Using the consolidated work plan to determine types of work to be completed and the skills required to deliver
- Using a matrix of skills and requirements to match this to the available resource across CPD and IM to ensure coverage exists for the work to be completed.
- Highlighting any resource, skills, competency gaps that will impact of the future delivery plans
- Identifying duplication in resource where efficiencies could be realised.

Streamlining the planning and transaction of works is another key factor in ICT capability. Current project delivery processes are under examination, with a proposal for a new efficient, cost-effective structure integrating delivery between CPD, COO Assets and IM reporting to the ICTT Programme Board in April 2015. The whole project initiation, scoping, project authority, delivery and handing over to maintenance process in Pathway needs full integration within IM and experience in Stations / ICTU needs to be shared with IM. Reduction in double handling of projects between IM and CPD would offer significant reduction in costs. Clear definition of maintenance within IM would help derive between options for hardware / software.

Standards and Processes

ICT is still maturing as an asset group and an urgent review of standards, processes and procedures is required to remove conflict of requirements, duplication or gaps where no standard current exists is required. This will be used to develop a road map to develop a common set of ICT standard and procedures.

Our Category 1 Standards, and our approach to design control and whole life asset management are beginning to look outdated, and do not deal well with software based systems, added to which, a lot of what we have is not founded on the latest "target operating models". A clear definition of "target operating models" is required before requirements are built on that bedrock. Investigation of methods to effectively manage and distribute ICT standards may mean moving away from Category 1 Standards as monolithic documents, towards relational databases of requirements, which are much better at dealing with the fact that no single requirement stands in isolation.

The initial review of standards is complete with recommendations for the next stage to be made by March 2015.

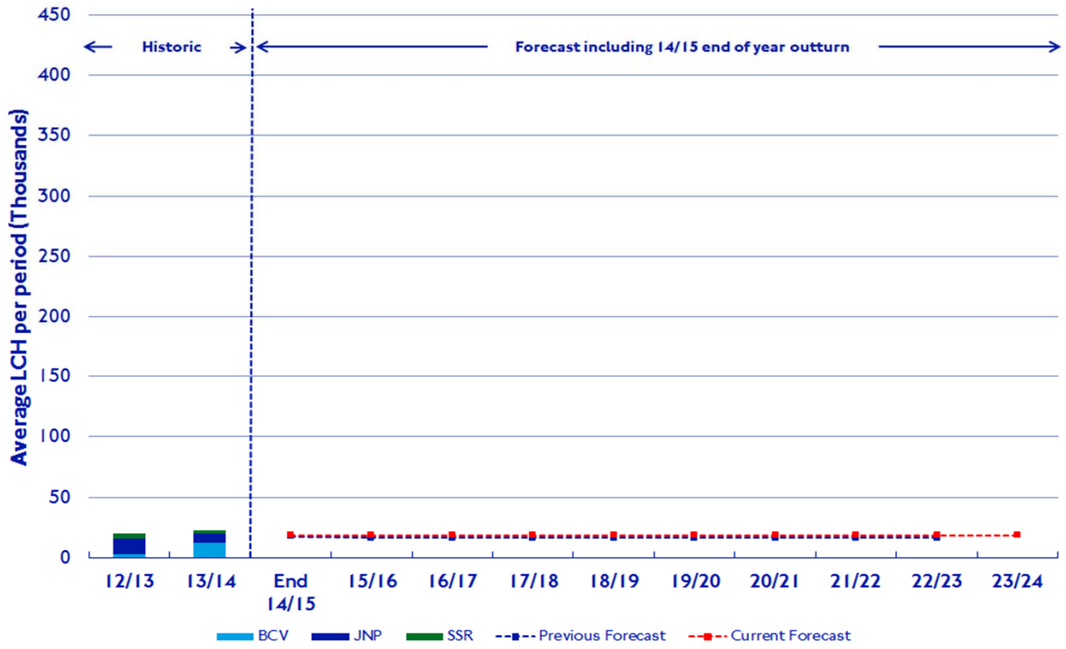
Consistency in design reduces whole life costs of installation. Currently we have multiple designers (Atkins, Siemens, Telent & IPS) providing similar but different designs compliant with standards. This leads to increased spares, holding different maintenance solutions and different training requirements. Standard solutions will give greater efficiency in delivery, maintenance and operation. A typical CCTV installation costs between £500k and £750k. A standard approach could reduce delivery cost by £100k to £150k per site by reducing project management costs and assurance. Standard solutions will achieve reduced capital costs as contracts will adhere to bulk purchasing agreements that are already in place for ICT equipment.

Introducing standardisation of design across the range of ICT systems and assets will ensure that the business can move to more effective configuration management. This will involve:

- Identification of the key systems requiring standardisation of design
- An assessment of the key factors that have enabled multiple and conflicting solutions to be provided by previous programmes i.e. governance, procurement, standards
- An assessment of how standardised designs would be created, managed and assured
- A prioritised list linked to the workbank of projects to deliver the standardised solutions
- Development of a process that enables standard designs to be delivered across a range of work programmes, for example the Integrated Stations Programme.

Completing this work for station systems is high priority because this is the domain where proliferation of designs is most apparent, and a better foundation is required for Bank station, the NLE etc., because the "target operating models" are now defined, and because there is a track record of creating systems that do not meet user requirements and are expensive.

Reliability - Lost Customer Hours (LCH) - Total LU Stations (Non-L&E) - Figure 82



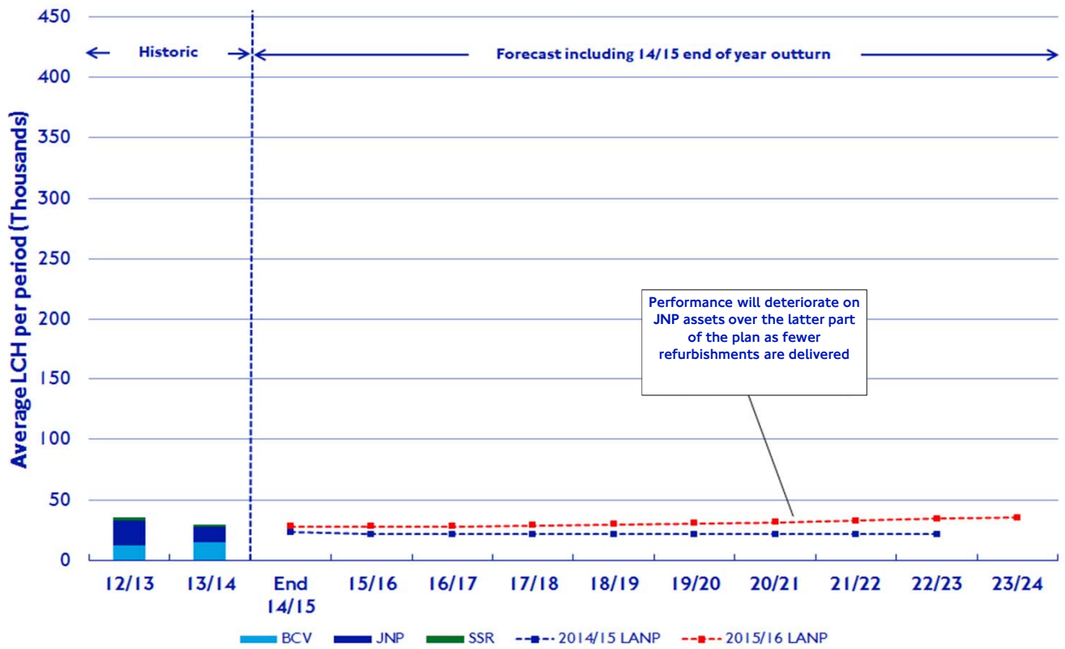
Stations have a very low impact on LCH compared with other assets and contribute c.5% of the annual total. Incidents associated with water ingress (in equipment rooms), PA and Fire systems and Tunnel Telephones have historically been the predominant cause of LCH in Stations and this remains the case.

The forecast for 14/15 was estimated at c23k LCH per period. Actual performance is better than forecast by c4k LCH per period. The 15/16 forecast assumes Station assets will continue to perform at the current run rate (c19k LCH per period). This is based on a year-on-year improvement in actual performance and the continuation of the capital investment plan focussing on targeted asset renewals as well as new assets being introduced through completion of the Integrated Stations Programme (ISP).

The forecast is flat as asset condition improvements through maintenance and small Capex investments are offset by increases to the asset base by projects such as Crossrail and the Northern Line Extension. The overall impact is anticipated to remain neutral, this will be reviewed as projects move through their lifecycle.

LCH values associated to Night Tube are also not included at a stations level. There are currently only network figures which have yet to be attributed to the individual asset areas, as outlined in the network summary pages.

Reliability - Lost Customer Hours (LCH) - L&E - Figure 83



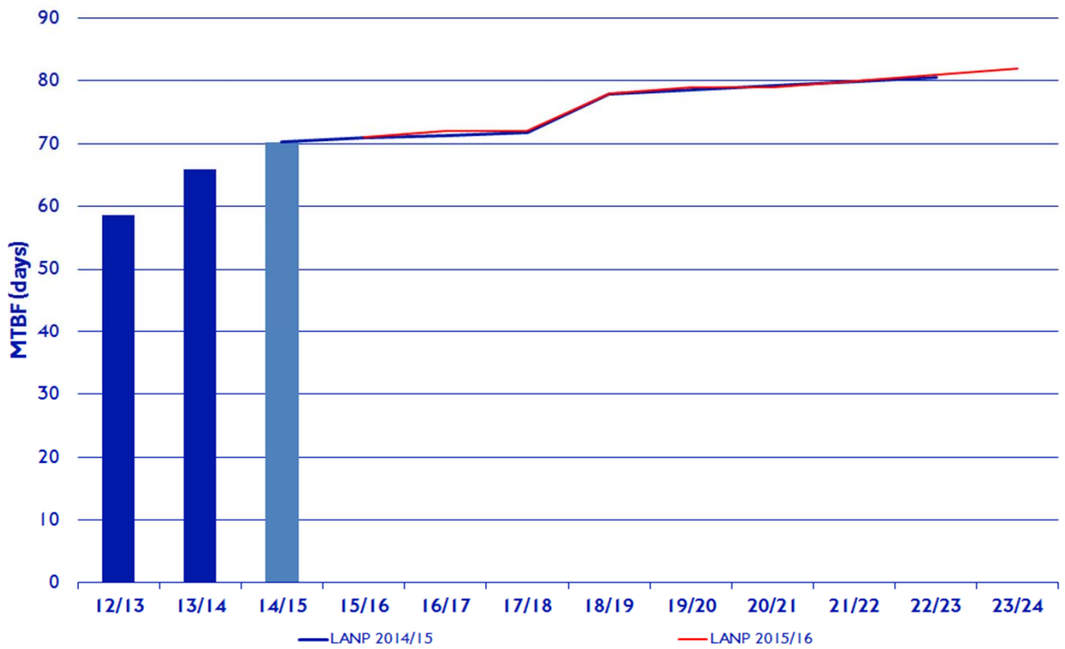
L&E remains the main contributor to Stations LCH performance. The main contributors are planned outages and issues with escalator steps causing machines to come out of service. L&E performed slightly better (c2k per period) than last year's forecast due to the consistent delivery of the refurbishment and renewal programme. With no major change to the frequency of Capex or Opex interventions, the current forecast assumes a continuation of the current performance rate of c.28k LCH per period for the network until 17/18. Following this there is a steady increase anticipated, owing to the lack of funding in the current plan to address the condition of the machines on the Jubilee Line Extension (JLE).

Previous assumptions that the volume of additional assets, as part of the Pan TfL additions, would increase LCH have been removed as performance of the early machines has been very positive. Continued improvement of the existing asset base is anticipated to neutralise any additional incidents from the 94 escalators and 53 lifts being delivered into service for Crossrail, the Northern Line Extension and the Croxley Rail Link, this will be reviewed as projects move through their lifecycle.

The condition of the JLE L&E asset base is a major concern. Approximately 50% of the JLE escalators will have life expired steps and chains at the end of the existing Accord contract in 17/18. There is insufficient funding in the refurbishment programme for these works and similarly the SMVT refurbishments/replacements on the JLE. Therefore the LCH and the number of faults will increase from 17/18 onwards if additional funding is not secured. Asset Performance are in the process of rationalising the final three year programme for the JLE to attempt to mitigate a portion of the asset risk.

The L&E asset base is split: 31% BCV, 54% JNP, and 15% SSL

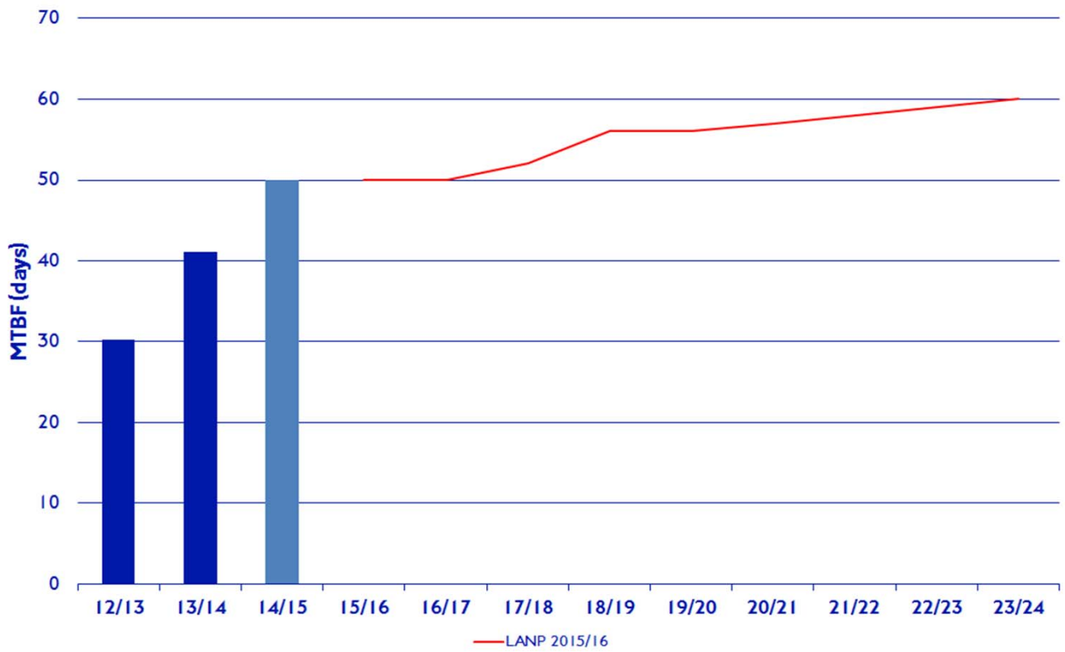
Reliability - Mean Time Between Failures (number of days) - Escalators - Figure 84



Escalator MTBF performance is slightly better than the 14/15 forecast and 8% improved on actual performance from the previous year owing to the continuation of the maintenance programme and further installations of new machines across the network. The 15/16 forecast continues to show an improvement from 71 to 82 days MTBF (network average) between 15/16 and 23/24 resulting from the ongoing escalator refurbishment programme.

The profile assumes 94 new assets resulting from Crossrail and the Northern Line Extension to Battersea which will introduce the new HD-Metro type of escalators which (based on performance to date at Charing Cross, Greenford and Blackfriars) are expected to be twice as reliable as the legacy fleet (Pan TfL contract target of 120 days).

Reliability - Mean Time Between Failures (number of days) - Lifts - Figure 85



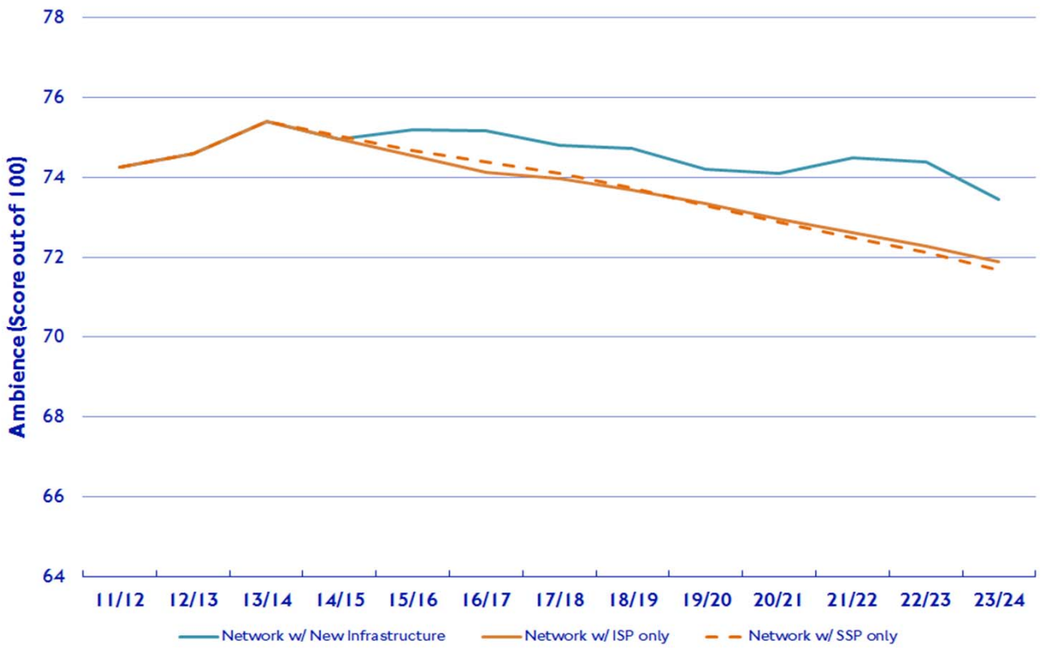
The 14/15 forecast only measured PMVT lifts owing to their impact on station closures. The 15/16 forecast includes all lifts as a result of the growing importance of the SMVT lifts for step-free routes and customer flows. Therefore, there is no performance against previous forecast to report. Closures as a result of asset failure (PMVT) will still be recorded through LCH values as SMVT lifts do not accrue LCH figures.

There has been significant improvement in the reliability of the lifts on London Underground in line with the commencement of the JNP major refurbishment lift programme in 2012 and the BCV/SSL lift replacement programme, the continued preventative maintenance regime and reliability growth plans.

The forecast assumes a levelling of performance over the next two years followed by a significant rise as a result of the increase in the asset base from Crossrail, the Northern Line Extension and capacity/step-free access installations. The use of Pan TfL machines will support this improvement owing to the performance targets set within the contract exceeding current levels.

LU Asset Plan - Stations

Ambience (MSS) - Figure 86



The strategy for the Station Stabilisation Programme (SSP) was for 'fair' condition, ensuring stations were safe, legal and operable. This resulted in a workbank that focused primarily on systems assets, rather than customer facing assets which impact on ambience.

The development of the Design Idiom and concern over tidemarks created through new builds such as Crossrail, an increased commercial development portfolio and Fit for the Future - Stations ticket hall changes, has required a strategy that addresses the customer facing areas of the stations as well as the SSP base scope. This forms the basis of the Integrated Stations Programme (ISP).

The change from SSP to ISP scope has resulted in a higher overall ambience score at the end of the current plan. Looking at the 69 stations originally planned in SSP (BCV/SSL), the SSP scope would have better performance in the short-term (until 18/19) due to the gap in delivery whilst rescoping to the ISP specification and reprofiling spend to assist with business planning constraints.

JNP, BCV and SSL now all have funding within Asset Performance to deliver enhanced maintenance which will be utilised for specific interventions across all assets. This will start to mitigate against asset degradation at locations not addressed by ISP, that impact on ambience.

Major station works and new builds will neutralise the ambience degradation across the plan at network level.

Risk - Top Stations Asset Risks - Table 22

ARM Ref		Description	Mitigation	Current Exposure	Target Exposure
SSD38021	1	Platform Train Interface issues	Platform Edge tactiles have been completed except for Cannon Street and Leytonstone. These are being addressed as part of current projects. Tactiles are not currently programmed for installation on ex-Silverlink stations. Platform inclines will be addressed as and when condition related works are required. ISP will only be looking to review platform inclines if major works are to be done to the platform surfaces. Works of an immediate Safety Concern will be carried out by COO from reactive maintenance budget.	High (20)	Medium (12)
SSD38020	2	Impact of water Ingress on assets and people	Control: monitored by the Cleaning Maintenance Regime and reporting of faults to the FRC by Station Supervisors. Targeted inspections completed on known high risk locations. Works of an immediate Safety Concern will be carried out by COO from reactive maintenance budget. Planned interventions will be carried out through Asset Resilience and ISP	High (16)	Medium (8)
EP00002	3	JLE Escalators components beyond life (c50% of fleet)	Rephasing of works within existing contract terms (up to 2018). Cost pressure raised as part of business planning.	Medium (15)	Medium (8)
67656	4	Accelerated deterioration of customer facing assets	Prioritising Capex funding (Asset Resilience, ISP). Review planned Opex strategy and associated contracts (2017/18).	Medium (12)	Medium (8)
EP00001	5	Asbestos impact on projects and asset condition	Hazardous material team to survey and prioritise opportunities across network. Funding to be agreed to support the strategy for removal.	Medium (12)	Medium (8)

Platform Train Interface (PTI): The number of platforms without tactile paving stones is currently 17 (5 of which will be rectified within the scope of existing projects and 12 requiring funding). Platform levels will be addressed via major projects where funding is available and in special cases, the Integrated Stations Programme (ISP).

Water Ingress: An increase in the number of objects falling from height has increased the risk profile for assets affected by water ingress (the primary cause for falling objects). COO works to remove tiles above head height in affected stations has mitigated the risk of injury but has left unfinished surfaces. Asset Resilience/ISP will target known areas of water ingress and COO will continue to respond to safety/critical incidents such as ingress into SERs.

JLE lift and escalator condition: currently 50% of the escalator fleet, approximately 63 machines, will have expired steps and chain by 2018. These machines will require a half life refurbishment which is currently unfunded. The contract team are mitigating the exposure by accelerating refurbishments in the current contract with the remaining liability to be submitted as a cost pressure during the business planning round.

Customer facing condition: concern has increased over the condition and perception of customer facing areas within stations. With changes to the station environment by projects such as Fit for the Future - Stations and Commercial Development there is a need to prioritise electrical and premises packages of works within asset resilience and ISP. A review of TPS and Amey contracts (due to expire in 17/18) will look at ensuring future mitigations.

Asbestos: The hazardous materials team are looking at the potential opportunities to align removal works with station projects to enable more cost efficient project delivery and a reduction on the safety risk across the network.

Cost (£m; outturn) and Volume Summary - Maintenance and Projects - Table 23

Stations Maintenance Costs (£m)		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Communications		25.3	24.8	25.8	25.5	26.1	27.4	28.1	29.1	30.1	31.2	273.5
Systems & Overheads		62.4	67.2	69.4	70.2	70.4	72.3	75.1	76.9	79.6	81.8	725.3
Premises		28.3	30.3	30.8	31.9	32.5	34.9	36.2	37.3	38.5	39.9	340.6
Cleaning		30.8	32.5	34.0	35.3	36.9	38.2	39.8	41.1	42.6	44.1	375.2
Total Outturn		**146.8**	**154.8**	**159.9**	**162.9**	**166.0**	**172.8**	**179.1**	**184.4**	**190.9**	**197.0**	**1714.5**
Total Constant 2014/15 Prices		**146.8**	**151.2**	**150.9**	**148.5**	**146.2**	**147.1**	**147.2**	**146.5**	**146.5**	**146.1**	**1476.9**

L&E Maintenance Costs (£m)		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Escalators		26.4	27.8	28.8	30.6	31.8	33.1	36.1	36.6	39.1	40.6	331.0
Lifts		8.9	8.3	8.4	9.0	9.3	10.7	10.4	11.0	11.3	11.8	99.0
Overheads		2.5	2.2	2.1	2.1	2.1	2.2	2.3	2.4	2.5	2.5	22.9
Total Outturn		**37.8**	**38.3**	**39.4**	**41.6**	**43.2**	**46.0**	**48.8**	**50.0**	**52.9**	**54.9**	**452.8**
Total Constant 2014/15 Prices		**37.8**	**37.4**	**37.1**	**37.9**	**38.1**	**39.1**	**40.1**	**39.7**	**40.6**	**40.7**	**388.6**

Stations Project Costs (£m, including risk)		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Stations Stabilisation Programme / Integrated Stations Programme		54.1	26.8	65.1	67.7	70.7	71.8	74.0	75.3	75.6	76.6	657.7
Capacity, Crossrail & 3rd Party		308.0	282.7	256.4	191.4	126.7	152.8	290.2	71.7	105.4	90.6	1876.0
Northern Line Extension		0.1	58.7	49.8	80.6	34.8	5.5	0.6	0.0	0.0	0.0	230.2
Asset Resilience		5.7	8.8	8.5	8.8	0.0	0.0	0.0	0.0	0.0	0.0	31.8
Total Outturn		**368.0**	**377.0**	**379.8**	**348.5**	**232.2**	**230.1**	**364.9**	**147.0**	**181.1**	**167.2**	**2795.7**
Total Constant 2014/15 Prices		**368.0**	**368.2**	**358.3**	**317.7**	**204.5**	**195.8**	**300.0**	**116.8**	**139.0**	**124.0**	**2492.3**

Project Delivery - Stations		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
ISP	No.	3	3	5	8	13	12	7	7	4	8	70
LU Crossrail	No.	1	1	4								6
Capacity & Access Upgrade & NLE	No.	0	5	6	3	4	2	2	4	2	0	28

L&E Project Costs (£m, including risk)		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Escalators		39.5	40.4	43.6	39.3	32.2	35.7	38.5	41.1	26.0	14.6	350.9
Lifts		14.0	16.7	21.7	18.8	18.9	14.3	11.0	8.1	6.6	0.5	130.7
Management Costs		1.8	1.6	1.2	1.8	1.6	4.8	4.0	5.3	2.7	3.4	28.4
Total Outturn		**55.3**	**58.7**	**66.5**	**60.0**	**52.7**	**54.8**	**53.5**	**54.6**	**35.3**	**18.6**	**510.1**
Total Constant 2014/15 Prices		**55.3**	**57.4**	**62.8**	**54.7**	**46.4**	**46.6**	**44.0**	**43.4**	**27.1**	**13.8**	**451.4**

Project Delivery - L&E		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Lift Replacement/refurbishment	No.	12	16	19	17	17	12	8	6	4	2	113
Escalator Replacement/refurbishment	No.	28	30	34	28	24	26	28	30	16	10	254

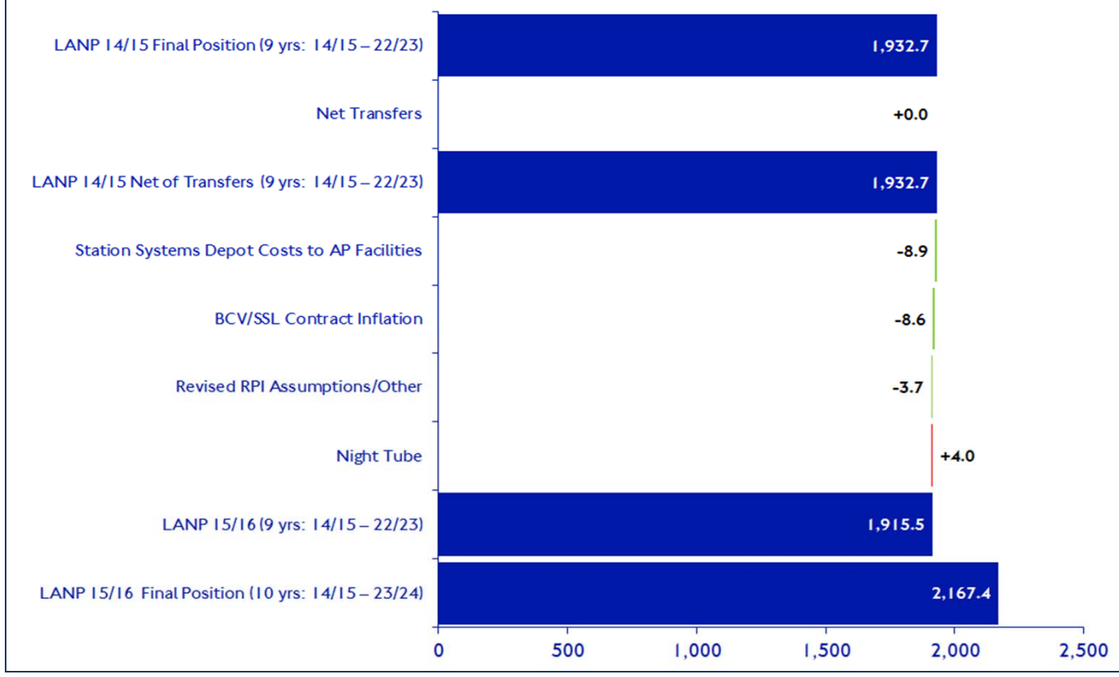
The Stations maintenance forecast remains in line to that of last year. However, £25.6m has been identified to be moved from Capex into the maintenance budgets within COO (Asset Resilience). This budget will allow COO to manage asset degradation and deliver more preventative works. This will be transferred to Opex on an annual basis once workbanks are agreed and reflected in the associated Q3 forecast. Opex provisions for new stations or major upgrades are not included in the business plan and will be raised by the sponsors as part of the business planning round. The LU Crossrail Opex impacts have not been included as they are currently held in the Rail for London budget. This is to be transferred to LU maintenance prior to Q3 15/16 and will be reflected in subsequent forecasts.

The Stations project cost forecast has decreased significantly owing to large cost savings realised through the maturing of scope requirements for the NLE and NTfL projects. There has also been significant re-phasing of delivery in Stations, particularly SSP to ISP, to account for changes to individual scopes and to assist with LU's spending profile over the next two to three years, as agreed through the 2014 business planning round. ISP costing assumes efficiencies made through opportunities such as working in traffic hours.

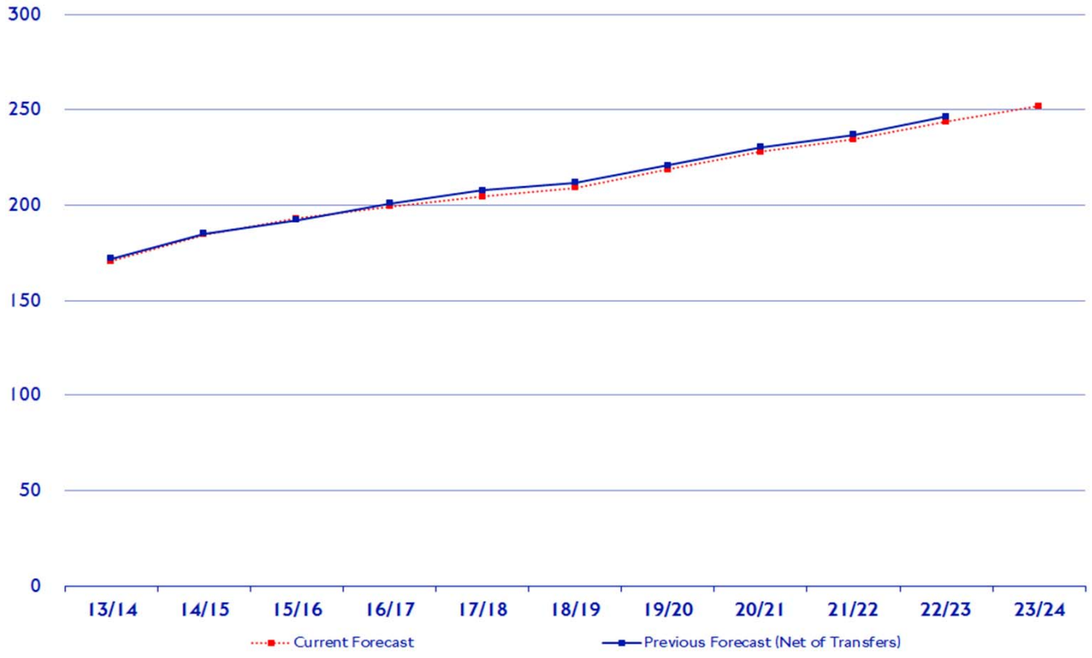
The L&E maintenance forecast remains in line with last year. L&E project forecasts reflect the planned programme of works with a slight amendment to expenditure in the first three years. Capex at the end of the plan needs to be uplifted as funds are yet to be secured to continue the required level of refurbishment and replacements. The largest gap is in relation to the JLE half-life refurbishments that will be required on c.63 machines post 2018. There is a risk of cost/programme increases in the region of 50% if there are changes to agreed closures – predominantly in the PMVT replacement programme. Project volumes for L&E remain in line with the previous forecast and continue to show the number for the works on the JLE despite the funding gap of c£90m rejected in the 2014 business planning round. Works are underway to clarify the true impact of delaying these works with a revised cost pressure estimate to be submitted as part of the 2015 process.

LU Asset Plan - Stations

Cost Variance Analysis - Opex - Figure 87



Cost Phasing Analysis - Opex - Figure 88



Overall, the Stations Opex plan has reduced by £17.2m between 15/16 and 22/23 compared to last year.

The only notable increase in the plan is £4m for the impact on maintenance as a result of Night Tube. This increase was not added to last year's LANP owing to a lack of clarity as to the extent of any additional maintenance. The £4m will be allocated to maintaining additional assets such as passageway gates on stations with partial night running, as well as changes to maintenance and cleaning contracts as a result of the reduced engineering hours available.

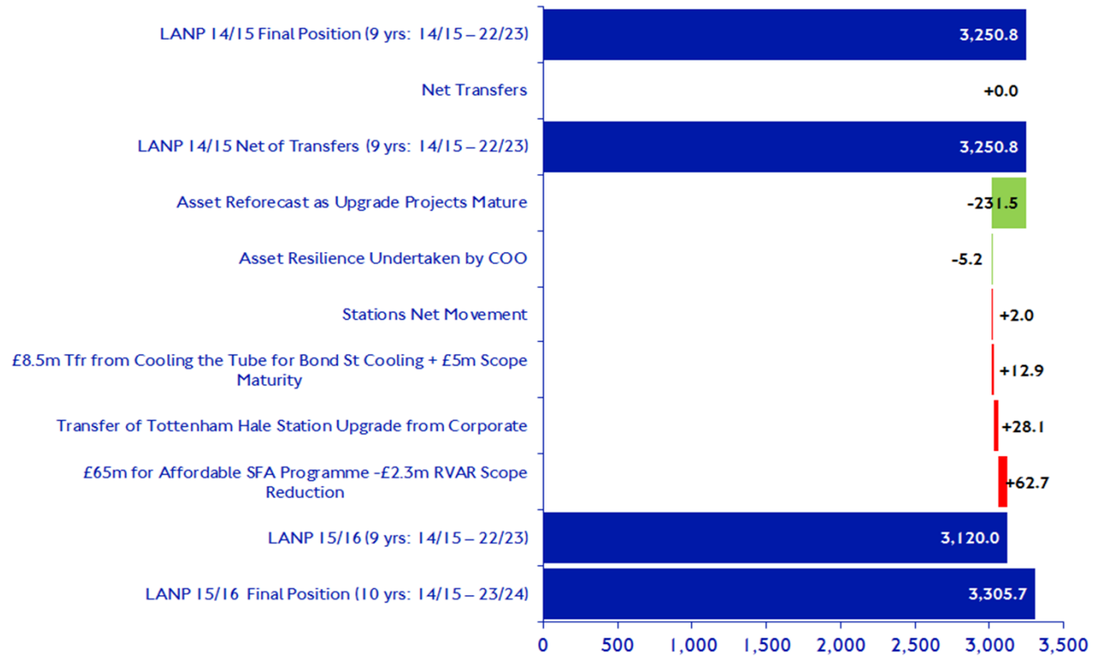
The increase has been offset by the removal of £12.3m from adjustments to previous inflation estimates on BCV/SSL contracts and RPI revisions. There is also a further reduction of £8.9m from reallocation of Depot assets from the stations portfolio into COO facilities.

Phasing of the Opex throughout the duration of the LANP remains in line with the previous year's forecast.

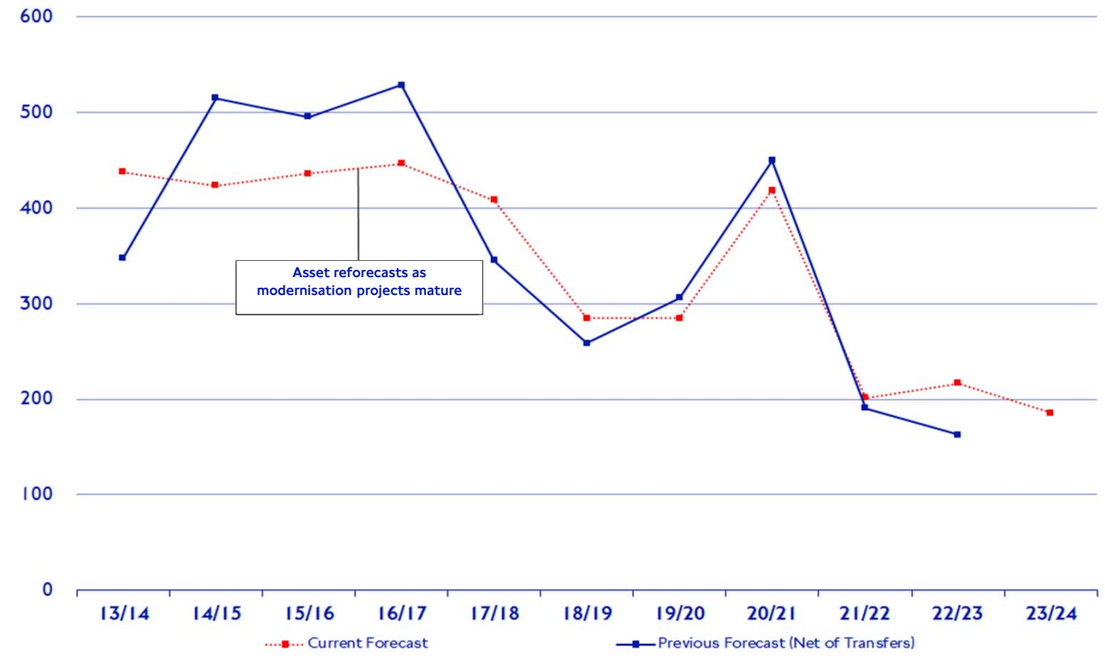
LU Asset Plan - Stations

Cost

Cost Variance Analysis - Capex - Figure 89



Cost Phasing Analysis - Capex - Figure 90



Stations Capex costs between 2015/16 and 2022/23 have reduced by £130.8m compared to last year.

The reductions over the year include:

- £231.5m reduction achieved through the maturing of scope for the NLE and major capacity projects and a reduction in the Platform Edge Doors scope for the Victoria line

-£5.2m transfer to Asset Performance for the Asset Resilience workbank. As future workbanks are agreed with Asset Performance further funds will be moved annually from the Capex budget

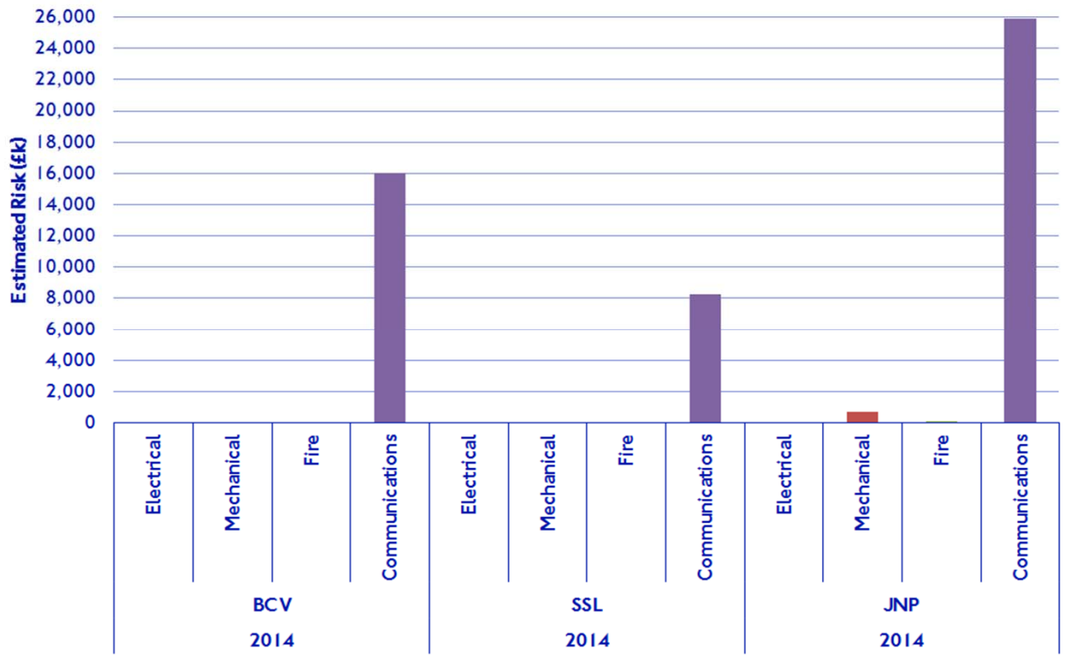
The most significant increase is the additional £62.7m added to the plan to deliver affordable step-free stations across the network. This investment is to be bolstered by third part investment to improve the step-free offering at a significantly lower unit cost than has been achieved at a number of previously delivered, larger scale interventions

The other major increase is the £28.1m increase associated with the transfer of funds for the upgrade of Tottenham Hale from TfL Corporate into London Underground

£12.9m has also been transferred into stations from Cooling the Tube for works at Bond Street

The phasing of the station capital spend has been flattened between 14/15 and 16/17 in order to help the business meet its financial commitments. This has predominantly been achieved through the maturing of the NLE scope and the ISP programme pushing the delivery programme out to later in the plan. The following years are anticipated to remain in line with the previous forecast with an uplift in 22/23 to incorporate the works moved from the early part of the programme.

Asset Condition (ACR) - Functional Condition (Code 2-4 risks) - Figure 91



Station system assets are required to be safe, legal and operable. Due to their shorter life cycles (typically 5-10yrs) assessing functional condition, or level of risk, is more appropriate than measuring physical condition. Risk is measured in terms of safety, additional maintenance requirement and performance (< £0.25m p.a.).

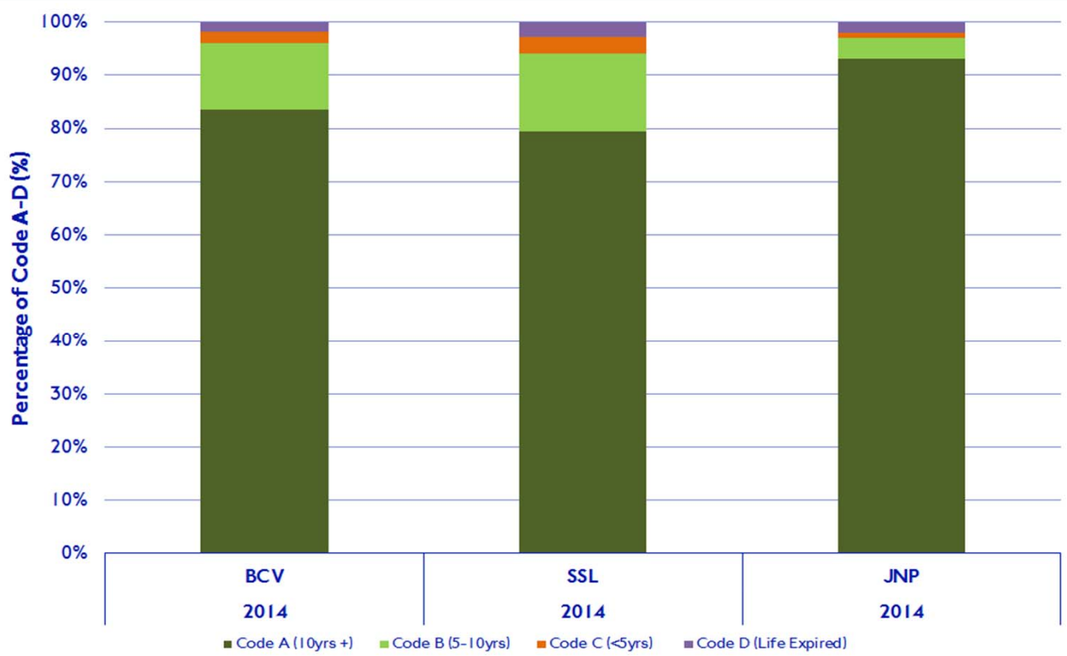
Electrical: Extra maintenance of L&E isolators at JLE sites continues and should be resolved by 16/17.

Mechanical: Minimal change over the year in BCV/SSL with the removal of all concerns relating to R22 refrigerant the only note. The JLE is 75% complete with remaining R22 works, completing by 2015 as per the European Directive. JNP are continuing enhanced maintenance to remove Code 3s to extend asset life whilst the Capex programme will remove the majority of concerns by 16/17.

Fire: BCV/SSL risk has remained at a very low level throughout the year. JNP risk has reduced over the year due to a replacement programme for obsolete call points and a better understanding of the ACR classifications method.

Communications: age and obsolescence issues can result in performance impacts, this explains the higher level of performance risk associated with this asset.
SSL - Code 3s have increased marginally from 2013.
BCV - Code 4s have reduced due to the review and reassessment of CER cooling issues. Projects such as the Central line CCS, VSU, Asset Resilience & ISP will reduce the code 4 costs in future years when works are complete.
JNP – The change in Communications ACR between 2013 and 2014 for JNP is due to an alignment of ACR reporting practices across BCV, JNP and SSL. The Station Services programme is currently upgrading CCTV on the JLE which will re-life a substantial number of assets. The Canary Wharf Digital installation was completed by the Asset Performance JNP Station Services team since the publication of the ACR and should reduce future impact assessments. The large increase is partly due to the alignment of ACR methods with BCV and known risks around Tunnel Telephone, JLE SIMS and Atapco PA non compliance.

Asset Condition (ACR) - Physical Condition (Code A-D) - Premises - Figure 92

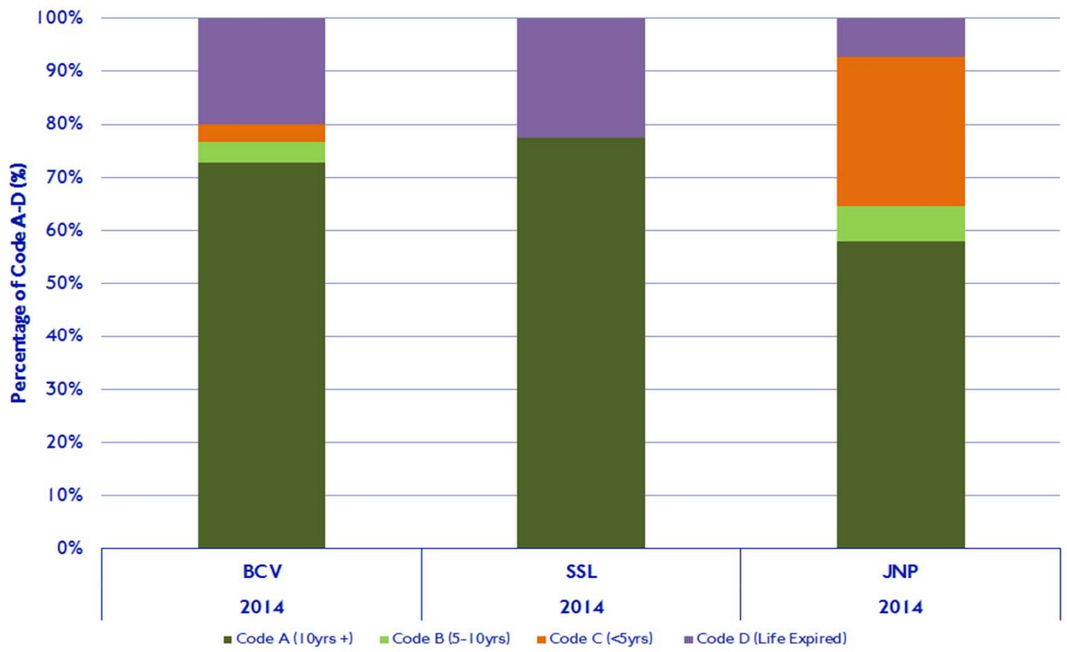


Premises assets have a long life of between five and 40 years. The 2014 ACR assessment shows that 83% of BCV, 93% of JNP and 79% of SSL premises assets have over ten years of remaining life.

BCV / SSL: There has been minimal change in condition over the year. The change from SSP to ISP in 15/16 is anticipated to result in localised improvements. However, the number of stations being treated will be reduced and therefore Asset Performance have been allocated additional funds to ensure, through a thorough workbank process, that issues captured in the ACR are addressed in 15/16 through to 17/18. These works should see the condition of the premises assets improve for the 2015 ACR. One area of concern has been a recent issue with falling objects. As a result a number of intrusive surveys have commenced where a number of sites have required immediate works. There is potential for these works to impact on both the ambience of stations and the condition report for next year's LANP owing to the intrusive nature of the surveys.

JNP: Since the last LANP the process for measuring the ACR on JNP Premises has been changed to mirror the methodology used on BCV/SSL. This has been in addition to the move into ESTEEM (premises condition modelling tool). The result is the re-categorisation of those assets that are re-lifed with many now being recorded as code A rather than B or C.

Asset Condition (ACR) - Physical Condition (Code A-D) - Lifts - Figure 93

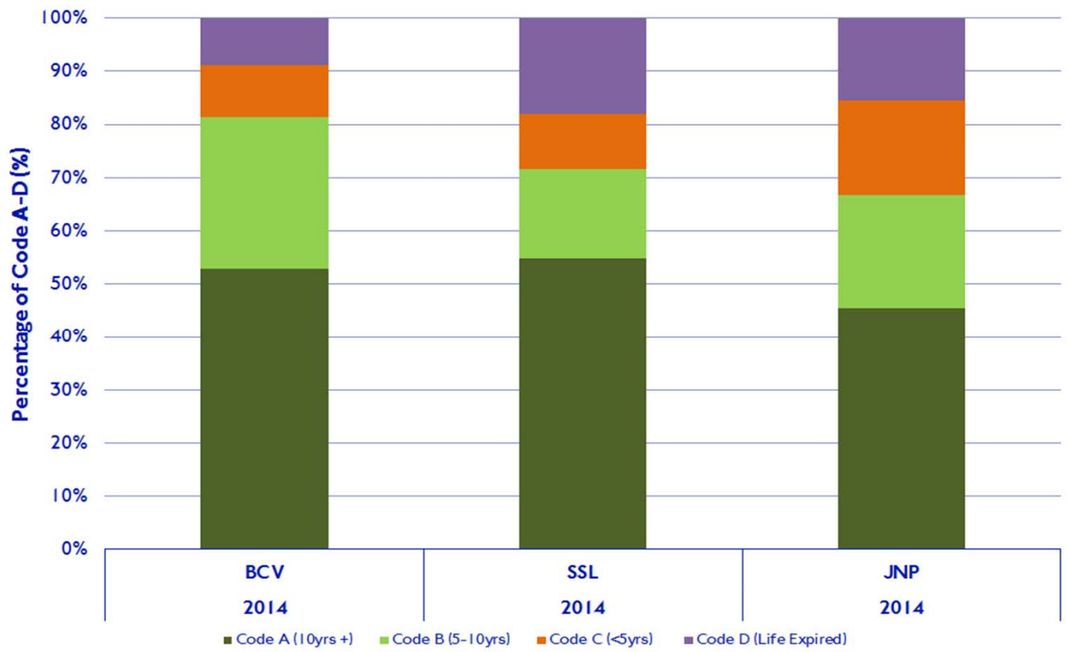


In the 2014 assessment, 73% of BCV (down 20%), 58% of JNP (up 7%) and 77% of SSL (down 7%) lift assets are deemed to have more than ten years residual life and 20% of BCV, 7% of JNP and 22% of SSL lift assets are deemed at or near life expiry against the CAT1 Standard. All lifts remain safe in operation, however some components, for example electrical drive and control systems are subject to ongoing inspection and mitigation regimes.

BCV/SSL: The PMVT lifts are at, or near, end of life on the BCV and SSL with the exception of those replaced in the past two to three years. A pan TfL programme is in place to replace all of the remaining PMVTs and approval has recently been granted to replace a number of SMVT hydraulic lifts which are also reaching expiration across the network. These programmes will result in a significant improvement in the Code A conditions in future years, however a degradation is anticipated through 2015-17 until works are in delivery/completion. Generally on the BCV, the condition of the lifts has remained stable after recent controller works on our Wadsworth fleet and the commencement of refurbishment works on Elephant & Castle and Queensway. On the SSL notable improvements have come from the new assets added to portfolio at Paddington and Cannon Street, with lifts at Hammersmith also being replaced. Gloucester Road 3 & 4 have been removed for replacement. Further enhancement works have been undertaken at East Ham and Earls Court to improve reliability.

JNP: The continuation of the renewals and maintenance regimes have seen improvements in all condition codes. Whilst the JLE SMVT lifts are a concern owing to life expiration, replacement works at Russell Square, Kilburn, Waterloo and Covent Garden have seen the overall condition of the JNP fleet improve.

Asset Condition (ACR) - Physical Condition (Code A-D) - Escalators - Figure 94



The 2014 assessment has seen a significant rise in the number of assets with 10+ years life, in both BCV (+20%) and SSL (+23%), whilst JNP has remained constant. The number of assets at, or near, life expiry has not changed significantly. Owing to the design life of 30-40 years it is not a concern that only c50% of the fleet has 10+ years. Many of the components on the machines have life of less than 15 years and therefore there will always be a significant portion of components in need of renewal. This is addressed through the planned maintenance, refurbishment and renewals plan.

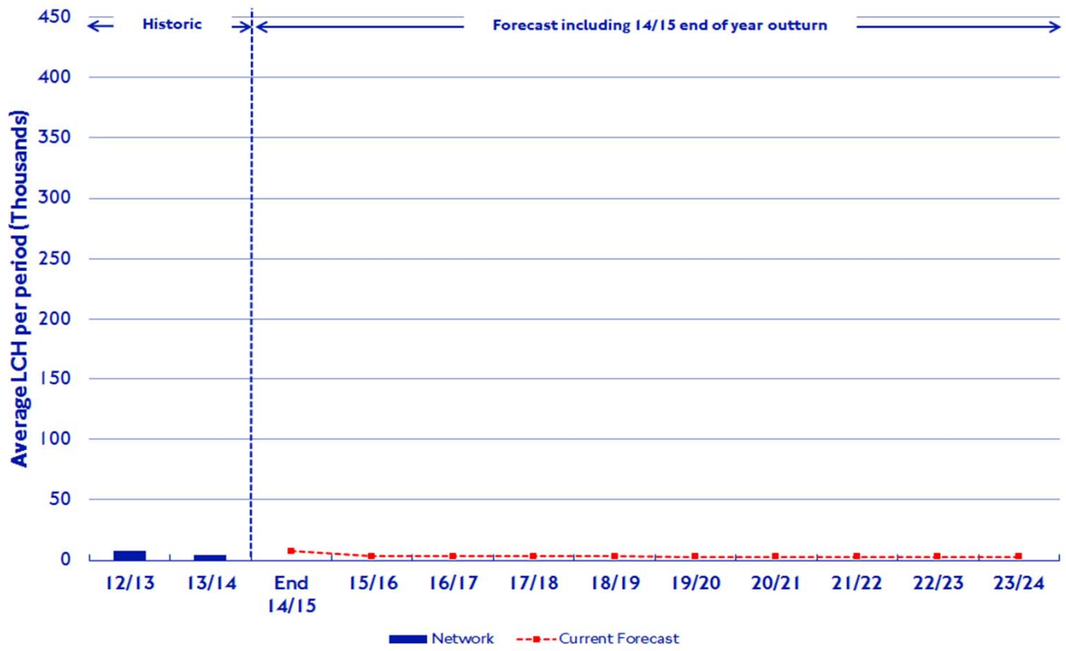
All escalators remain safe in operation, however some components such as gearboxes and steps are subject to ongoing inspection and mitigation regimes.

BCV/SSL: The change in physical condition is due to the completion of replacement and refurbishment projects at various locations such as Vauxhall 2 & 3, Highbury & Islington 1 & 3, Blackhorse Road 3 and Kilburn 1. A number of EMR (Enhanced Maintenance Regime) works have also been carried out to change out brakes, steps and step chains at various locations such as Bond Street 6, and Holborn 3, 4 & 7 alongside other minor interventions to extend asset life. Greenford has undergone a replacement of the wooden machine and five machines were replaced at Embankment under the pan TfL contract.

JNP: Due to the continued programme of interventions, the condition of the assets remains at a similar level reflecting the amount of work undertaken. There is concern over the condition of the JLE fleet of assets owing to the lack of Mod 3s being completed prior to the end of the current contract in 2018. It is estimated that 63 machines will have life expired steps and chain at this point. There is currently work to rephrase Mod 1s and 2s to release funds within the programme, however it should be noted that there is a risk of a considerable increase in the Code D assets over the coming years. Additional funding/reprogramming is required to minimise this risk.

LU Asset Plan - Power

Reliability - Lost Customer Hours (LCH) - Power - Figure 95



Power assets incur extremely low levels of LCH (1.2% of Fleet and 1.8% of Signals totals this year to date). BCV LV assets have only had one failure causing any LCH this year to date, while SSL and JNP have incurred no LCH. High Voltage (HV) Network and Distribution failures incurring LCH are also rare. This is due to the high level of redundancy and resilience built into the HV network.

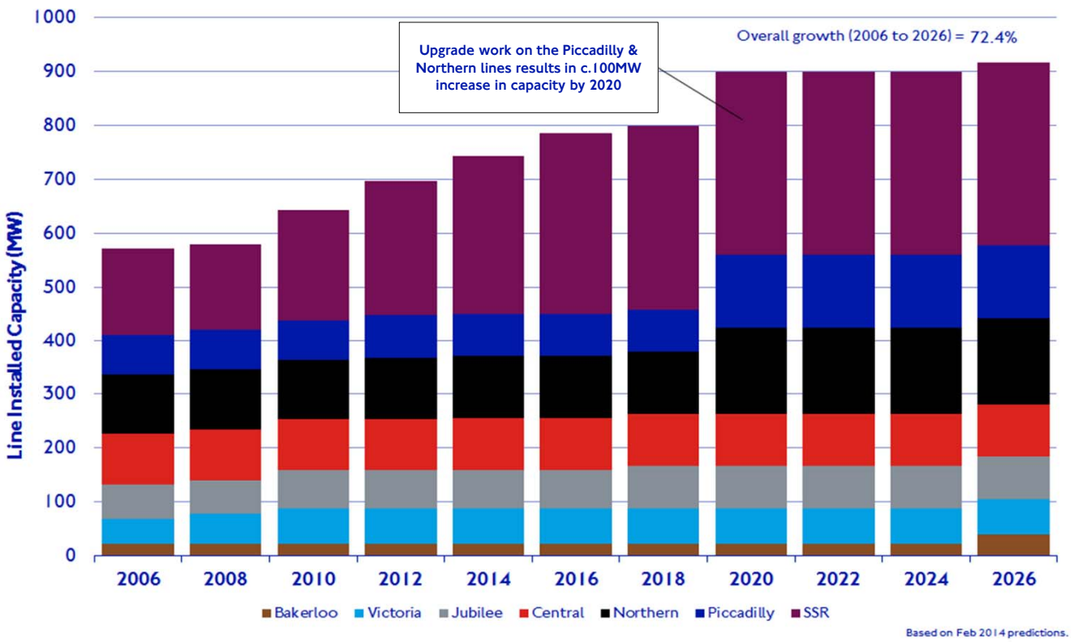
However when HV failures do occur they tend to incur significant LCHs, impacting multiple lines simultaneously, thus justifying the need for a high level of redundancy and resilience. This was evidenced in June 2014 when a compressor caught fire at Holloway Road substation, a failure which was the main contributor to the LCH total in 14/15 to date. Upon investigation, the root cause was a fan failure adjacent to the compressor. Subsequently all substation fans of that type were checked for degradation; the investigation concluded that this was an isolated incident with no indication of an emerging failure trend.

Note 1. LV Power failures have to be manually extracted from Signals CUPID data, and HV failures have historically been confused with DNO Power failures. The numbers reported here are all manually validated. JNP LV asset data has been validated this year for the first time. It is the intention to work with the COO Performance team, JNP and Insight to improve the reporting process and the accuracy of the reported data.

Note 2. DNO failure data is not included in this Asset Plan.

Note 3. Point heaters, though maintained on SSL lines by Power staff, are considered in the Signals Asset Plan.

Capacity - Growth Installed Substation Capacity (MW) - Figure 96



Projected growth in Installed Substation Capacity between 2006 & 2026 has increased from last year's assessment of 49.6% to 72.4%.

This follows recent feasibility work on Northern line having developed a more detailed understanding of predicted loads to support the Northern Line Extension, Northern Line Upgrade 2 and Northern Line Upgrade 3.

There is considerable concurrent Power upgrade work on both the Piccadilly & Northern lines equating to a 101MW increase in installed capacity by 2020. This needs to be carefully programmed between the Power & Cooling Delivery team and the Line Upgrade programmes in order to ensure timely and cost effective delivery.

Cost (£m; outturn) and Volume Summary - Maintenance and Project - Table 24

Power Maintenance Costs (£m)		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Power Maintenance		4.9	4.5	4.6	4.8	4.9	5.2	5.3	5.5	5.7	5.9	51.5
HV Power and Distribution Assets		20.8	21.6	21.1	23.3	23.8	24.7	25.5	26.5	27.5	28.7	243.6
Overheads		1.7	1.9	1.9	2.0	1.8	1.9	1.9	2.0	2.1	2.1	19.2
Total Outturn		**27.3**	**28.0**	**27.7**	**30.1**	**30.6**	**31.7**	**32.8**	**34.0**	**35.3**	**36.7**	**314.3**
Total Constant 2014/15 Prices		**27.3**	**27.4**	**26.1**	**27.4**	**26.9**	**27.0**	**27.0**	**27.0**	**27.1**	**27.3**	**270.5**

Power Project Costs (£m, including risk)		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Legacy Train Systems		0.2	0.7	0.7	0.5	0.5	0.5	0.0	0.0	0.0	0.0	3.0
New Tube for London		0.0	0.0	0.0	8.5	14.5	17.9	53.6	63.6	59.2	82.5	299.9
Northern Line Extension		1.0	1.9	4.2	4.0	6.6	1.8	0.6	0.0	0.0	0.0	20.0
SSR Upgrade (Including SSR Power Portfolios)		48.7	57.8	44.1	20.2	5.8	2.4	0.4	0.0	0.0	0.0	179.4
World Class Capacity		0.4	4.3	5.4	20.6	34.0	40.4	10.6	0.0	0.0	0.0	115.9
JNP Power Projects		4.2	3.2	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0
Infrastructure Renewals (Excl SSR Power Porfolios)		7.8	21.7	17.8	21.3	27.5	15.2	17.3	17.3	17.3	8.3	171.5
Total Outturn		**62.3**	**89.5**	**75.7**	**75.2**	**88.9**	**78.2**	**82.4**	**81.0**	**76.6**	**90.8**	**800.6**
Total Constant 2014/15 Prices		**62.3**	**87.4**	**71.4**	**68.6**	**78.3**	**66.5**	**67.8**	**64.3**	**58.8**	**67.3**	**692.8**

Project Delivery		2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	Total
SSR New Sub-Station Installations	No.	1	2									3
SSR Upgraded Sub-Stations	No.	10	3									13
JLU 2 Upgraded Sub-Stations	No.				2	4						6
NLU 2 / 3 Upgraded Sub-Stations	No.						4	8	5			17
NLE New Sub-Station Installations	No.			2								2
NLE Upgraded Sub-Stations	No.			1								1
PLU Upgraded Sub-Stations	No.					4	7	5				16

Maintenance Delivery - LV Assets		2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	Totals
BCV/SSL/JNP DEPOT Assets	No.	1,405	1,439	1,409	1,412	1,433	1,396	1,418	1,437	1,403	1,418	14,170
BCV/SSL/JNP Electrical Trackside Equipment	No.	2,089	2,163	2,215	2,152	2,154	2,186	2,196	2,143	2,196	2,152	21,646
BCV/SSL DC Cables	No.	216	286	228	138	142	161	286	228	138	142	1,965
BCV/SSL LVAC Cables	No.	173	259	101	125	101	198	259	101	125	101	1,543
JNP DC Cables	Site	14	29	23	30	1	6	23	19	28	1	174
JNP LVAC Cables	Site	23	10	15	23	10	15	23	10	15	23	167

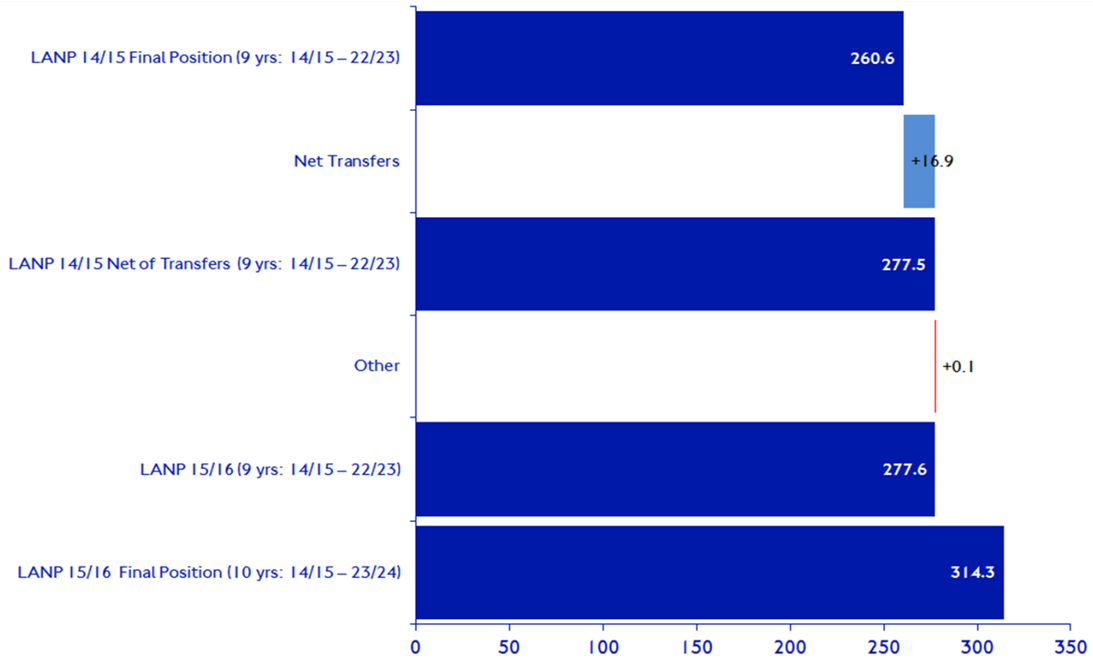
Maintenance Delivery - HV System & Distribution Assets		2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Condition Monitoring	No.	451	451	451	451	451	451	451	451	451	451	4,510
Equipment Inspection	No.	577	577	577	577	577	577	577	577	577	577	5,770
Ancillary Equipment Maintenance	No.	689	689	689	689	689	689	689	689	689	689	6,890
Routine Maintenance	No.	22,464	22,464	22,464	22,464	22,464	22,464	22,464	22,464	22,464	22,464	224,640
Site Inspection and Statutory Inspection	No.	720	720	720	720	720	720	720	720	720	720	7,200
Substation Site Cleaning	No.	347	347	347	347	347	347	347	347	347	347	3,470
Equipment Testing	No.	2,355	2,355	2,355	2,355	2,355	2,355	2,355	2,355	2,355	2,355	23,550
Voltage Transformer Maintenance	No.	36	36	36	36	36	36	36	36	36	36	360
Misc (Calibration, EU Verification)	No.	5	5	5	5	5	5	5	5	5	5	50
Lorry and Trolley Maintenance	No.	3	3	3	3	3	3	3	3	3	3	30

HV Maintenance - Work has just been completed (November 2014) on the migration of the former Powerlink asset and maintenance information into Ellipse. The Head of Asset Performance Power has indicated that there is a shortfall in resources to deliver the existing maintenance regime. As a result, a maintenance regime review is being undertaken to determine the extent of the shortfall and to mitigate its financial impact. In addition, work is now required to better understand the impacts from the emerging upgrade programmes on HV maintenance volumes and whether the team is sufficiently resourced to meet these requirements. In light of these factors, the expectation would be an increasing trend of HV maintenance volumes year-on-year for the 16/17 Asset Plan. As the maintenance review has only just commenced, the HV maintenance volumes presented here have not changed from the 14/15 Asset Plan.

LV Maintenance costs remain stable throughout the Plan.

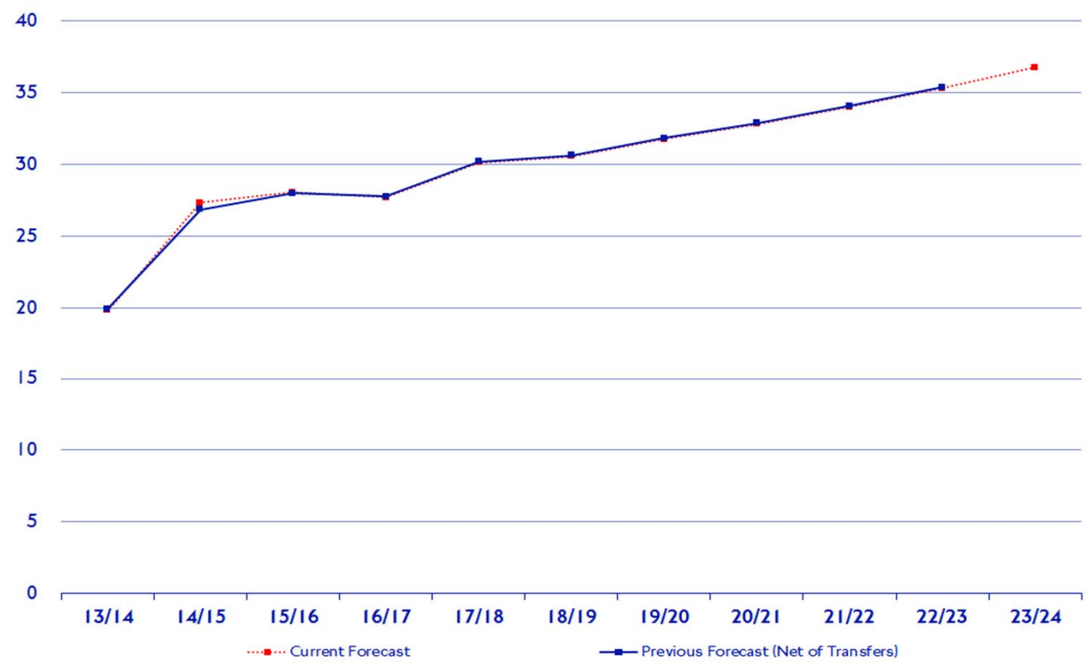
Project Delivery Volumes - Substation delivery represents an initial view of the delivery dates for future line modernisation programmes and is subject to further scope refinement.

Cost Variance Analysis - Opex - Figure 97



Net Transfers refers to the transfer of Operational Opex into Maintenance Opex– the Central Emergency Power Supply function has moved from COO Operations into Asset Performance Power. This transfer amount of £26m is offset by a negative amount of £9m which was transferred to Asset Performance Facilities for cleaning and upkeep of properties, an amount that was formerly held under Asset Performance Power.

Cost Phasing Analysis - Opex - Figure 98

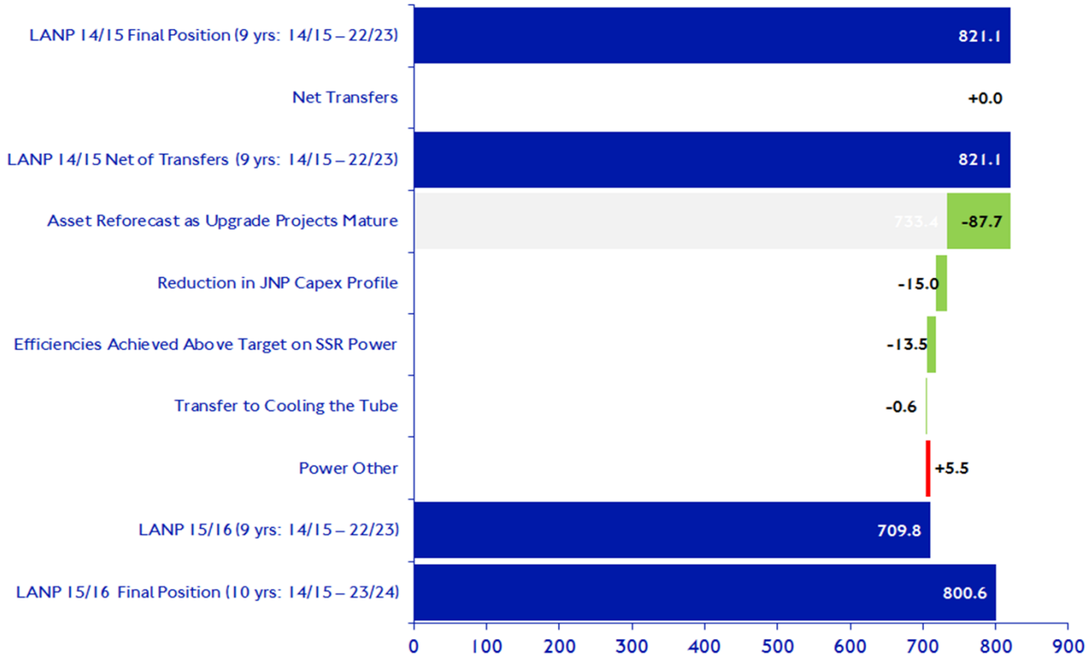


The power maintenance profile has not changed from last year.

LU Asset Plan - Power

Cost

Cost Variance Analysis - Capex - Figure 99



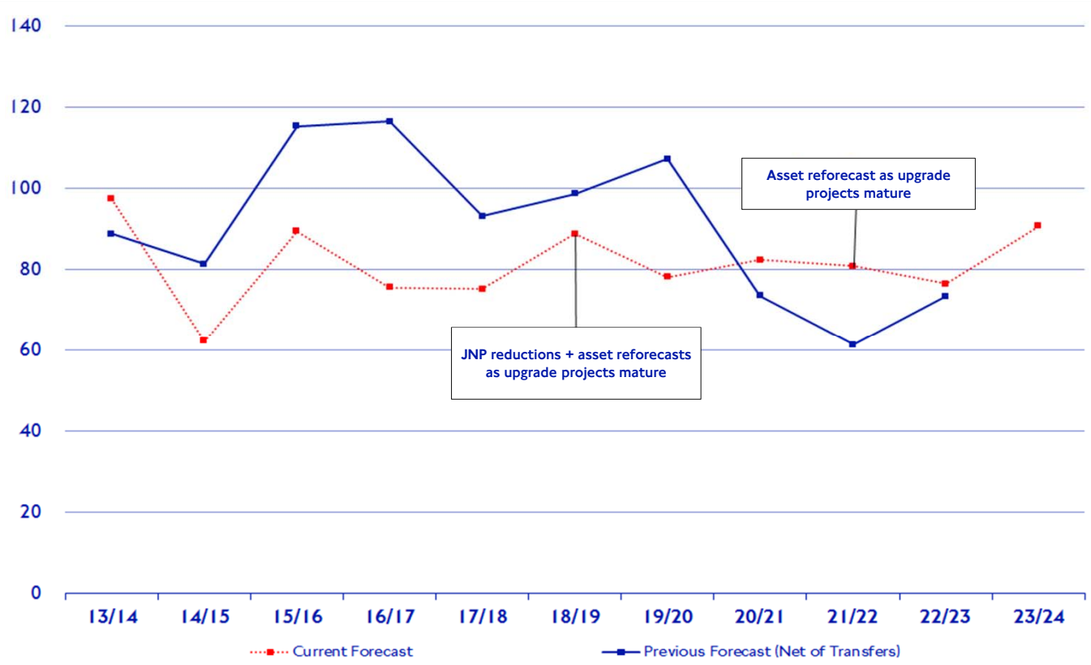
Power Other is an increase in spending on the Victoria line World Class Capacity programme

A transfer from Power to Cooling was made on SSR Package 5

Asset Reforecasting as upgrade projects mature – this refers to evolving changes in NTfL, World Class Capacity and the Northern Line Extension programme allocation to assets as scope and estimates of major projects mature.

The JNP Capex renewals budget was reviewed in the 2014 Business Planning round and £15m was returned to the business.

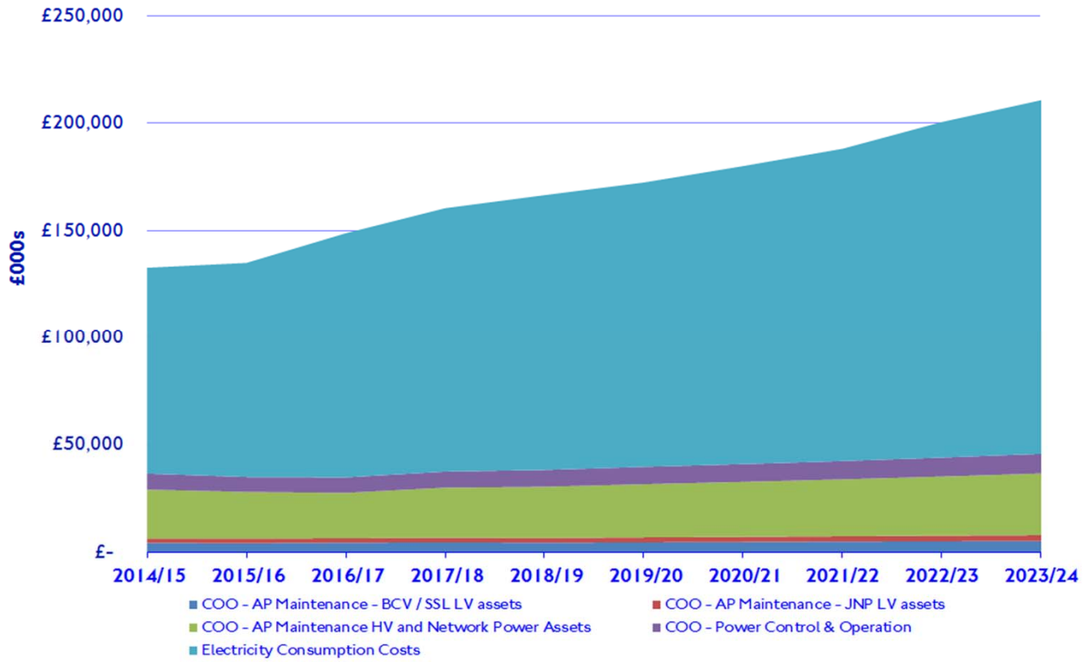
Cost Phasing Analysis - Capex - Figure 100



Variance from last year is largely due to NTfL re-phasing.

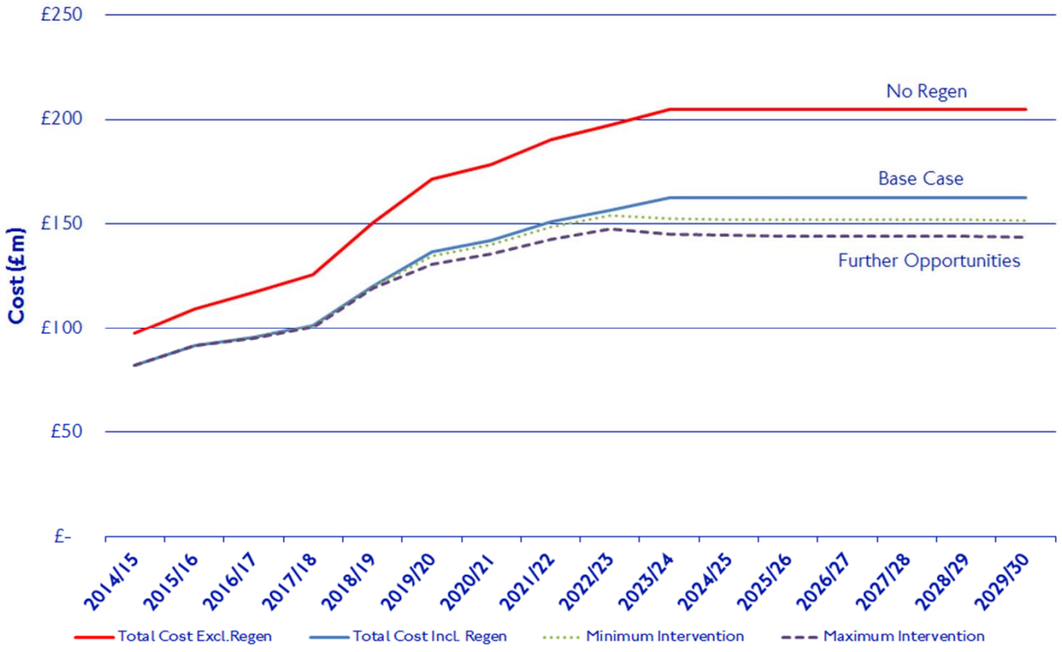
LU Asset Plan - Power

Cost - Operating Costs (£000s) in Outturn - Figure 101



Power Opex continues to be dominated by LU's predicted Energy Cost Profile, which comprise 77% of total operating costs. Maintenance comprises 19% of overall operating costs. Opportunities to reduce operating costs are detailed in Figure 102.

Costs - Operating Costs - Energy Efficiency Initiatives - Figure 102



Traction Energy – Opportunity: The blue line (base case) represents predicted spend inclusive of savings now being made through use of regenerative braking, and the red line demonstrates the £500m we would have had to spend if we did not use regenerative braking. There is significant opportunity to further reduce operating costs, in the order of £10m - £20m per annum, represented by the "minimum" and "maximum" intervention lines on the graph. The implementation of such opportunities is highly dependant on support from the NTfL and World Class Capacity programmes. If this support is not forthcoming, in addition to increased whole life costs, it will be both technically difficult and more expensive to retrospectively apply energy efficient interventions.

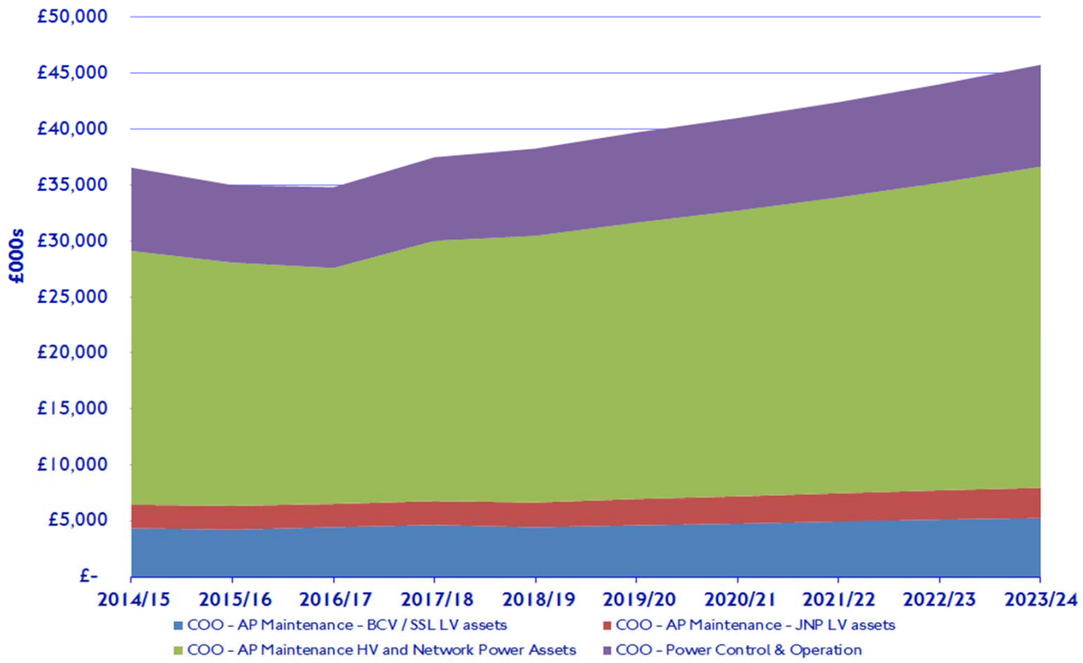
Power Sourcing Initiatives: While not actually reducing energy consumption, opportunities exist to reduce the unit cost of a proportion of our electricity, via local low carbon generating stations. Commercial discussions are progressing with two local combined heat and power generators in London, both of which could be directly connected to our system.

Separately, proposals are under development to utilise spare space at Greenwich Power Station to install up to six gas engines, providing combined heat (to local residents and businesses) and power (for LU use). Initially two of these highly efficient engines are planned to be installed by 2017, the remainder will be delivered in parallel with the potential development of a distributed heat network in the Greenwich area.

By 2020 LU could be receiving up to 200 GWh (~15% of its total consumption) from locally generated sources.

LU Asset Plan - Power

Costs - Operating Costs (Excluding Electricity costs; £000s) in Outturn - Figure 103



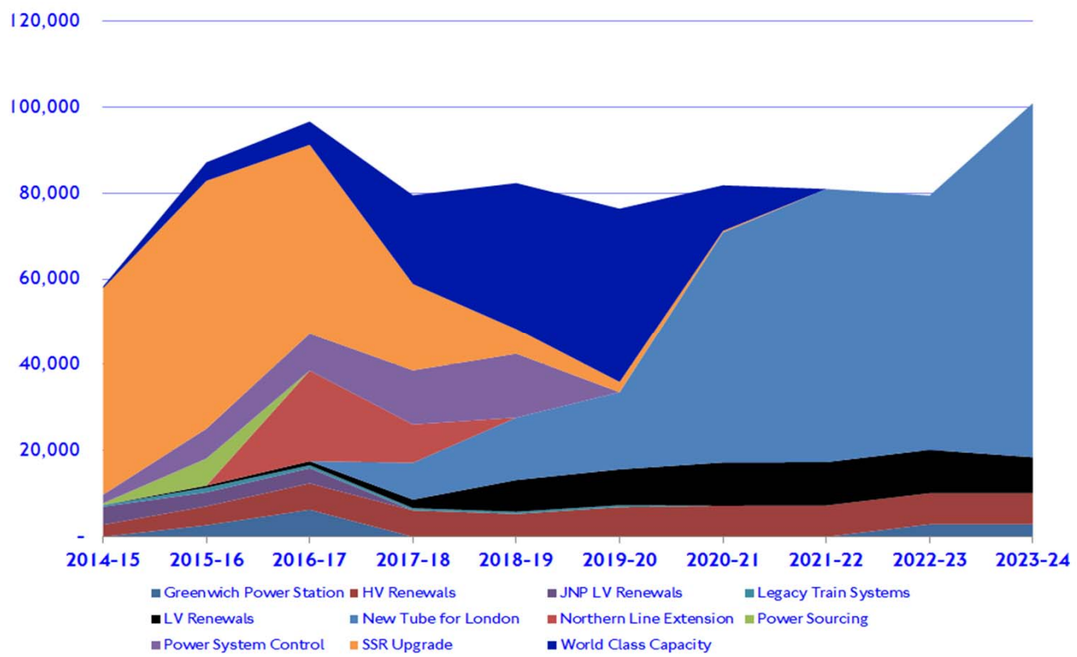
Following termination of the Power Service Contract in August 2013 a risk has been identified that budgeted maintenance costs may be insufficient. The potential increase required to maintain the existing asset base under the current maintenance regime is £900,000 per annum. The Head of Asset Performance Power has therefore initiated a Strategic Maintenance Review, to explore a more optimal range of maintenance frequencies across the complete asset base, in order to safely and reliably maintain the assets within the current budget and resources.

In addition, the ever increasing number of new assets being introduced now (via the Sub-surface upgrade programme) and in the future (via NTfL / World Class Capacity), will put further strain on existing resources as stated in the maintenance volume section of this plan. The inevitable consequence is an expected rise in the HV maintenance cost for future years which is yet to be reflected in the cost graph. The associated impacts will be better understood (ideally with the support of an Activity Based Cost Model), commencing in the 2015 Business Planning round.

The HV assets, represented by the green block in the graph, and the BCV and SSL LV assets, represented by blue, are now under the same management team (October 2014). The maintenance of JNP LV assets, represented by red, continues to be managed separately.

Maintenance costs for LV asset maintenance continues to be stable across the plan.

Cost - Budget Forecast for Capex (£m) in Outturn - Figure 104



Capacity upgrades continue to dominate Power capital expenditure by a ratio of 4:1.

Significant concurrent major power works are being planned to support the Piccadilly line upgrade, Northern line upgrade 2 and Northern line upgrade 3. This will need to be carefully phased and managed by the Power & Cooling delivery team in order to ensure timely and cost-efficient delivery.

Work is underway to develop a long term Power Project Workbank covering: Asset Renewals, Capacity Upgrades & Traction Energy Initiatives.

Further benefits are possible by bringing all future Power project activity under a singular CPD delivery unit. While the majority of Power works are undertaken through the Head of Power & Cooling, the removal of some existing satellite LV project functions would remove unnecessary interfaces and ensure that optimal solutions are achieved.

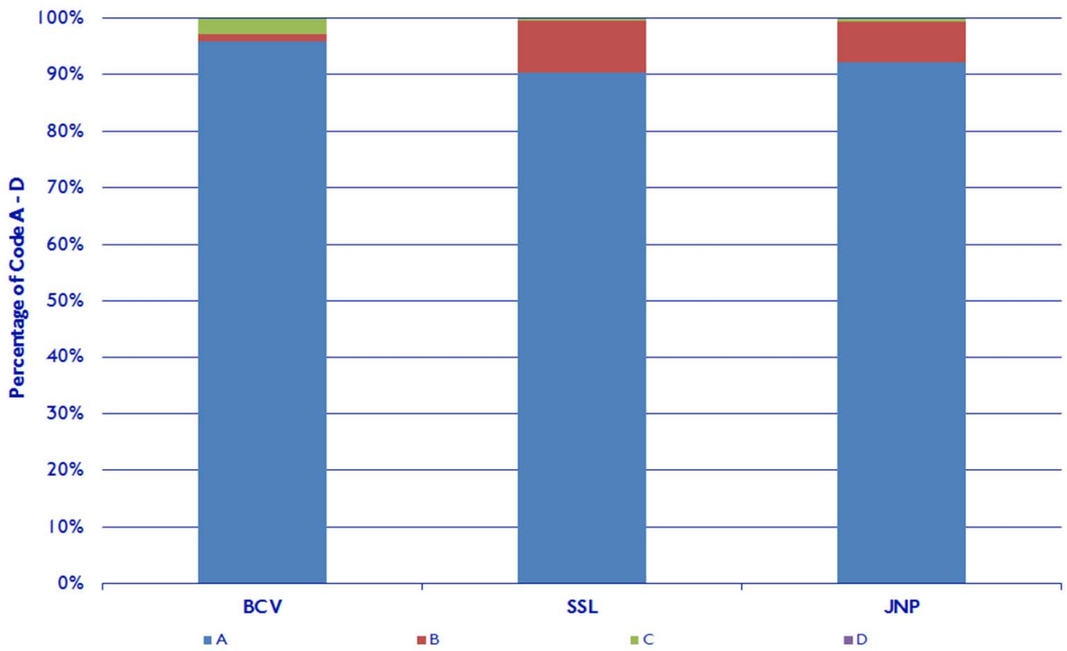
The developing project workbank provides the opportunity to move towards a three yearly programme of combined LV & HV Power Renewals activity, now that all the Power Assets are under LU ownership. The first three yearly programme will be initiated in 15/16.
LV individual budgets have now been combined into a singular LV Renewals provision, similar to the existing HV Renewals, in support of the emerging workbank.

New Power SCADA is about to be tendered. In parallel, maintenance are undertaking additional propping works to reduce the risk of failure of the existing SCADA system prior to its replacement.

Risk - Top Power Asset Risks - Table 25

ARM Id	Risk Title	Description	Mitigation	Current Score	Target Score	Owner
SPC-AA-P-0001	Network Rail decide to discontinue providing power to parts of the LU Network	Network Rail are required to provide TfL 3 years notice, prior to termination. Areas supplied by Network Rail include: >Waterloo & City Line >District Line Wimbledon Branch >Some stations or parts of Stations (e.g. Waterloo)	Space provision will exist to install Rectifiers following existing W&C project. However risk provision necessary as installing rectifiers will be at TfL cost and there is no space provision for other areas fed by Network Rail	Medium	Medium	Howard Taylor
SPC-AA-P-0002	Central Line Major Capacity works	TfL decide to no longer accept the present lack of resilience (installed capacity) and the associated potential service disruption following a rectifier outage.	Small provision (circa £2m) already in plan, but insufficient if major capacity upgrade work is necessary. Risk provision required to cover this	Medium	Medium	Howard Taylor
SPC-AA-P-0003	Unknown / Unforeseen Asset Degradation	Could be due to insufficient, inappropriate asset condition evaluation/inspections	Validate robustness of current asset condition assessment process and re-align with TfL ACR process - Engineering. However existing Renewals budget should be able to cover emerging issues.	Low	Low	Phil Carmichael/ Howard Taylor/ Gary Warner
SPC-AA-P-0004	Increasing Risks of Grid Outages	General reduction in available National Generating capacity as older generating stations are closed, until new generating facilities are commissioned. Current predictions indicate National capacity bottoming out in 2015/16 increasing thereafter and then reducing again by 2018/19 (due to increasing demand). Over the next few years there will be an increased risk of blackouts and brownouts, resulting in varying levels of service disruption and requirement for CEPS intervention	Using existing protocols, forward review with Grid undertaken by Mike Harrington/Richard Jones (COO), will continually evaluate this risk.	Medium	Medium	Mike Harrington/Richard Jones
SPC-AA-P-0005	JNP Delivery Inconsistency	JNP Power organisation and activities are not yet fully integrated into rest of TfL, making it difficult to ensure there is a singular plan and strategy for Power Assets.	Until wider organisation is fully integrated (e.g. Engineering, maintenance, delivery are part of TfL Power), ensure where possible JNP work scope and strategy is aligned with rest of TfL	Low	Low	Howard Taylor
SPC-AA-P-0006	New Technology - Accelerated Obsolescence	New technology used in major switchgear, rectifiers, transformers installed in recent and ongoing upgrades: 1) requires potentially different skill sets for maintenance than TfL presently possesses. 2) Obsolescence issues may mean the residual life/supportability of key components is of a much shorter duration (circa 10 years) compared with the rest of the substantive asset (circa 40+ years)	1) Develop and implement plan for enhancing staff competence - Engineering, Maintenance 2) Initiate proactive obsolescence review to manage impact (e.g. Purchase strategic spares, revised maintenance, build in planned renewals etc) 3) Existing Renewals budget should be sufficient for any changes in asset strategy here	Medium	Medium	Howard Taylor/ Gary Warner/ Phil Carmichael
SPC-AA-P-0007	Latent Defects from new Equipment	Given the significant amount of Power Upgrade activity, there is a risk TfL may have unknowingly inherited a latent defect issue which could become apparent long after the Upgrade programme has been completed	Other than any warranty arrangements, there is unlikely to be any further mitigation	Low	Low	Howard Taylor
SPC-AA-P-0008	Capacity of existing Short Circuit Devices	Evaluation work is underway to confirm whether the existing Short Circuiting Devices are still fit for purpose under all current operating arrangements	Subject to evaluation, either: a) Amend Operating arrangements b) Upgrade SCDs	Medium	Low	Phil Carmichael (Lyn Brown)
SPC-4-0001	Obsolescence of SCADA	Obsolescence of the existing three systems may result in an increasing failure rate impacting train services prior to system replacement in March 2018. The external maintainer is unwilling to continue supporting the system without a software upgrade.	Update the software for both ABB SPIDER and MicroSCADA systems to ensure continued support from existing maintainer prior to system replacement in March 2018.	High	Low	Head of Delivery/ Head of Power Maintenance (Chris Tong/ Gary Warner)
SPC-4-0002	Industrial action due to proposed SCADA system efficiencies.	A 20% Power Control Room operator headcount reduction has been proposed on commissioning of new SCADA system in March 2018 (subject to consultation with our Trades Unions)	Power Supply Manager to work with union representative and manage stakeholders to reduce the probability of Industrial action.	High	Low	Mike Harrington (Power Supply Manager)

Asset Condition (ACR) - Physical Condition (LV Assets) - Figure 105



This is the first year a consistent LV Power ACR has been produced, which has included an assessment of JNP assets using the same methodology as the assets on BCV/SSL.

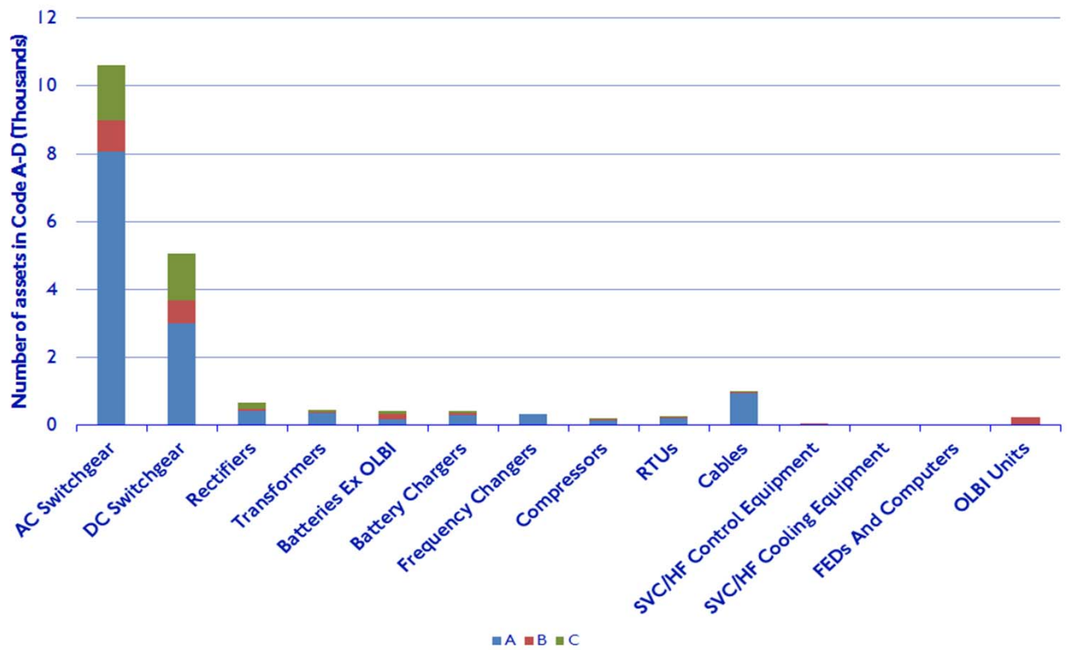
BCV: Assets in category B are all lead cables. Assets in Category C are the lead cables in shafts on the Bakerloo line and remaining Sidings Circuit Breakers on the Central and Bakerloo lines.

- The lead cables in shafts on the Bakerloo line are being replaced in a Renewals project. Project Authority is being sought in July 2015.
- The Circuit Breakers will be programmed in the LV Renewals Work Bank for replacement, starting with the Bakerloo line in years 2015-18.

SSL: Assets in Category B are lead cables, Neasden Ring Main and associated Switchgear and Sidings Circuit Breakers. All of these assets are being replaced by the Sub-surface upgrade programme

JNP: Assets in Category B and Category C are lead cables and Sidings Contactors. The JNP LV Renewals programme is replacing all of these assets.

Asset Condition Assessment - HV Network & Distribution - Figure 106



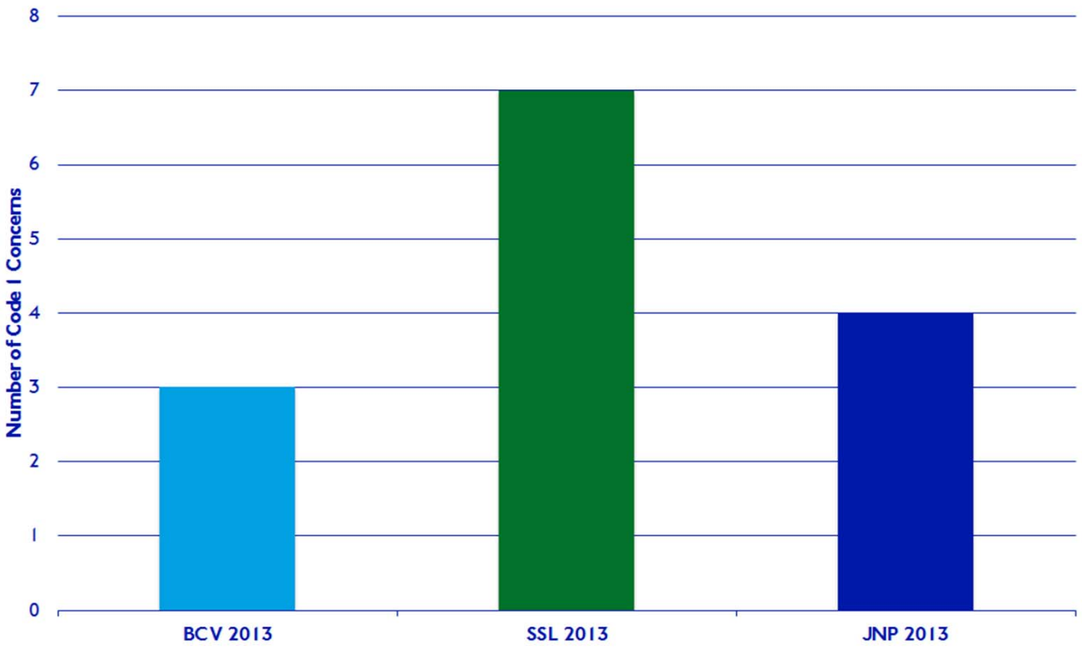
No formal ACR currently exists for the HV Network and Distribution assets. It is intended to resolve this in 2015. The whole asset base will then be categorised by Residual Life (Codes A to D) and by Functional Concerns (Legal/Statutory Compliance, Safety, Extraordinary Maintenance and Performance (LCH Impact of Failure). Previously, the former PFI Contractor (Powerlink) conducted "Renewal and Upgrade" (R&U) assessments of the individual assets.

HV Network & Distribution assets have a service life of 55 years with the exceptions of Local Emergency Power Supplies (LEPS) equipment, RTUs and battery chargers which have a service life of 20 years, cables which have a service life of 65 years and DC switchgear which has a service life of 50 years.

Batteries for substations, LEPS and UPS are consumables and are changed according to the condition monitoring results recorded during planned maintenance. Agreed concessions are in place for life extensions of frequency changers based on maintaining service life until decommissioned under the signalling upgrade projects.

There is some AC / DC switchgear on the network that is due for replacement based on Residual Life, as indicated on Figure 106. These assets have been assessed and added to the HV workbank using a risk based approach with the Park Royal Switchgear identified first for replacement.

Asset Condition (ACR) - Functional Condition (Code 1) - LV Assets - Figure 107



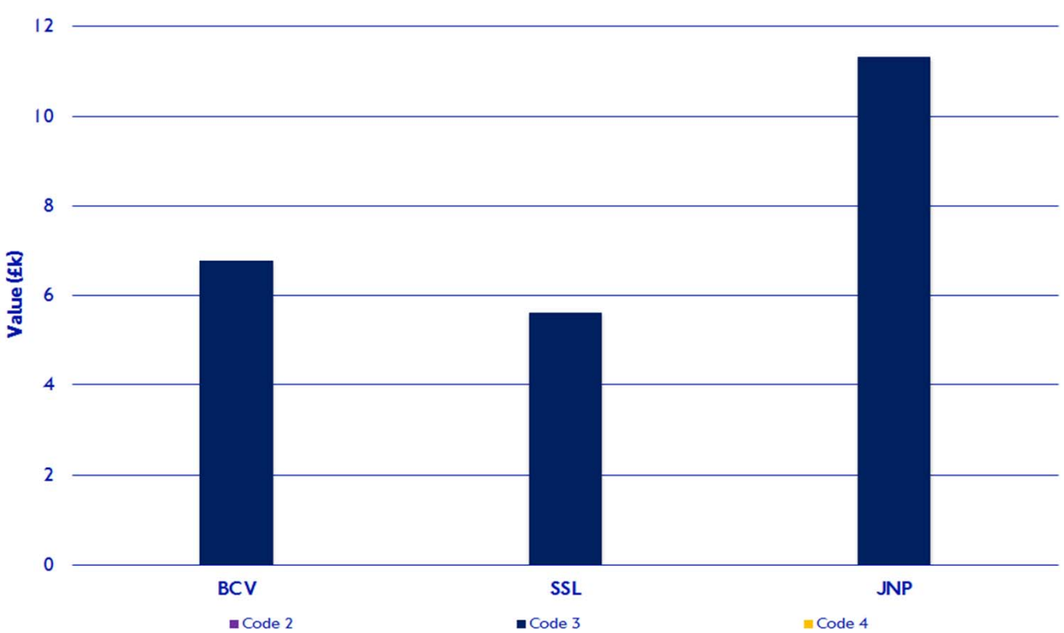
JNP Code 1 concerns are Emergency Gap Jumpers, Knife Switches, Disconnection Panels and Sidings Circuit Breakers. A programme of LV Renewals is taking place on JNP, and will remove all Disconnection Panels when PILC cables are replaced, all non-compliant Knife Switches and Sidings Circuit Breakers.

BCV Code 1 concerns include Emergency Gap Jumper Cables, Knife Switches and DC Sidings Circuit Breakers. The Switches and DC Circuit Breakers on BCV will be addressed in a programme of LV Renewals detailed in the Power LV Renewals workbank.

SSL Code 1 concerns include Emergency Gap Jumper Cables, Knife Switches, Depot and Siding DC Circuit Breakers, Contactors, Disconnection Panels and DC Link Boxes. The SSR Upgrade will address the majority of these issues on SSL Lines. Any residual issues not covered will be considered as part of the Power LV Renewals workbank.

Emergency Gap Jumpers on all Lines will be replaced in a Renewals project. Project Authority is being sought in April 2015.

Asset Condition (ACR) - Functional Concern (Code 2-4) - LV Assets - Figure 108



Code 2:
No Code 2 values are being published as it is not deemed optimal to publish values from a QRA which is programmed to be comprehensively updated. The Power QRA is programmed to be updated in 15/16. The safety concerns identified are all of negligible value, and now also include the JNP concerns.

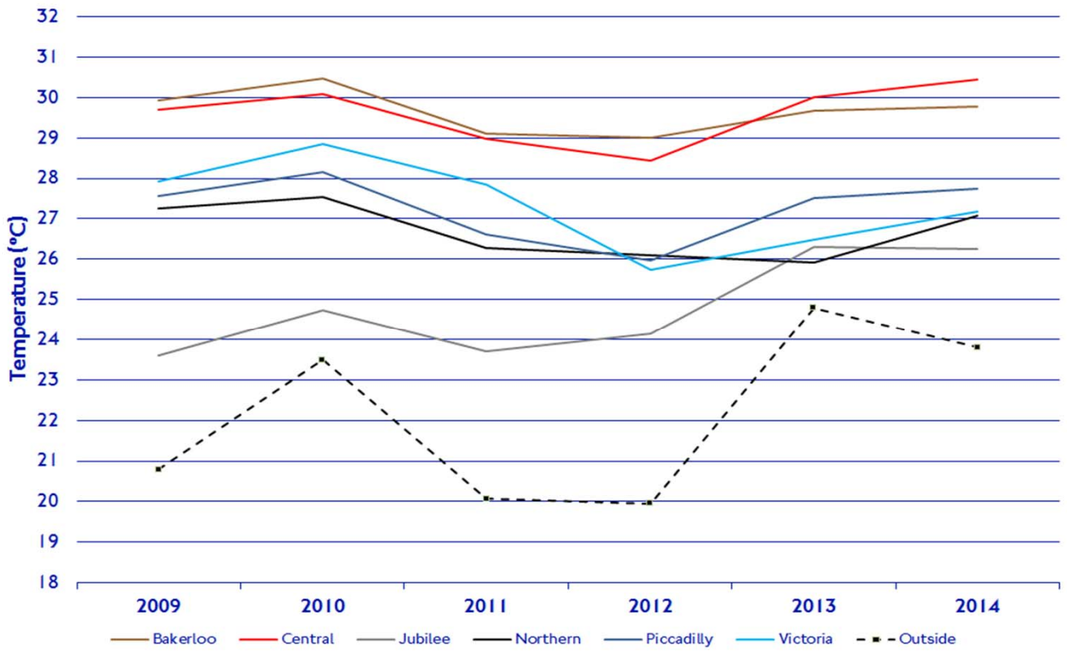
Code 3:
BCV - Enhanced maintenance is being carried out on OB4 Traction Circuit Breakers which are subject to maintenance on a six monthly cycle rather than the standard annual visit. All lead traction cables in vertical shafts are now subject to annual inspection.

SSL - At Neasden Depot the AC Ring Main and associated Switchgear has been identified as being in poor condition and is programmed for replacement by the SSR Upgrade. Until the assets are replaced they are being inspected annually instead of five-yearly.

JNP - Enhanced maintenance on JNP takes place on PILC Cables, Sidings Circuit Breakers and a Voltage Stabiliser at Archway. The cables and Circuit Breakers are being replaced by the JNP LV Renewals programme, and the Voltage Stabiliser at Archway will be addressed in the Power LV Renewals Work Bank.

Code 4:
There are currently no Code 4 concerns on Power assets.

Temperature Data - Average PM Peak Platform Temperatures in July - Figure 109



The extended warm weather period in summer 2014 and the July 2013 heat wave led to very high temperatures on the network (over 31.5°C) on some platforms. This is reflected in Figure 109, showing the high ambient temperatures over the past two summers and the impact on average platform temperatures. The Central and Bakerloo lines were particularly warm, especially the central section of the Central line, one of the busiest links on the network. The network top 20 hottest platforms are exclusively on these lines.

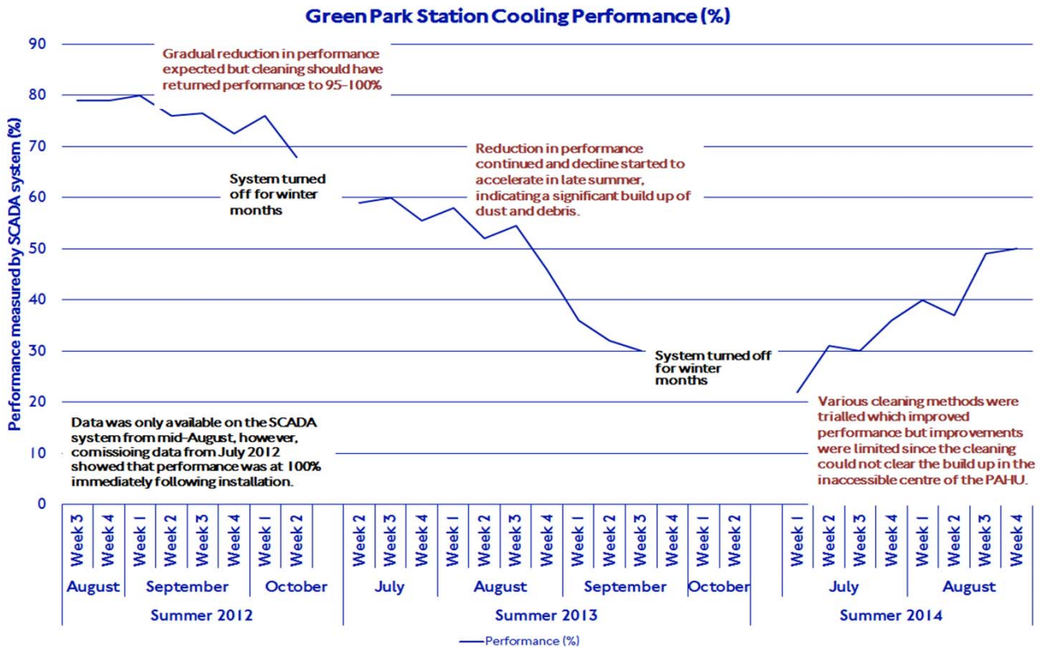
The Victoria line experienced higher temperatures than expected in June - July 2014 (by approx 1°C) due to the removal of coasting on the line immediately following the introduction of WTT 36, due to a need to increase the recovery potential of the line. Coasting has now been re-instated.

Since summer 2013, two previously out-of-service fans have been re-instated: Cromwell Curve on the Piccadilly line and Redbridge Lane on the Central line. Although the temperature reduction cannot be seen on the line average, local temperatures at the adjacent stations have reduced. Further previously out-of-service fans are planned to be brought back into beneficial use, with one brought in by summer 2015 and two in summer 2016.

Regenerative braking, which reduces the waste heat released into the tunnels, was introduced on the Northern line in summer 2013, and reduced average temperatures by 0.5-1°C. This benefit has now been negated by the full performance now available on the line.

There is a workstream looking specifically at the Central line, focussing on train temperatures and customer perception of heat. To date, the train windows on the Central line have been covered with a solar reflective film and other solutions are under investigation.

Performance of station cooling Platform Air Handling Units (PAHUs) - Figure 110



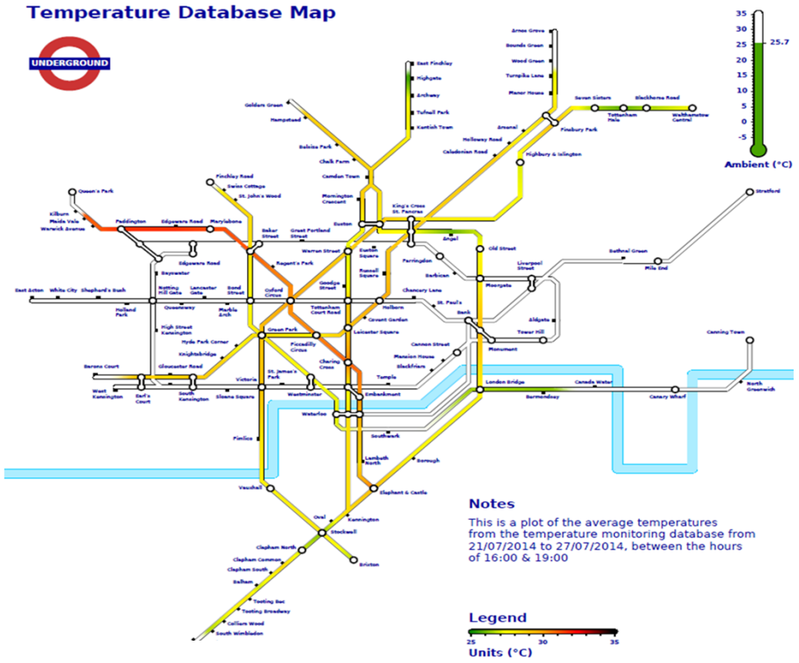
In 2012, two station cooling schemes were designed and installed to be in beneficial use by the London 2012 Olympics. Figure 110 shows the cooling performance of the Platform Air Handling Units (PAHUs) at Green Park station since they were installed, which is equivalent to the percentage of benefits delivered by the project.

The cooling schemes performed well in the first summer. In the second year of operation (2013), a series of tests and trials discovered that the performance of the system had dropped significantly and did not improve when the PAHUs were cleaned. This prompted a review of the whole system to isolate the root cause of the drop in performance. The chillers (for Oxford Circus) and boreholes (for Green Park) were found to be providing the desired input temperatures, however, the heat exchange in the PAHUs was not performing as intended. The indications were that the PAHUs were blocked with dust and the cleaning methods were insufficient to clean the PAHUs and return them to the original performance.

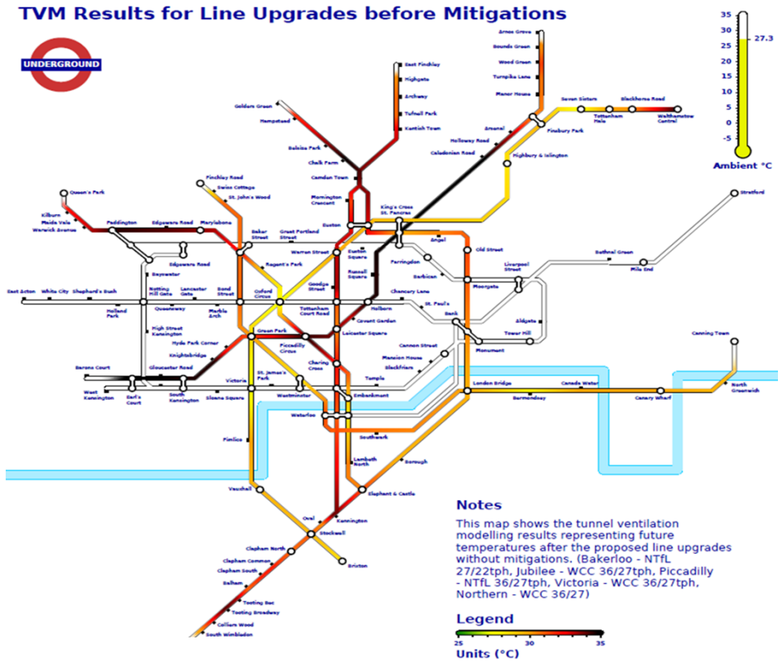
A number of innovative cleaning methods and products were tested over the past year with varying success. These methods could only return the system to c.50-65% performance due to the build up of dust in the centre of the cooling coil which could not be reached by the cleaning methods. The plan is to re-design the PAHUs and test a series of filters and in-built cleaning facilities to mitigate these issues for future installations. For the existing PAHUs, the water pressure cleaning method (which was the most effective method) will be adopted to keep the performance as high as possible for the next few years. Once the re-design is completed, there will be a review to determine whether the new PAHUs should be retrofitted. The impact of the re-design on Bond Street and Victoria stations is under review.

LU Asset Plan - Cooling

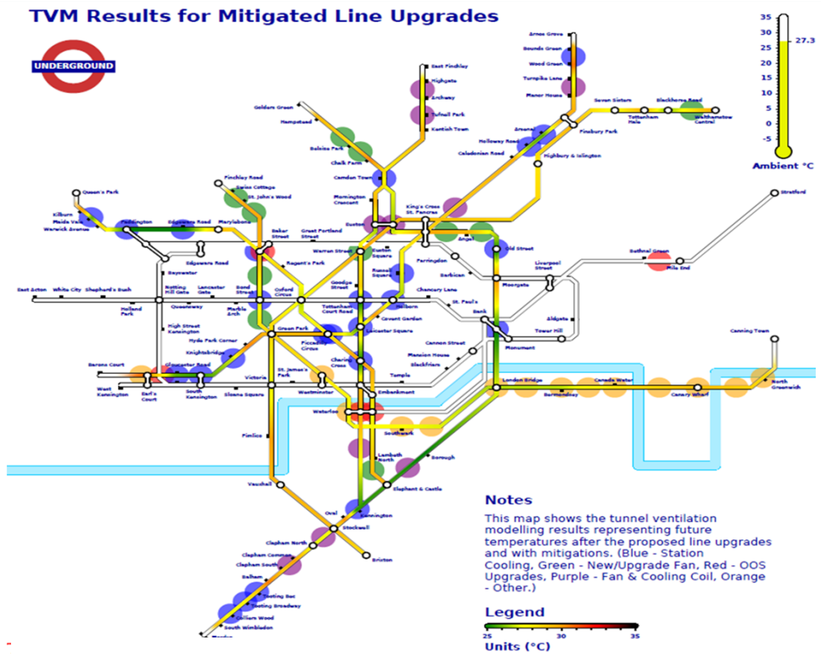
Impact of Line Upgrades on Temperatures (present) - Figure 111



Impact of Line Upgrades on Temperatures (unmitigated) - Figure 112



Impact of Line Upgrades on Temperatures (mitigated) - Figure 113



Heat maps have been created to show the predicted impact of future service enhancements on average afternoon peak platform temperatures. The lines shown have been modelled using the Tunnel Ventilation Models, similar data will be available for the Central line in early 2015. All modelling assumes that the current cooling capacity (delivered by ventilation fans and station cooling systems) continue to be operational.

The cooling strategy for future line upgrades is based on a requirement for cooling interventions only if average summer platform temperatures are predicted to exceed 32°C and consideration of cooling opportunities if temperatures exceed 30°C. It should be noted that this strategy will result in higher platform temperatures than currently experienced on some lines, such as the Jubilee line, since these platforms are relatively cool at the moment.

The maps do not take potential traction energy efficiency improvements into account. Increase in traction energy directly contributes to increases in tunnel temperature. The Network Traction Energy Efficiency Workgroup was set up to actively study opportunities to improve traction energy efficiency. Workstreams include early switch on of regenerative braking, evaluation of coasting, installation of aluminium conductor rail and inverting substations. Coasting, increasing regenerative voltage and inverting substations are being considered for line upgrades as part of a systems approach to temperature management. The use of waste heat to sell to external companies is also under consideration at some sites.

A trial of inverting substations is ongoing at Cloudesley Road substation on the Victoria line. The Victoria line World Class Capacity programme has introduced a single DC section, which will increase the voltage cap to 890V in early 2015, and introduce 4500A in late 2016. Two inverters will be installed in 17/18.

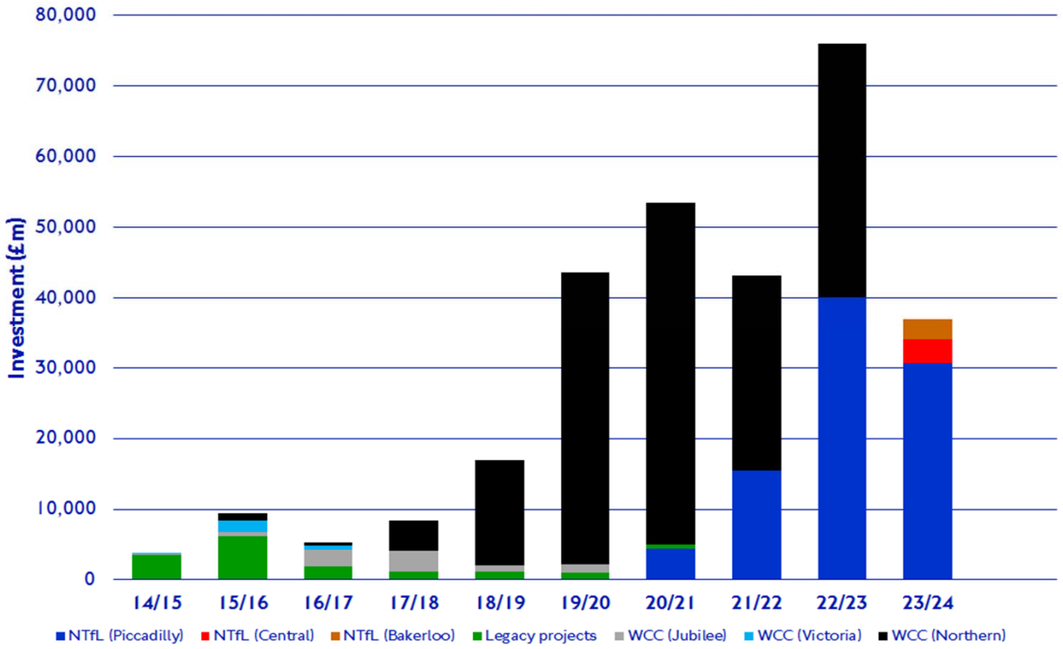
LU Asset Plan - Cooling

Total Cooling Costs (£m outturn including risk as at Q3 2013/14) - Table 26

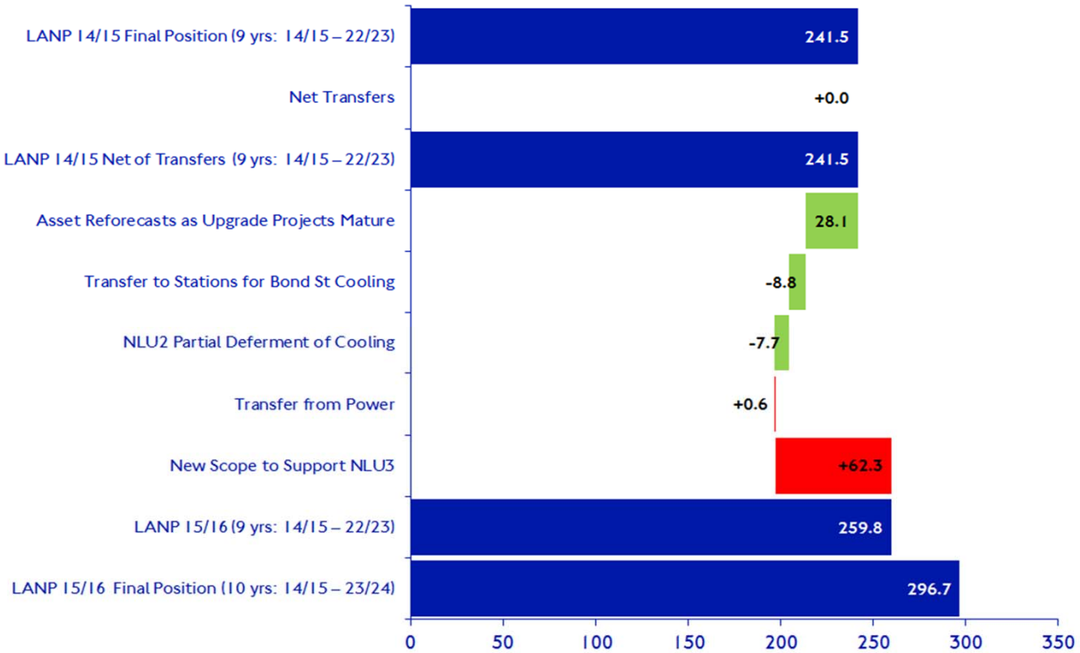
Cooling the Tube Project Costs (£m, including risk)	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	Total
Capacity Optimisation	0.1	3.3	3.4	7.2	15.8	42.5	48.4	1.3	0.0	0.0	122.0
Infrastructure Renewals	3.4	6.2	1.9	1.1	1.1	1.1	0.7	0.0	0.0	0.0	15.5
New Tube for London	0.0	0.0	0.0	0.0	0.0	0.0	4.3	15.5	40.0	36.9	96.8
Stations Upgrade, Crossrail & 3rd Party	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
World Class Capacity - NLU3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.3	36.0	0.0	62.3
Total Outturn	**3.6**	**9.4**	**5.3**	**8.3**	**16.9**	**43.6**	**53.5**	**43.1**	**76.0**	**36.9**	**296.8**
Total Constant 2014/15 Prices	**3.6**	**9.2**	**5.0**	**7.6**	**14.9**	**37.1**	**44.0**	**34.2**	**58.4**	**27.4**	**241.4**

All cooling maintenance costs sit in the Stations budget

Cost Phasing Analysis - Capex - Figure 114



Cost Variance Analysis - Capex - Figure 115



New Tube for London (NTfL): will introduce new rolling stock with air conditioning on the Piccadilly, Central and Bakerloo lines. Although air conditioning will improve customer comfort and safety there will still be an increase in tunnel temperatures due to increased waste heat output. As per the cooling strategy, traction energy efficiency measures, such as regenerative braking, will be delivered to reduce waste heat at source but there will be some locations where additional cooling mitigations will be required, with nine station cooling schemes and three fan upgrades likely on the Piccadilly line; five station cooling schemes and one fan upgrade on the Bakerloo line; and ten station cooling schemes and two fan upgrades likely on the Central line. The scope of the cooling schemes may increase if higher trains per hour service patterns are adopted.

World Class Capacity (WCC): Victoria line WCC will increase trains per hour (tph) to up to 36 peak and 27 interpeak. The line is well ventilated due to the MTVS upgrades completed for the line upgrade and there are two station cooling schemes on the line, with a third scheme being implemented at Victoria station. A vent fan upgrade plus chillers at Forest Road is required to enable the higher tph on the north end of the line. The Jubilee line WCC will increase the tph up to 34-36 peak and 27 off-peak. Coasting and other energy efficiency measures are under investigation to partially mitigate the predicted tunnel temperature increase. In addition, a station cooling scheme is required at Bond Street station and three fan upgrades to allow fans to withstand the higher piston pressures. The impact of the Northern Line Upgrade 2 /3 has been modelled. It is anticipated that there will be 18 fan upgrades and nine station cooling schemes required to mitigate temperature increases and ensure that existing fans are not negatively affected by the increased piston pressures.

Infrastructure Renewals/Legacy Projects: projects focus on: (i) renewal of existing ventilation fan assets; (ii) the re-instatement of long term out of service fans; and (iii) the re-design of the Platform Air Handling Units (PAHUs) to provide sustained cooling performance.

LU Asset Development Activities

Summary (14/15 Activity)

London Underground (LU) is continuing to develop asset management maturity within the business by focusing on the improvement of certain areas where the greatest business benefit can be derived. There have been a number of significant areas of Asset Management (AM) development in 14/15, the key achievements are listed below:

1) Asset Management Steering Group - The pan Transport for London (TfL) steering Group has been established and is setting out a programme of work to ensure a coordinated and integrated approach to the development of asset management practices across the TfL business.

2) Maturity Management for all TfL - A pan TfL contract was put in place to provide gap analysis in support of maturity assessment against ISO 55001, ISO 55001 certification and maturity achieved beyond ISO 55001. Significant progress has been made by LU this year, with an ISO55001 stage 1 audit by external auditors Lloyd's Register, who identified that that LU's systems were ISO 55001 compliant.

3) Role Families for AS&I Asset Management - The Asset Management Role Family has been developed and now groups similar AM jobs into generic roles describing the overall purpose of what people do in our organisation. Individuals will be able to see more clearly what's expected in their current roles, and other roles they may aspire to.

4) Asset Information Strategy (AIS) - The AIS was published in June 2014. The AIS sets out LU's current position and strategic direction to the effective and efficient management of asset information.

5) Asset Management Training - A pan-TfL initiative to provide training in asset management has resulted in two levels of courses being established for members of staff during 2014/15.

6) Asset Management Information System Replacement - The AMIS programme was established in 2014 and is currently detailing the requirements for the programme to replace the Ellipse and Maximo systems by 2020, and provide a solution that is integrated with TfL Crossrail. A feasibility study will determine the best overall solution and will be completed in May 2015.

7) Predict & Prevent (P&P) - Established vision, strategy and requirements for P&P. Identified interfaces and started to build relationships. Identified the various local projects/activities underway across the business and ensured they support the vision.

8) Asset Management Communication Strategy and Plan - A communication strategy was issued and related plan progressed to promote asset management around LU. This has focused on general awareness of asset management, and the asset management policy, promotion of the training courses and information around ISO 55001.

LU Asset Development Activities 2015/16

Summary (Future Activity)

Title	Asset Management Enablers	Asset Manager/ Sponsor	Key Contact / Lead	Governing Body	Responsible Directorate	Asset Area	Description	Key Benefits	Start Date	End Date
Asset Management Training Level 3	Organisation & People	Richard Moore	Kate Yates	Delivery & Commercial Capability	Strategy & Service Development	All	Development of training of staff in whole life asset management, including general understanding of asset management at Level 3 enabling staff to undertake the IAM Diploma examinations.	Members of staff both within the direct asset management community, and those who undertake asset management activities as part of their role will gain improved skills in the discipline. They will also be able to take the certificate or diploma in asset management. Members of staff will receive a consistent level of training across TfL.	Apr-15	Mar-16
ISO 55001 Certification - Stage 2				Asset Management Steering Group	Strategy & Service Development	All	On-going surveillance audit to retain ISO 55001 certification for London Underground.	LU will continue to demonstrate its capability in delivering high quality asset management through surveillance audits. Continued focus on asset management will make sure we keep working together towards the overall LU Vision.	Apr-15	Apr-17
Asset Information Requirements & Standards review (BIM)	Asset Information & Systems	Richard Moore	Will Hackney / Victor Kainth	Delivery & Commercial Capability	Capital Programmes Directorate	All	BIM Level 2 Deliverables: Identify, capture and align the Information Requirements to inform the Organisation Information Requirement (OIR), Asset Information Requirement (AIR) and Employer's Information Requirements (EIRs) as per PAS1192-3 and PAS55 (ISO55001). Supplier capability and management. To monitor and review current and emerging industry and RUG standards to inform the development and implementation of new or updated company standards and guides.	Opportunity to ensure the collaborative production, use and management of digital representations of the physical and functional characteristics of a facility / asset. The resulting Project Information Models (PIMs) and Asset Information Model (AIM), when fully coordinated, support decision-making about a facility or asset throughout its lifecycle from earliest conceptual stages, through design and construction, operation and maintenance and eventually decommissioning and demolition.	Jan-13	Nov-16
LU Asset Management Information Systems Replacement (AMIS)			Kostas Tsatsaris / Victor Kainth	Asset Management Steering Group	Information Management	All	The existing Asset Management Information Systems (Ellipse and Maximo) are reaching the point where further incremental development cannot be undertaken after 2020 and it is proposed that a single system is introduced to replace Ellipse/Maximo.	A linked management system will allow for more in-depth analysis of fault trends and hence allow further refinement of asset management approach for individual areas.	Mar-14	Mar-20
Asset Information Quality Process	Asset Information & Systems	Richard Moore	Victor Kainth	Asset Management Steering Group	Strategy & Service Development	All	Develop a process to evaluate and grade the quality (i.e. completeness and accuracy) of the data held within the asset management information system (e.g. Ellipse).	Ability to monitor, grade and improve the maturity of the data held within LU's principle asset management information systems.	Mar-15	Mar-17
ICT infrastructure		Mike Everett	Kevin Payne	ICT Programme Board	Strategy & Service Development	All	This work stream will deliver the 'ICT infrastructure' (railway information systems, data transmission networks, data storage and retrieval capability, and information management protocols, business operational software, railway operational systems and security). Main areas of activity during 2014/15 will be to establish strategy groups to develop long term road maps and work banks and to support the implementation of a pan-TfL data network strategy and to produce a pan-TfL data-storage and retrieval strategy.	Consistent approach to information management providing a starting point for improved project and procurement delivery.	Mar-14	Mar-16
Civils Asset Degradation Modelling	Decision Making	Daniel Scott	Fiona Thomson	Asset Management Steering Group	Strategy & Service Development	Civils	Undertake degradation modelling in order to improve current understanding so that future maintenance requirements can be predicted with greater certainty. This includes development of a Value Management Tool for prioritising capital projects, according risk, maintenance costs, whole life costs and opportunities. Ongoing improvement of the Civils Risk Model (STRATA), by validation and review of input assumptions and results with Profession Heads. Inclusion of JNP assets, to ensure Civils asset risk is evaluated consistently across the Network.	Delivers value for money, by ensuring the work plans deliver maximum benefit for the available budget. In addition, this will allow more accurate forecasting for future maintenance requirements and costs. Knowledge of asset degradation will assist with the development of optimised maintenance regimes and improved whole life cost modelling.	Apr-14	Mar-16

LU Asset Development Activities 2015/16

Summary (Future Activity)

Title	Asset Management Enablers	Asset Manager/ Sponsor	Key Contact / Lead	Governing Body	Responsible Directorate	Asset Area	Description	Key Benefits	Start Date	End Date
Deliver Mayoral carbon emission reduction target and delivering cost efficiencies through lower LU power consumption.	Decision Making	Howard Taylor	Howard Taylor	Asset Management Steering Group	Strategy & Service Development	Power	Develop LU Power's possible contribution to this Mayoral target without adversely impacting Power system resilience and security: • Traction Energy Efficiency Opportunities • Develop TfL's Energy Metering Strategy	Operating Cost Mitigation, Tunnel Temperature Mitigation	Mar-14	Mar-16
ESTEEM - Premises Data collection and decision support tool.		Elmarie Conradie	Richard Knowles	Asset Management Steering Group	COO AP and Strategy & Service Development	Stations	ESTEEM enables data review and interrogation to produce standard reports for maintenance planning, business planning and Asset Condition Reporting (ACR).There are several planned development for ESTEEM, as follows: •A dashboard is being developed which, utilising the information from ESTEEM, will record the concerns, defects and condition issues which will identify i) the work required; ii) the cost of the work; iii) the delivery mechanism and iv) the timescales for implementation. • Integration of JNP data into ESTEEM • Read only access for all • Link to GIS	More effective Asset Management processes through the following activities: •Optimising interventions from a whole life cost prospective. • Optimising interventions in synergy with other asset areas. • Considering economies of scale by grouping tasks and or locations for projects.	2015	2016
Asset Risk Quantification Tool Development	Safety & Risk Management	Daniel Scott	Daniel Scott	Asset Management Steering Group	Strategy & Service Development	All	Develop a tool for quantifying the composite effect of multiple probabilistic costs, performance concerns and risks. Provide an easy to use format which can be utilised in a Stakeholder workshop approach to capture tacit knowledge on likely event probability. Provide calculated asset lifespan (and confidence) and likely exposure to probabilistic cost, performance and safety risk (passenger and staff) through life of the asset in a form compatible with relevant Asset Management Models for use in long term business forecasting and AM decision making.	Benefits through improved asset understanding and asset management decision making. Outputs from the tool would aid in the development of Whole Life Asset Models in areas where these do not currently exist and would enable existing models to be enhanced and made more accurate	Apr-14	May-15
Predict & Prevent Programme- Predictive Maintenance	Performance & Condition Monitoring	Marc Sims	Nicola Self	Predict & Prevent Programme Board	Chief Operating Office Asset Performance	All	Prioritise and implement predictive maintenance opportunities. Monitor the asset, apply rules to predict customer impacts and generate alerts and alarms to prevent incidents. Implement maintenance regime change where justified. This project is intended to become a business as usual activity by 2018/19.	Improve reliability & availability of assets by preventing incidents Improve targeting of asset maintenance	Apr-14	2018/19
Predict & Prevent Programme- Command & Control			Richard Jones	Predict & Prevent Programme Board	Chief Operating Office Asset Performance	All	Prioritise and implement opportunities to improve command and control of maintenance and operations. This project is intended to become a business as usual activity by 2018/19.	Flex maintenance and operational plans in order to prevent (or minimise the impact of) incidents	Apr-14	2018/19
Predict & Prevent Programme- Operations - Stations			Steve White	Predict & Prevent Programme Board	Chief Operating Office Asset Performance	Stations	Prioritise and implement opportunities to use predictive analytics to predict and prevent operational incidents in the stations environment. Apply rules to predict customer impacts and generate alerts and alarms to prevent incidents. This project is intended to become a business as usual activity by 2018/19.	Minimise incidents and disruption in the stations environment by preventing incidents	Apr-14	2018/19
Predict & Prevent Programme- Operations- Trains			Steve White	Predict & Prevent Programme Board	Chief Operating Office Asset Performance	Trains	Prioritise and implement opportunities to use predictive analytics to predict and prevent operational incidents in the trains environment. Apply rules to predict customer impacts and generate alerts and alarms to prevent incidents. This project is intended to become a business as usual activity by 2018/19.	Minimise incidents and disruption in the trains environment by preventing incidents	Apr-14	2018/19

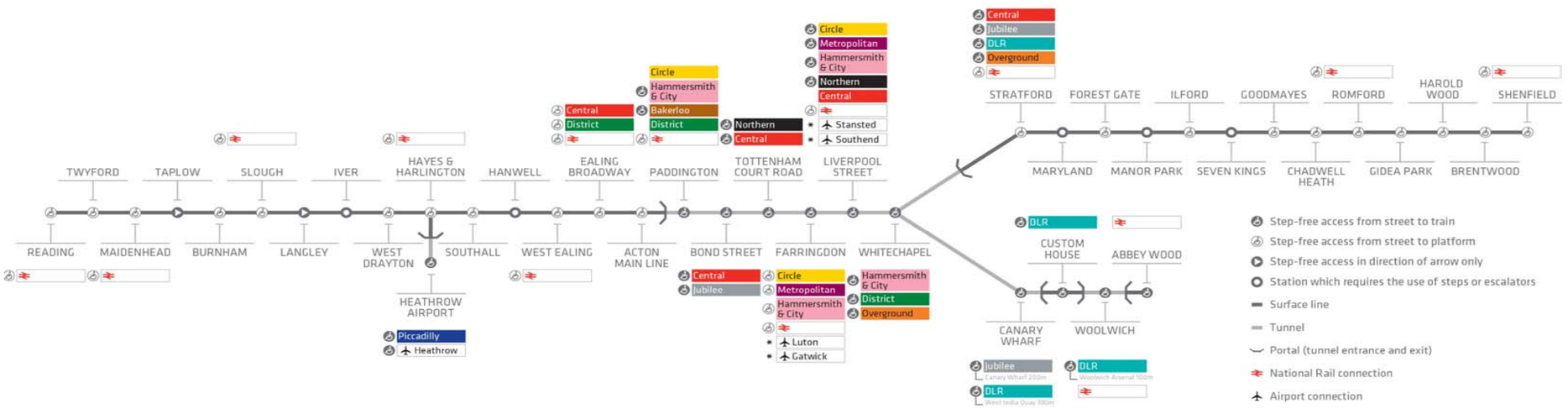
4

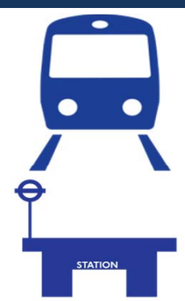
Rail Plans

Expected performance, cost, key deliverables, risks and asset condition by rail mode

Crossrail (Operations)

Asset Base





Up to 24 trains per hour at peak times

Will serve 42 stations

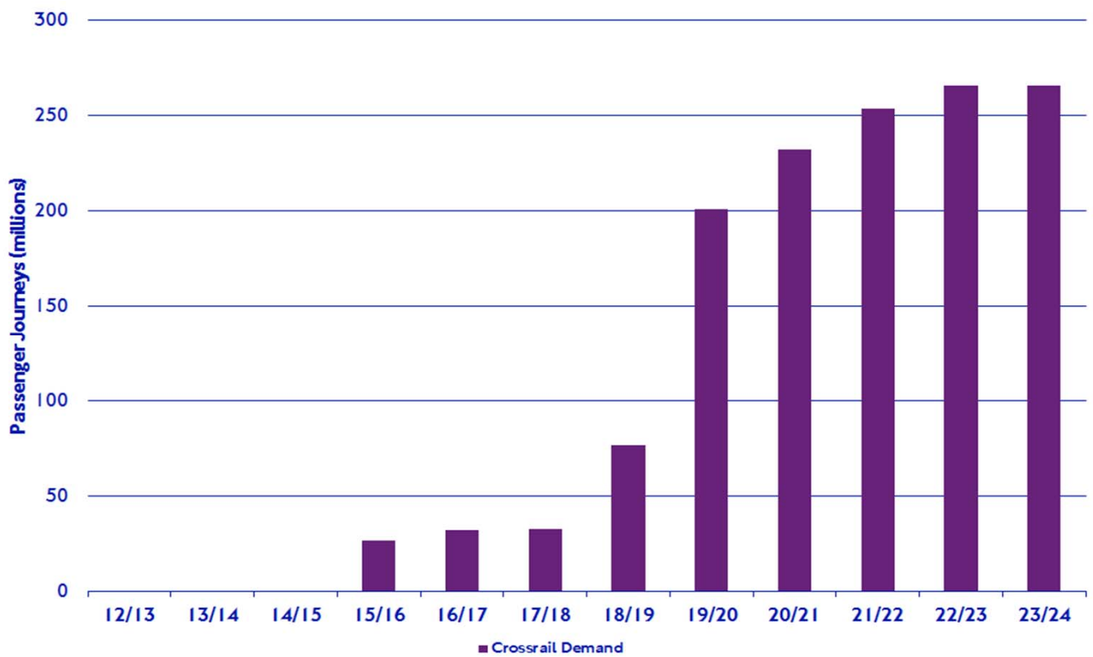
Fleet size: 66 new, air conditioned trains

118km of track (inc. Rail for London and Network Rail infrastructure)

Key Deliverables

May 2015	Liverpool Street – Shenfield service starts
May 2018	Heathrow – Paddington (mainline platforms) service starts
Dec 2018	Paddington (Crossrail platforms) – Abbey Wood service starts
May 2019	Paddington (Crossrail platforms) – Shenfield service starts
Dec 2019	Full through service in operation

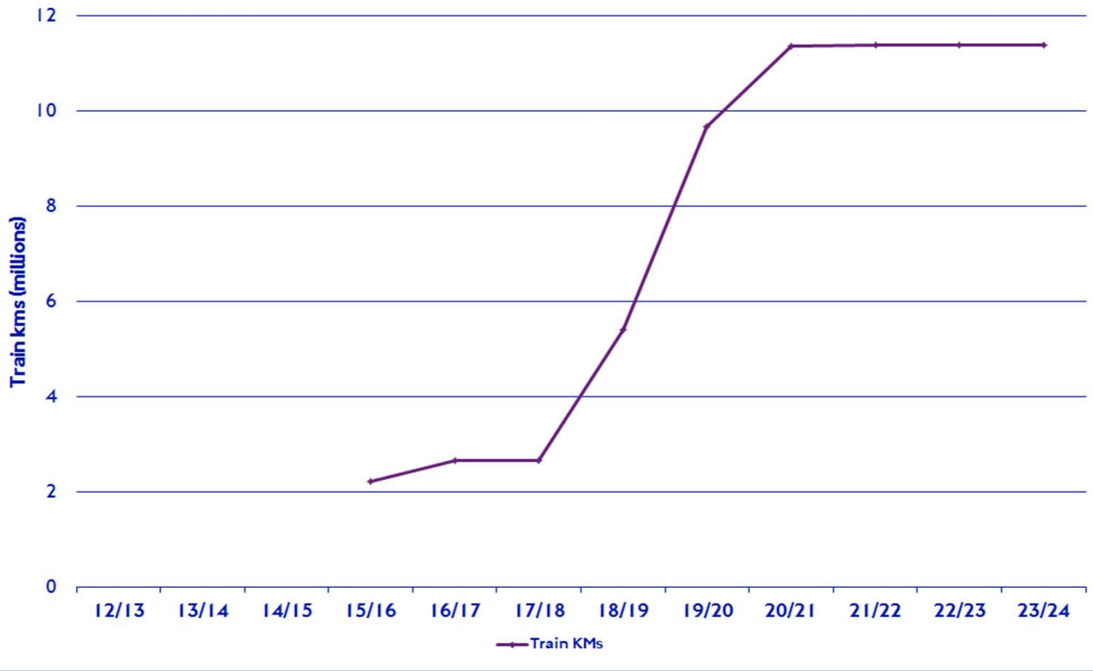
Demand - Passenger Journeys (Millions) - Figure 116



Crossrail services will start running between Liverpool Street and Shenfield from May 2015 taking over the stopping services currently operated by Abellio Greater Anglia.

Customer demand is forecast to steadily increase, with significant increases in 18/19 (as Heathrow to Paddington services commence in May 2018 and Paddington to Abbey Wood services start in December 2018) and 19/20 when a full through service begins operation.

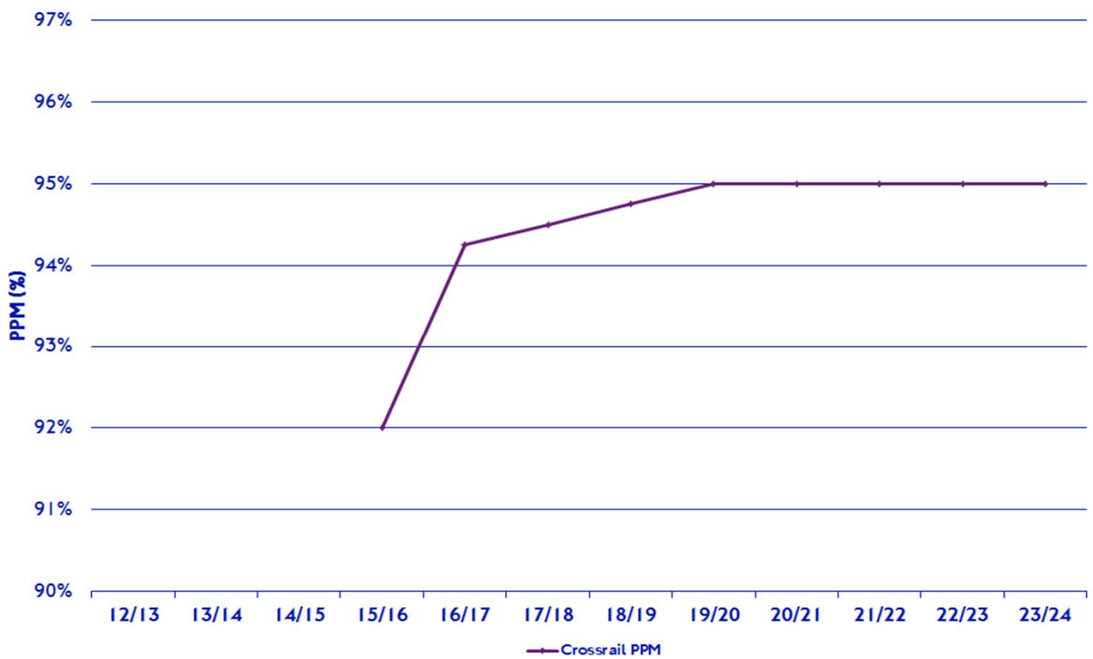
Capacity - Train Kms Operated (Millions) - Figure 117



Kilometrage operated increases sharply through the plan period as additional Crossrail services are added. Kilometrage will hit a plateau of c.11.4m kms from December 2019 when the full through service is in operation.

Train kilometrage forecasts are based on the contract bid model which reflects a specified Service Level Commitment (SLC).

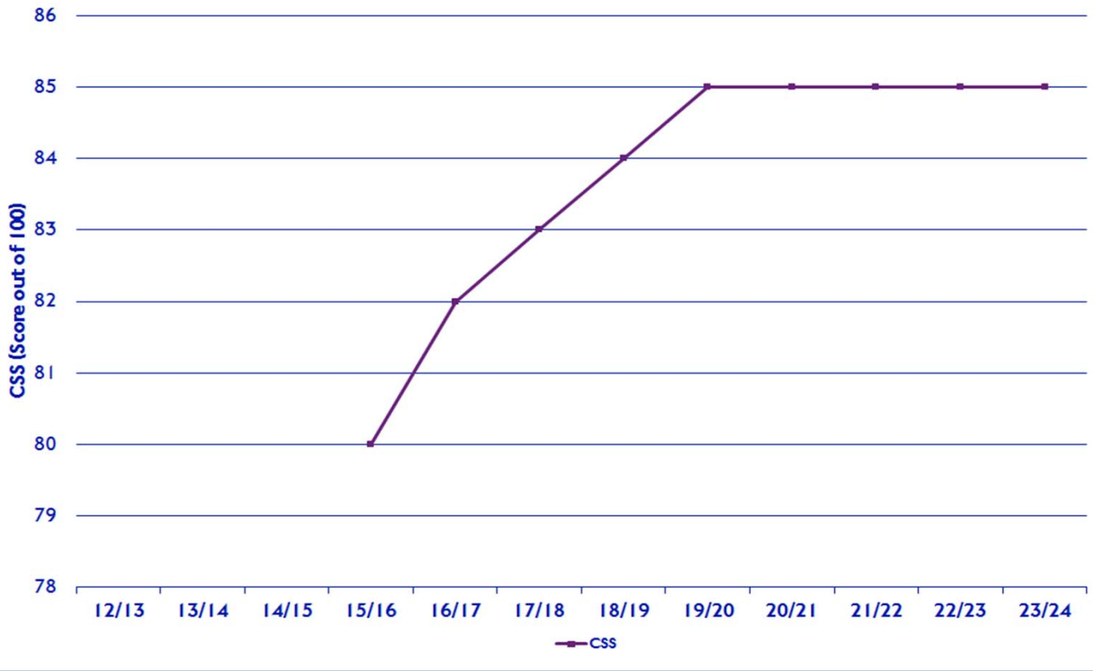
Reliability - On-Time Performance (PPM MMA) - Figure 118



Reliability and punctuality of Crossrail services will be measured via the PPM MAA (Public Performance Measure - Moving Annual Average).

The current forecast is based on the target as required by Rail for London's Concession Agreement with MTR Corporation (Crossrail) Limited, the Concession Operator.

Customer Satisfaction - CSS - Figure 119



The CSS forecast for 15/16 is based on the current performance of the Liverpool Street to Shenfield services as operated by Abellio Greater Anglia. The forecast is expected to improve steadily over the plan period as MTR take over operation and more Crossrail services are added.

The targets agreed for the later plan years are those which have been agreed by the concession agreement with MTR.

Cost Summary (£m, outturn) - Table 27

Commercially sensitive information removed

Total Revenue: Total revenue is expected to increase significantly year-on-year across the plan. This is a product of more Crossrail services being in operation and increased demand for services as customers become aware of their availability. This starts with the Shenfield line service in operation from 15/16 until 20/21 when the full Crossrail route is in operation.

Total Operating Expenditure: This accounts for the majority of Crossrail costs, with the largest proportion being payments to the concession operator (MTR). Crossrail services are being let as a concession by TfL, similar to the concession let by TfL for London Overground. The remaining costs focus on infrastructure maintenance, rolling stock maintenance, mobilisation costs and overheads.

Total Capital Expenditure: Capital costs scale up with the staged delivery of enhanced service levels. Early capital spend is focused on the train fleet required for the enhanced service levels and station enhancements, such as the significant improvements that have been delivered to stations on the east end of the route to coincide with the launch of the Crossrail brand in October 2017. The funding received for DfT funded station improvements reflect the fact that certain accessibility schemes will be funded by a DfT grant.

Docklands Light Railway (DLR)

Asset Base

101.6m Customer Journeys in 2013/14

Fleet size: 149 articulated vehicles

Serves 45 stations

30 trains per hour during the peak periods (on the west route); new timetable from early 2015

c.40km total line length including depots & sidings in both directions

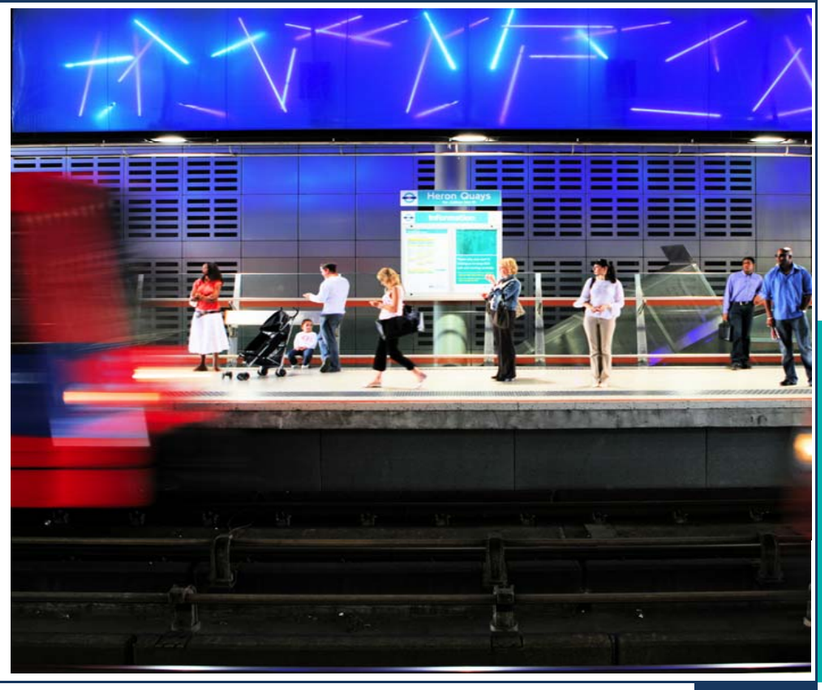
Thales SelTrac S40 Transmission Based Control System (TBTC)

99.24% schedule operated in 2014/15 to date (as at Q3)

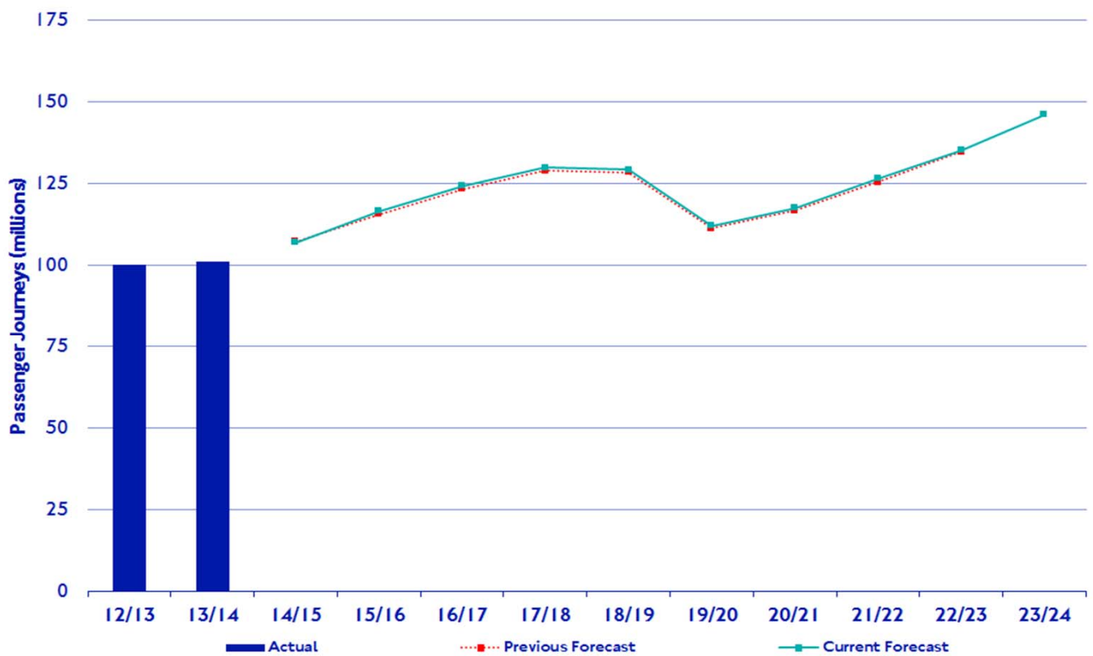
Key Deliverables

- Station capacity schemes (Canning Town, Custom House, Royal Albert, Beckton Park)
- Double Tracking Phase II
- B92 Replacement
- Royal Docks Capacity Programme
- Core Renewals

15/16 | 16/17 | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | 23/24



Demand - Passenger Journeys (Millions) - Figure 120

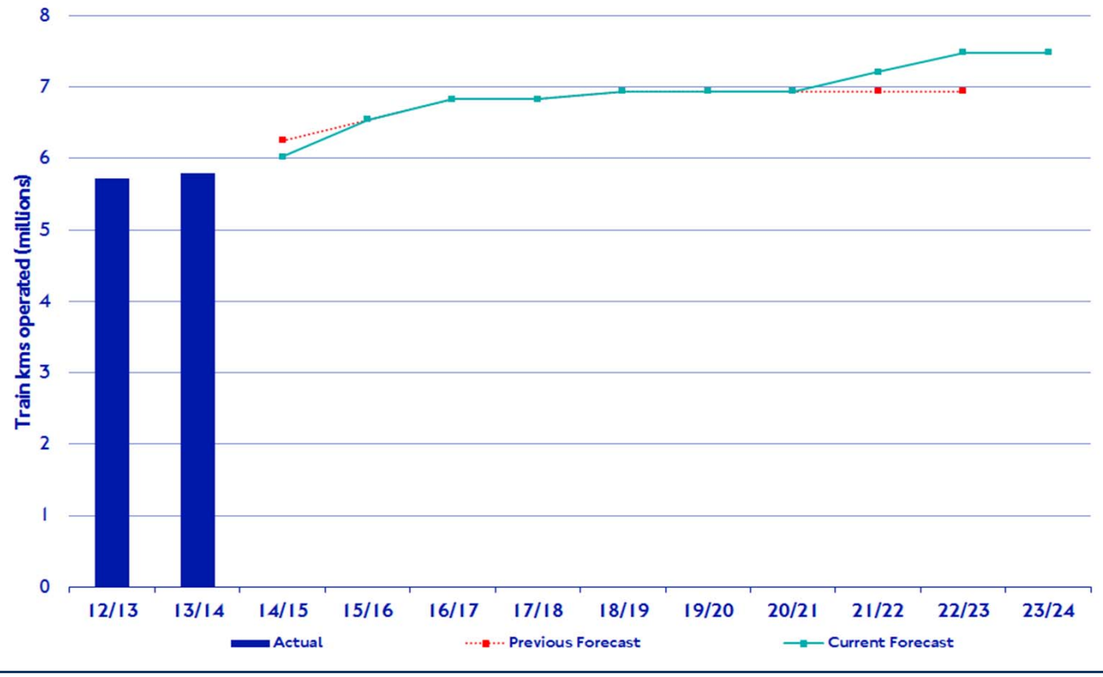


Passenger Journeys are forecast to increase by approximately 30m journeys between 15/16 and 23/24. The key drivers for this increase are: continued population growth, completion of the double tracking project (phase I completed in Spring 2014 and phase II in 18/19) and planned developments at Silvertown Quays and the Albert Business Port at Royal Victoria.

The commencement of the main Crossrail service in 18/19 is expected to abstract passenger journeys from the DLR as it will offer an alternative link to Docklands.

The current forecast includes All Night Running (operation of Bank - Lewisham and Bank - Woolwich Arsenal) from 21/22.

Capacity - Train Kms Operated (Millions) - Figure 121

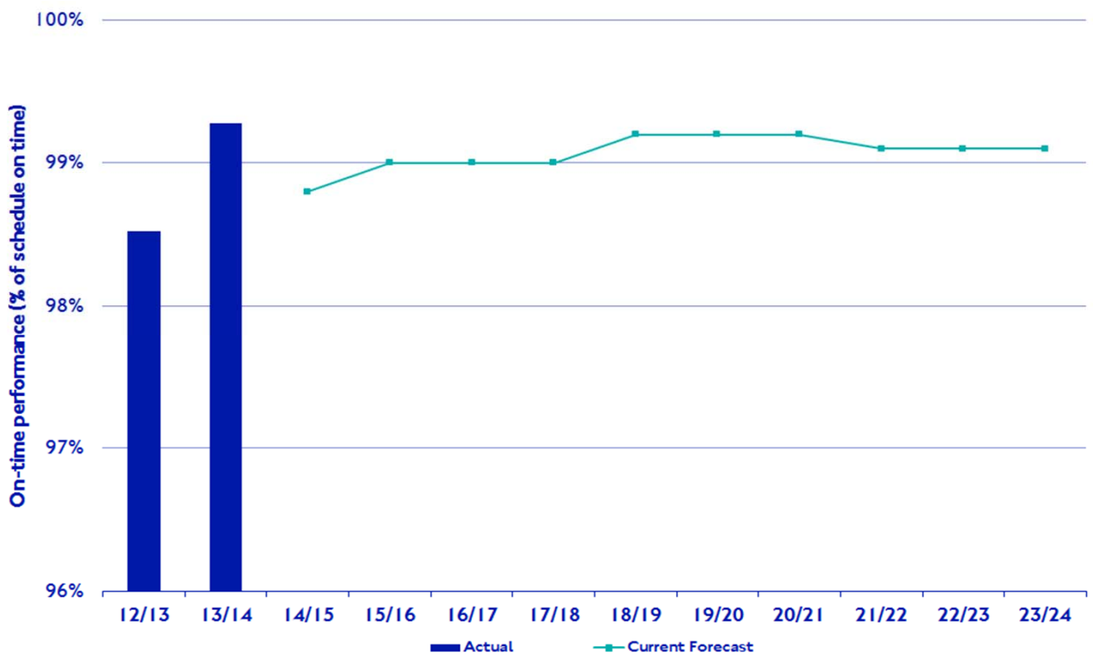


DLR is expected to run slightly fewer train kms in 14/15 than was expected in last year's forecast due to a small delay in the introduction of Train Service Plan A. This enhanced service plan will be introduced in time for the start of 15/16.

A number of future projects will provide additional capacity to help meet rising demand: (i) phase II of the double tracking project, finishing the doubling of all remaining track sections between Stratford and Bow Church in 19/20, (ii) future service increases following the introduction of new rolling stock from 21/22 to 22/23, and (iii) a small capacity benefit from the Royal Docks Capacity Programme.

This year's TfL Business Plan includes a provision for all night running of central services from 21/22, hence the additional capacity from 21/22 onwards compared to last year's forecast.

Train Service Performance - Departures - Figure 122



The previous On-Time Performance measure of reliability has been replaced with the Departures measure from 2014. This corresponds with the R&U Scorecard.

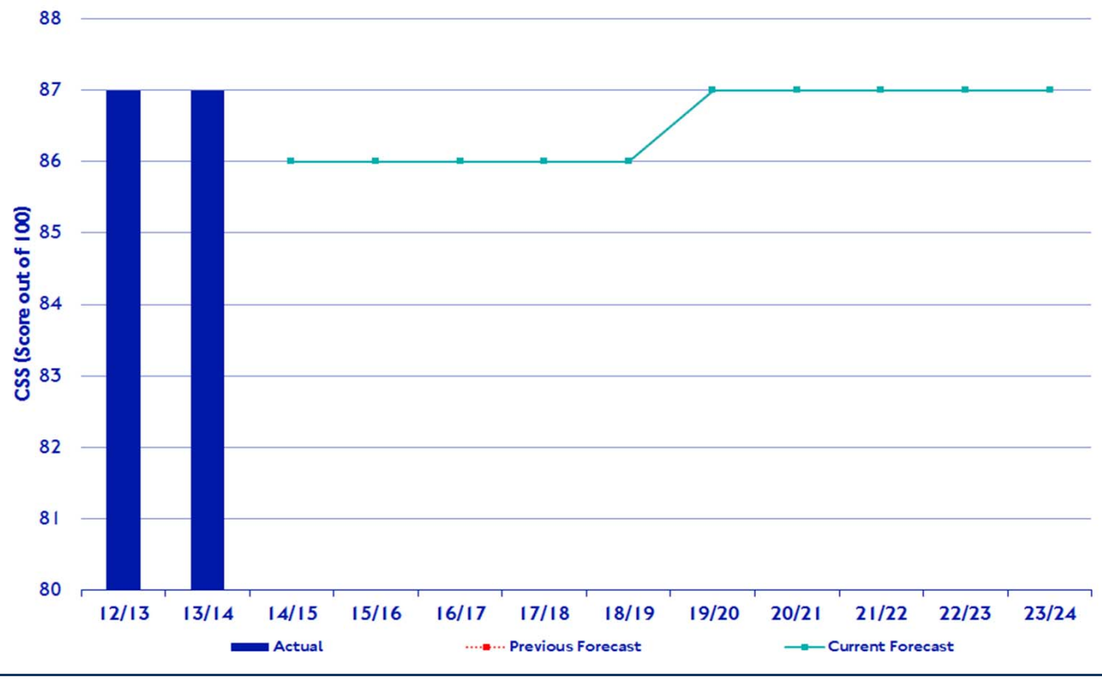
The current forecast represents the contractual target in the new Keolis Amey Docklands DLR franchise. This was calculated during the calibration of the new franchise performance regime.

The Silvertown Quays and Albert Business Park developments in the Royal Docks in 17/18 will increase over-crowding. This has a potentially negative impact on this measure, but the contractual targets are expected to be met.

The dip in performance from 21/22 is caused by the introduction of new vehicles on the network as part of the Royal Docks Capacity Programme and the New Train for Docklands project. Combined, these projects will deliver 42 new fixed-formation, walk-through trains, four major station upgrades and increased capacity on the Beckton and Airport lines.

It is expected that Crossrail will have a positive impact on departures as it will reduce overcrowding. However, this impact is not included in the forecast.

Customer Satisfaction - CSS - Figure 123



CSS is expected to remain at 86 between now and 18/19.

The commencement of Crossrail services is expected to reduce demand for DLR services and therefore have a positive effect on overcrowding. This is reflected in the improvement in CSS to 87 from 19/20. The arrival of new trains from 21/22 will support this sustained forecast of 87.

This forecast is also supported by a new quality regime for Keolis Amey Docklands. This quality regime will impact on the customer experience.

Cost Summary (£m, outturn) - Table 28

Commercially sensitive information removed

Total Revenue: DLR revenue is assumed to grow year-on-year until 18/19 as demand for services continues to rise and fares increase with inflation. It is expected that a small dip in income will occur in 19/20 as some customers transfer from DLR to Crossrail services. Revenue is expected to recover in the back end of the plan driven by additional demand resulting from the regeneration of the Docklands area serviced by the additional capacity provided by the rolling stock project and infrastructure investment.

Operating Expenditure: this accounts for the majority of DLR costs, and includes franchise payments to the operator. Keolis Amey Docklands (KAD) is the new franchise operator, taking over from Serco in Period 10 (14/15). This also includes payments to CGLR (Lewisham PFI), rolling stock lease, asset maintenance, commission and overheads.

Capital Expenditure: the Annual Infrastructure Maintenance programme forms the majority of DLR's ongoing capital expenditure. This focuses on core asset renewal which looks to improve asset condition, reduce unit costs and maintain reliability levels. The second phase of the north route double tracking project will complete the doubling of all remaining single-track sections between Stratford and Bow Church, enabling a further increase in capacity between Stratford and Canary Wharf. Other capacity increasing projects include the completion of the extension of Beckton shed and additional vehicles from 18/19 onwards.

Emirates Air Line

Context & Deliverables

Asset Base

1.5m Customer Journeys in 2013/14

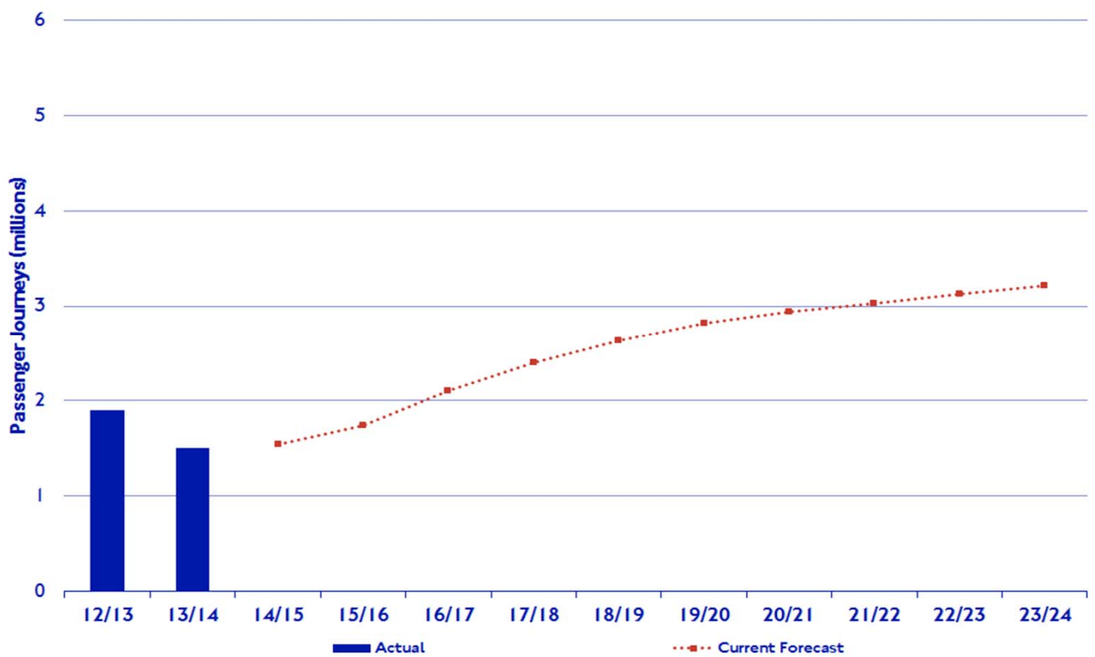
34 cabins in operation

Provides a link between Greenwich Peninsula & the Royal Docks

Total length of 1.1km

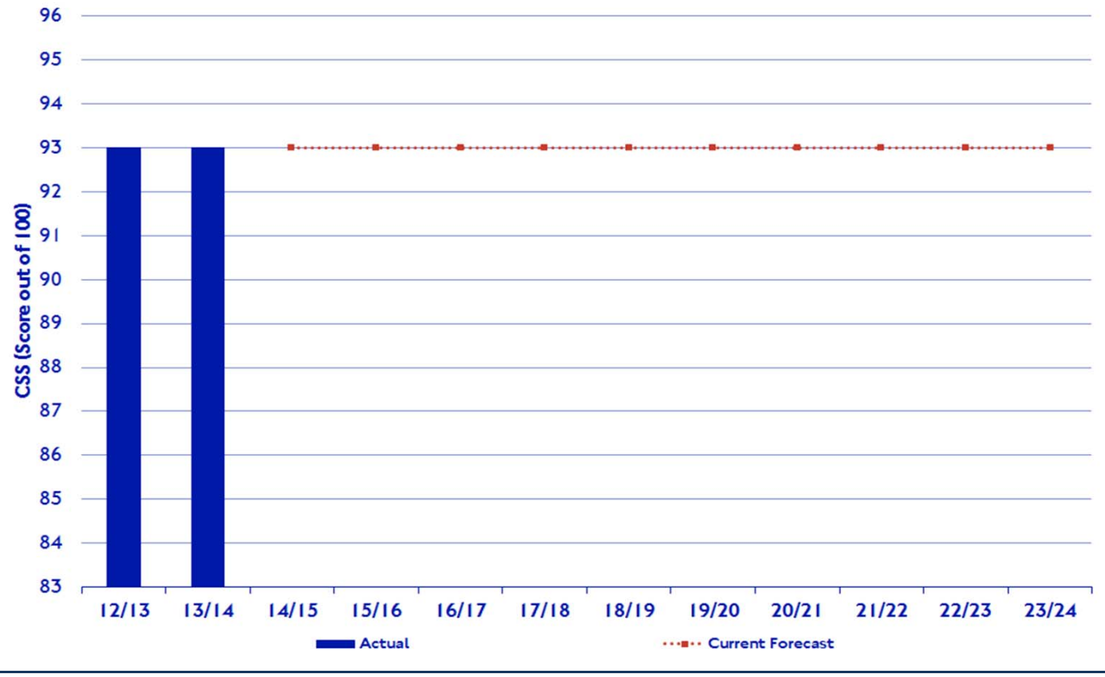
A cable car every 30 seconds

Demand - Passenger Journeys (Millions) - Figure 124



Demand for the Emirates Air Line is expected to grow year-on-year across the plan period due to general population growth in London. An increase in passenger journeys is anticipated in 16/17 due to a number of initiatives to improve Emirates Air Line visibility in other environments, for example selling tickets at North Greenwich station. A number of marketing plans are also in place, and expected to increase ridership, for example improved in-car technology and communications.

Customer Satisfaction - CSS - Figure 125



Customer satisfaction is expected to remain at 93 for the Emirates Air Line. As the score is already extremely high no specific funding or initiatives are planned to raise it any higher.

Cost Summary (£m, outturn) - Table 29

Commercially sensitive information removed

Total Revenue: Emirates Air Line revenue is assumed to grow year-on-year throughout the plan as demand for services continues to rise and fares increase with inflation.

Operating Expenditure: this accounts for the majority of Emirates Air Line costs, and includes franchise payments to the current operator, property, staff, marketing and overhead costs.

Capital Expenditure: the totality of the capital expenditure on Emirates Air Line is for infrastructure maintenance. This focuses on core asset renewal which looks to improve asset condition and maintain current reliability levels.

London Overground

Context & Deliverables

Key Facts

136m Customer Journeys in 2013/14

32 trains per hour operating during the peak periods on existing London Overground, West Anglia adds 14 tph

Serves 83 stations

Fleet size: 65 trains (including Class 378 & 172). From May 2015 this increases by 23 Class 315 and 11 Class 317 which will be refurbished in 2015

247.86km track on existing London Overground network, West Anglia adds approx 100 track km in May 2015. Vast majority of the infrastructure is managed by Network Rail

26 points and crossings on TfL's infrastructure

24 additional stations following West Anglia devolution, refurbished by 2017

Key Deliverables

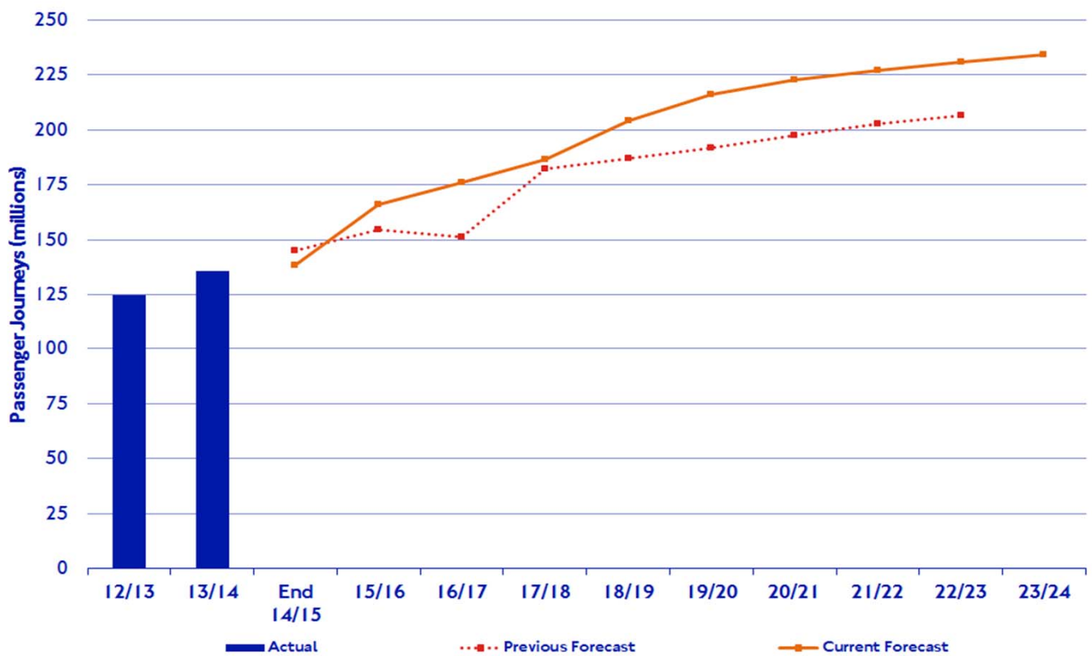
- West Anglia
- LOCIP
- LO Stations Capacity Improvement
- Gospel Oak – Barking Electrification
- Extension to Barking Riverside
- Core Renewals

15/16 | 16/17 | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | 23/24

Projects such as at West Hampstead enable delivery of the Stations Capacity Improvement Programme, to relieve congestion, improve accessibility, & ambience and reduce platform dwell times.

The provision of additional sidings at Silwood Triangle is a key infrastructure enhancement requirement of LOCIP. The programme will increase

Demand - Passenger Journeys (Millions) - Figure 126

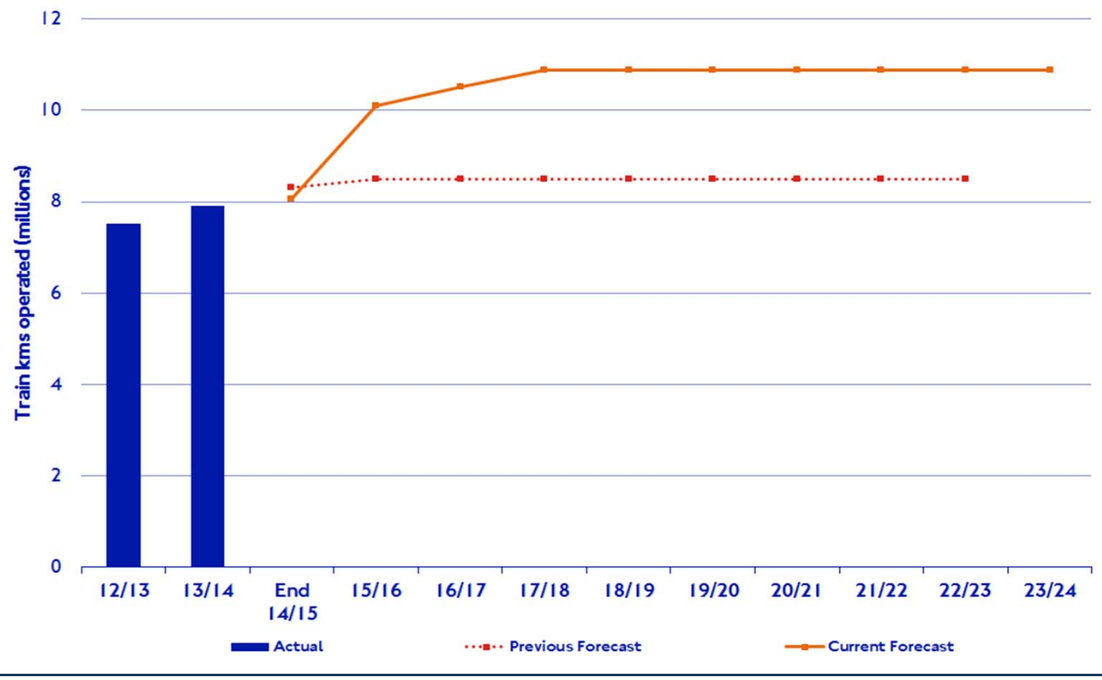


Demand is expected to increase by approximately 40% between 14/15 and 23/24.

The estimated level of demand for the end of 14/15 is expected to be around 5 million journeys fewer than last year's LANP. This is predominantly due to a combination of: (i) a lower number of journeys being made by Travelcard users on the network compared to our previous expectations; and (ii) an increase in the extent of the closure programme required for the ongoing London Overground Capacity Improvement Programme (LOCIP) and associated works.

The current forecast sees demand increasing year-on-year across the plan. This growth is predominantly driven by the underlying growth in the population of London but is supported by the improvement in services delivered through LOCIP which will be fully delivered by December 2015, the addition of new services from 2018 as a result of new rolling stock and the increase in capacity following the electrification of Gospel Oak to Barking services from 17/18 (and the consequent use of four car trains). This year's forecast also includes the impact of West Anglia services on the network and the proposed schedule for all night running on the East London line core section (from 17/18), the impact of which is reflected in the higher level of demand expected from 15/16 onwards as compared to last year's LANP.

Capacity - Train Kms Operated (Millions) - Figure 127



Capacity is expected to increase by approximately one million train kms between 15/16 and 23/24.

The additional capacity on the network is a result of the ongoing upgrade of the line and introduction of new services as detailed below:

- The addition of a 5th car and associated LOCIP works which has been delivered on the East London line (December 2014), with further benefits realised on the rest of the network by December 2015;

- The devolution of West Anglia services in 15/16;

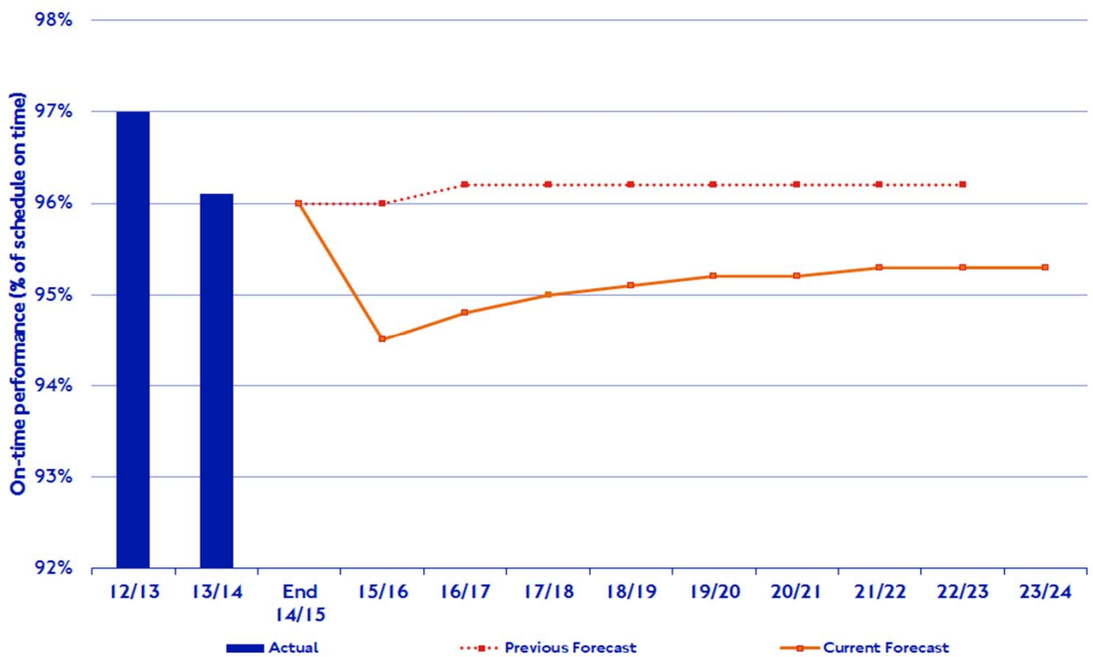
- The electrification of the Gospel Oak to Barking Line from May 2017 which allows a four-car electric train service to operate;

- The introduction of all night weekend running on the East London line core route from 17/18; and

- The procurement of additional rolling stock enabling a +2 trains per hour increase on the North, West and East London lines in 17/18

Capacity at the end of 14/15 is expected to be slightly lower than that assumed in last year's forecast due to the higher than expected impact from closures on the service. The increase in capacity compared to last year's LANP is a result of the inclusion of West Anglia services and all night running.

Reliability - On-Time Performance (PPM MMA) - Figure 128

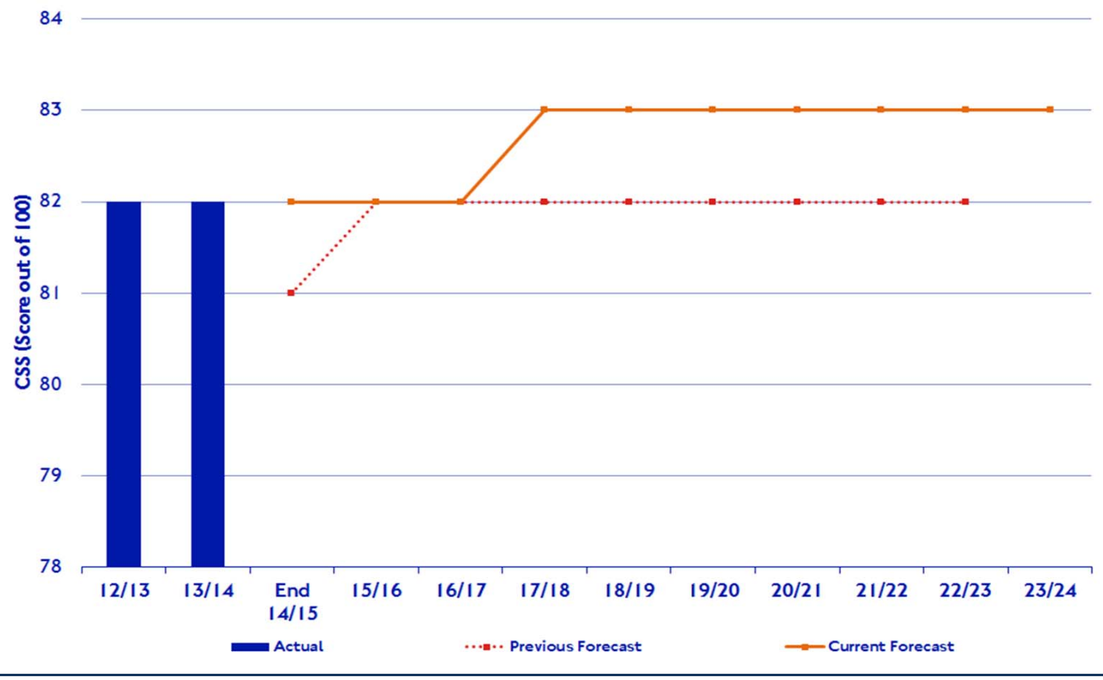


PPM MAA (Public Performance Measure - Moving Annual Average) at the end of 14/15 is expected to be slightly lower than 13/14, before falling in 15/16 by one and a half percentage points. This is due to Network Rail and Southern's continued poor performance and as a direct result of the introduction of West Anglia services which are currently performing at a lower PPM MMA than the existing network. Gradual performance improvements are expected from 15/16 onwards as LOROL take over operation of West Anglia services and through continuous improvement/resilience of existing network performance. The forecast takes a relatively cautious approach to performance improvements over the plan as West Anglia services are introduced. This approach will be reviewed when operational experience of running West Anglia services has been gained. Performance south of New Cross Gate is not expected to improve until all the works associated with the reconstruction of London Bridge for Thameslink are complete, scheduled for 2018, although we are working hard with industry colleagues to get a timetable that works.

The London Overground capital programme does not specifically target reliability. Instead, the primary focus for the programme is on increasing capacity and customer service through initiatives such as LOCIP and the station capacity programme. These projects do however help to mitigate against reliability challenges relating to increased demand and crowding.

PPM MAA is strongly influenced by Network Rail and other operators. London Overground operates 80 percent of its route mileage over the networks of other Infrastructure Managers. Close working relationships between parties have helped to minimise any detrimental impact to performance through third party operators but their limited targets hinder any major improvements in PPM MAA.

Customer Satisfaction - CSS - Figure 129



CSS at the end of 14/15 is expected to remain at 82. CSS performance is then expected to improve over the plan to 83 as a number of key projects are completed:

• The London Overground Capacity Improvement Programme will deliver a 25% increase in capacity through the addition of a fifth car to trains on most London Overground lines (14/15 on the East London line and 15/16 on the North and West London lines);

• The integration of West Anglia services from 15/16 will deliver an anticipated increase in CSS as a result of investment in the station environment (improvements to station safety and security, accessibility through the provision of a turn up and go service for customers requiring assistance, and through station deep cleans and the installation of new ticket machines);

• From 18/19 service frequencies on the North, West and East London lines will be improved by 2 trains per hour; and

• The electrification of Gospel Oak to Barking services will provide additional capacity and the ability to operate a 4-car service on this line for the first time

Cost Summary (£m, outturn) - Table 30

Commercially sensitive information removed

Total Revenue: Total revenue is expected to increase year-on-year throughout the plan. This is a product of the continued increase in demand for services and assumed fare rises. The London Overground Capacity Improvement Programme (LOCIP) will deliver increased capacity (4-car trains becoming 5-car trains) in 14/15 on the East London line and 15/16 on the North London line.

Total Operating Expenditure: this accounts for the majority of London Overground costs, with the largest proportion being payments to the concession operator (LOROL). These concession costs are based on our best estimates to date, but are dependent on the outcome of a tendering process that will see a new concession agreement granted in 16/17. The remaining costs focus on rolling stock lease, vehicle maintenance, asset maintenance, commission and overheads. The incremental costs of operating the Gospel Oak to Barking line once it is electrified are also included from 17/18.

Total Capital Expenditure: this is focused on the delivery of LOCIP and the supporting station capacity works, which will deliver a 5-car service (and an additional 25% capacity) across most London Overground lines by 15/16. The completion of the Gospel Oak to Barking electrification works (in 2017), will see four-car electric trains in operation, almost doubling capacity. All costs from 17/18 onwards focus on core asset renewal.

Tramlink

Context & Deliverables

Asset Base

31m Customer Journeys in 2013/14

Fleet size: 30 trams

Serves 39 stops

22 trams per hour operating during the peak periods

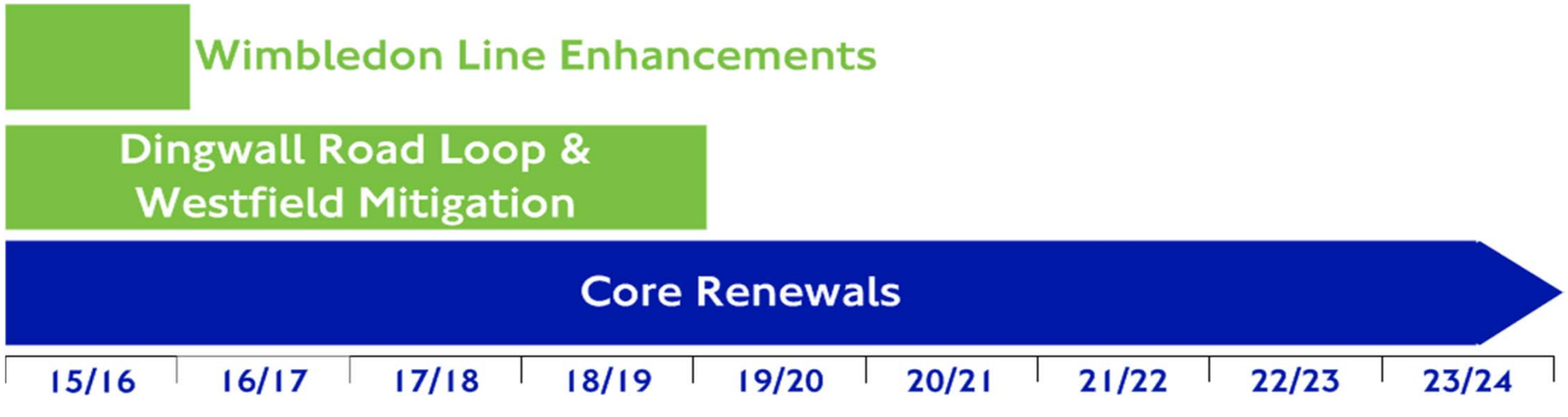
c.56km total line length including depots & sidings in both directions

40 sets of points and crossings

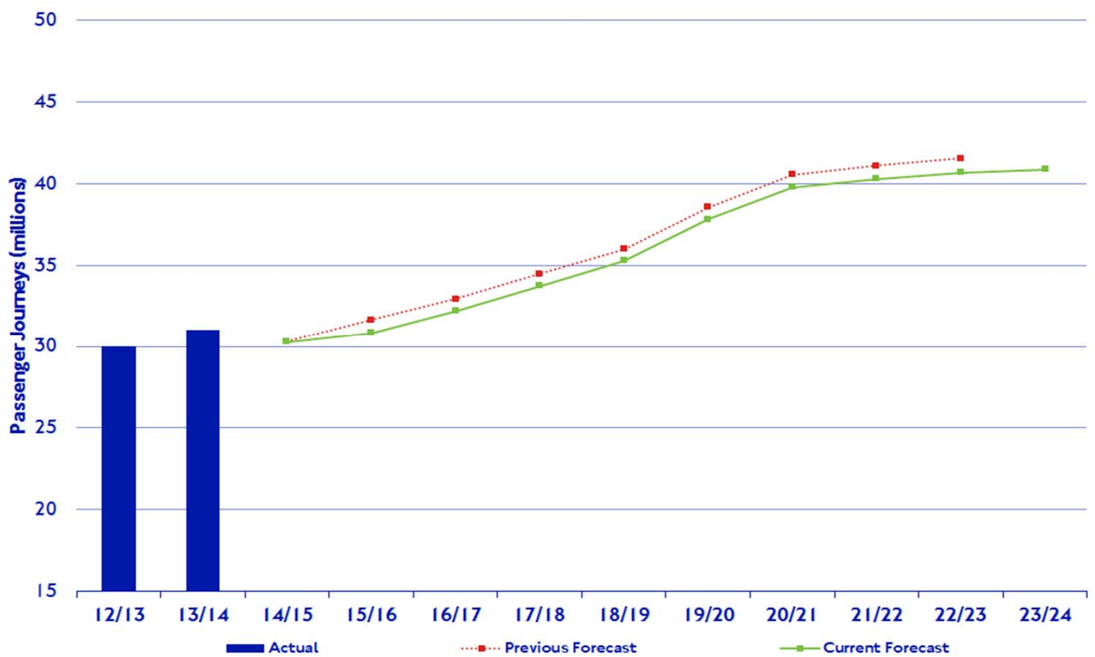
98.1% schedule operated in 2014/15 to date (as at Q3)

Key Deliverables

Construction of a turnaround loop at Dingwall Road (2018) provides the opportunity to better target services in advance of the opening of the proposed Westfield development



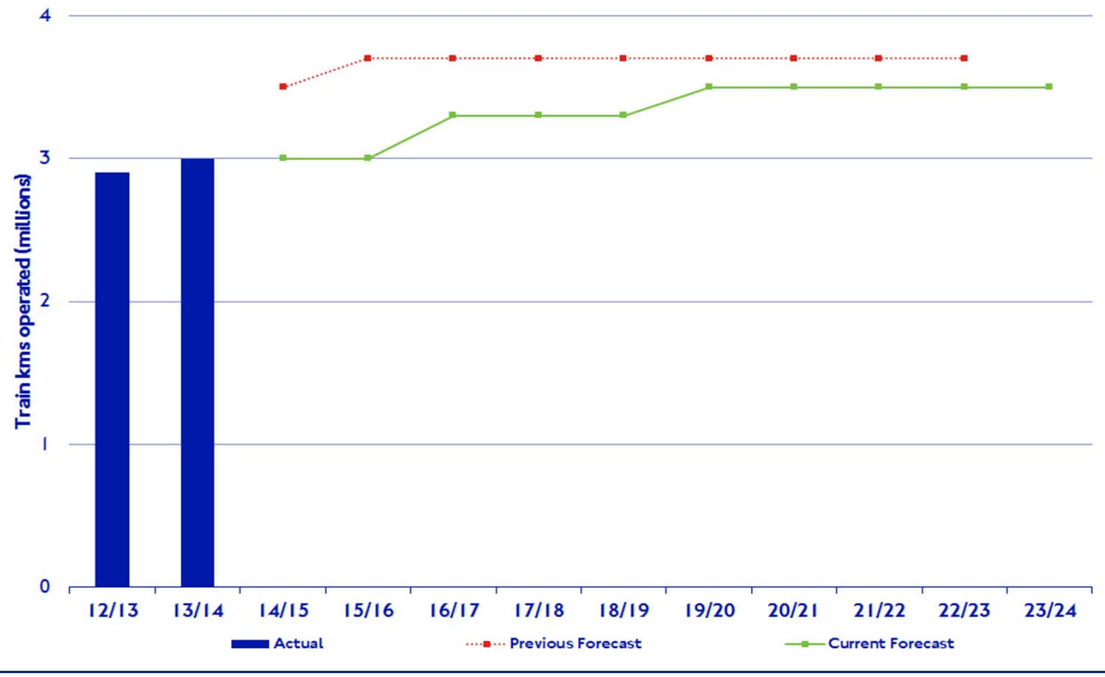
Demand - Passenger Journeys (Millions) - Figure 130



Demand is expected to increase by approximately 35% between 14/15 and 23/24. The increase in demand is primarily driven by the underlying growth in the population of London. However, the £1bn development of the Whitgift area of Croydon by Croydon Partnership, due to open in 2018, will provide for an additional c.2m passenger journeys per annum, increasing demand pressures at off-peak times, evenings and weekends at a number of locations. This year's LANP forecast is slightly lower than the 14/15 plan due to the impact of planned engineering closures.

Current analysis shows that crowding to the east of Croydon will continue to grow year-on-year. The implementation of the Dingwall Road loop will provide an opportunity to review the current services and better target overcrowding where needed. London Tramlink have secured £20m from the Croydon Partnership Development and GLA to build a turnaround loop at Dingwall Road west of East Croydon Station. The loop will provide opportunity to reduce the number of trams operating around the town centre allowing us to mitigate any impact of increased traffic and tram congestion caused by the increase in traffic and pedestrians attracted by the Whitgift Development. An additional benefit will be the increase in resilient services to the east of the network during town centre closures and unplanned shutdowns.

Capacity - Tram Kms Operated (Millions) - Figure 131



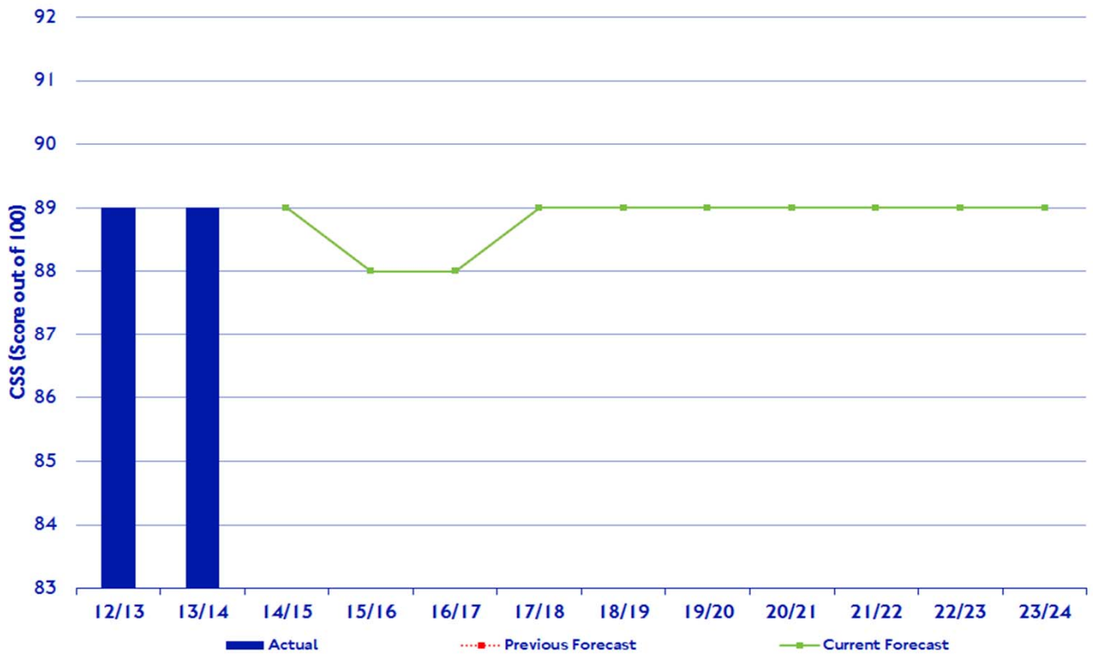
Capacity improvements scheduled within the current TfL Business Plan are expected to enhance services by approximately 0.5m train kms by 19/20. The Wimbledon Enhancement Programme adds further capacity between now and 16/17 (8 to 12 trams per hour between Therapia Lane and Wimbledon) with an extension of peak services to help meet current crowding and the predicted additional demand on Line 3 expected from 15/16 onwards (which is the most crowded route at present). In 19/20 the Westfield development and Dingwall Road loop open, affecting both kilometrage operated and passenger numbers.

Further capacity enhancements on the Wimbledon branch are limited as the majority of single line track has now been removed, with the double tracking of the Wandle Flyover (concept design stage) - which is currently unbudgeted - estimated to have the biggest potential benefit. Tramlink have also developed a number of options for stabling and maintenance facilities east of Croydon which would be required for a fleet larger than 38 vehicles (34 by 2016 with option for four more) . The additional sidings/light maintenance shed would offer additional resilience to the network which is cut in two by shared running in Croydon town centre.

This year's forecast is slightly lower than the 14/15 LANP due to the amount of closures due in 15/16 for track replacement works due to obsolescence and capacity enhancement, and the Connected Croydon works (LBC urban improvement programme of improvements).

A number of extensions to the network have been developed to preferred alignment stage including Crystal Palace and Sutton. These remain unfunded.

Customer Satisfaction - CSS - Figure 132



Tramlink is expected to achieve its CSS target for 14/15 (a score of 89). This is despite impacts to journeys during the double tracking and additional platform for the Wimbledon Enhancement Programme and the London Borough of Croydon's Connected Croydon project, which have both seen service disruption in the town centre for a sustained period of time. The continuation of these projects will continue to have an impact on services over the next two years and this prolonged disruption is likely to temper CSS in 15/16 and 16/17, before returning to current levels in 17/18.

There is not expected to be any further improvement in CSS because while capacity increases will lead to an expected uplift in passenger numbers, Tramlink are also having to sever a number of direct links to West Croydon (this will also negate some of the effects of the introduction of grade crossings on Wellesley Road which is part of the Connected Croydon programme).

Cost Summary (£m, outturn) - Table 31

Commercially sensitive information removed

Total Revenue: Tramlink revenue is expected to grow year-on-year throughout the plan. This is a product of the increase in demand for services and assumed fare rises. Westfield is expected to open in 19/20, with subsequent passenger growth from then, although this is offset by passenger disruption in the previous two years.

Operating Expenditure: this accounts for the majority of Tramlink costs, and the largest proportion is payments to the operator (TOL). The uplift in operating costs from 15/16 is due the running of additional services to Wimbledon following completion of the Wimbledon enhancement project. Vehicle maintenance, in-house asset maintenance and overheads account for the majority of the remaining opex costs.

Capital Expenditure: expenditure in the first two years of the plan is focused on the Wimbledon Enhancement Programme (£22.8m over 14/15 and 15/16), which will add an additional 4 trams per hour to the service by Spring 2016. The remaining expenditure focuses on the renewal of core assets (i.e. track), capacity enhancements, mid-life refurbishment of rolling stock and upgrading the Tramwash (to be completed in 15/16).