London North Western

Summary Route Plan:
Foreword

This document is a key building block that forms part of Network Rail’s Control Period 5 (CP5) Strategic Business Plan. It sets out the relevant outputs, activity and expenditure at route level to achieve the specified national outputs. It also forecasts long-term activity and expenditure at Route level to demonstrate that the Route is delivering CP5 outputs based on a sustainable whole-life, whole-system basis and should be read in conjunction with the other plans that have been produced.

This Route Plan is the first to be produced by the London North Western Route following devolution within Network Rail. It details how we will apply engineering and operational ‘localism’ to deliver improvements in the safety, reliability, efficiency and affordability of our railway infrastructure. It demonstrates our commitment to providing a sustainable railway that is real value for money, by building and operating it in a cost efficient manner.

The route will be transformed over the course of Control Period 5. Our ambitious and exciting investment plans will deliver widespread electrification, facilitate the introduction of new rolling stock, open up new rail routes and transform some of our key stations, whilst accompanied by an intensive programme of infrastructure renewals.

This investment in rail infrastructure will play a large role in spreading long term economic benefits across the route, and in this wider context we are conscious of the need to reduce the level of taxpayer support for the rail industry.

We know that our industry is under great public scrutiny and faces tough challenges to drive down costs. In response, this Route Plan places significant focus on operating, renewing and maintaining the infrastructure on a minimum whole-life, whole-system cost basis.

Devolution
The transition to become a devolved Route during the remaining years of CP4 has already started to yield positive changes in how the LNW operates. Some of these improvements have been most prominent in system sustainability and the culture in which the Route operates. Defining our engineering workbanks has involved more area-based decision-making by local engineering expertise.

The extensive changes we are making to our business, structurally and culturally, make this an exciting time for our people; such changes bring more responsibility, local planning and a real opportunity for changing the way in which we operate our railway. Devolution helps focus the route team on the key elements of this plan, and our people are committed to tackling and overcoming challenges to delivery.

Partnering with Stakeholders
Furthermore, there has been strong enthusiasm and engagement with key internal stakeholders during the construction of this plan.

Delivering our plans and meeting our ambitions means we need to partner with our stakeholders and work far closer with those who influence our supply chain and deliver for us. But this is only the beginning of the process; we need to lay robust foundations for subsequent Control Periods and we believe that this Route Plan achieves this. There remains a great deal to be done through working with other industry stakeholders which, over time, will undoubtedly improve the robustness of our plans and help deliver upon our promises to the railway.

Performance and capacity
The level of performance in CP5 is broadly the same as at the exit for CP4, but the challenge will be to maintain performance during CP5 whilst we carry out a major programme of enhancements and renewals. The increase in passenger demand heavily influences performance and reliability factors, these are just some of the challenges we face to maintain performance levels. Despite the network becoming further congested and services getting more crowded, performance results within our route during CP4 have actually improved year on year reflecting our best ever performance.

We believe that this plan provides a good overview of the issues faced by the route during the next Control Period, how we intend to meet them, the possible risks to delivery and the mitigations that we believe will control them. LNW Route will play a key role in delivering the overall Network Rail strategy for CP5.

Dyan Crowther, Route Managing Director
Jane Simpson, Director Route Asset Management
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Route overview

The London North Western Route is the largest Network Rail route and is often recognised as the backbone of the rail network. The route’s safety record continues to improve, our operating costs are steadily reducing, demand in our railway is rapidly increasing and overall the network is more reliable.

The London North Western Route equates to 24% of the overall business. The route is divided into four geographical operating areas and hosts 10 maintenance delivery units for 4,500 miles of the network, accommodating a diverse mix of traffic.

The ‘spine’ of the route is the West Coast Main Line (WCML), one of the UK’s priority Trans-European Network (TENS) corridors and the busiest mixed-traffic corridor in Europe. The LNW Route stretches 311.5 miles from London Euston to Scotland and links four major cities – Birmingham, Manchester, Liverpool and Glasgow.

There are 13 Train Operating Companies and 6 Freight Operators traversing the network, either moving various commodities or supporting local economies by linking major cities and smaller towns and villages.

Route Structure

Operations
The route has four geographical areas, each managed by a General Manager (GM) and each GM area is responsible for the day-to-day management of the railway. Two of the GM areas (Central and Merseyrail) are divided into sub-areas due to their size and nature.

Control Centres
The route has two Integrated Control Centres (ICC), located in Manchester and Birmingham, which it shares with lead operators. Other lead operators (Chiltern Railways and Cross-Country) maintain separate Control Centres to suit their business requirements.

Maintenance
The Route has 10 Delivery Units (DUs), which manage 52 area-based maintenance depots. The infrastructure asset type and the criticality of the route determine the type of maintainer expertise and fault team coverage at each depot. Each DU has an Infrastructure Maintenance Delivery Manager (IMDM) who is responsible for the day-to-day management of maintenance activity and indirectly orchestrating fault response.
The LNW Route incorporates four geographical planning areas

**Route H West – Cross Pennine and North West**

Route H is a mixed-use railway, incorporating the main cities and urban areas in North West England. The rural corridors provide an economic lifeline for many small villages as train services bring access to education, employment and heath amenities. The route serves a substantial and growing commuter market for rail services into Manchester, Liverpool, Leeds and Sheffield and, to a lesser degree, Preston, Cumbria and Pennine Lancashire.

The stations across the North West form the origins and destinations for a variety of journey purposes whilst providing suitable nodes for onward connections. Route H includes long distance flows on the interCity West Coast line from London Euston and CrossCountry/inter-urban services from the West Midlands and beyond, as well as important cross-Pennine flows between Yorkshire and the North West. Manchester and John Lennon Airport (Liverpool) are key destinations for leisure and business passengers.

Substantial freight flows link the container ports at Felixstowe, Tilbury and Southampton with the intermodal terminals at Manchester Trafford Park, Ditton and Garston. The Liverpool Docks, Peak District quarries and Manchester waste terminals generate major traffic and there are also significant flows of coal using the West Coast Main Line and Settle – Carlisle route. The Cumbrian coast area caters for specialist rail services for the nuclear industry.

**Route M – West Midlands and Chilterns**

Route M encompasses the rail networks in the West Midlands and the Chiltern mainline, which runs between London Marylebone and Birmingham. The West Midlands area is the heart of the national rail network, with many interCity, inter-urban and suburban rail services traversing the three central Birmingham stations (New Street, Moor Street and Snow Hill). New Street is a primary interchange station for many destinations across the network and a destination for local services supported by the local Integrated Transport Authority (Centro). Birmingham International station provides rail access to Birmingham Airport (via an Air-rail link) and the National Exhibition Centre.

The Chiltern main line serves long distance, commuter and leisure markets as well as occasionally forming a strategic diversionary route for WCML passenger and freight services when there is planned disruption. Some local services from London Marylebone use the London Underground (LUL) Metropolitan line between Harrow-on-the Hill and Amersham to Aylesbury Vale Parkway.

**Route N – West Coast Main Line**

The WCML London and South East England to the West Midlands, North West England and Scotland. An intense and diverse mix of passenger and freight traffic utilises the WCML close to 20 hrs each day; it is one of the busiest rail corridors in Europe, reflected in its designation as a priority Trans-European Networks (TENS) route.

As a major interCity route, it supports long-distance high-speed services from London to the West Midlands, North West, North Wales and Scotland. Long-distance services also operate from London Euston via the Trent Valley lines, which serve Nuneaton, Tamworth and Lichfield Trent Valley. Inter-urban services also operate on the route, supporting commuting into London (Euston) from Rugby, Northampton and Milton Keynes, in particular.

Branch lines, off the core route, support local/regional services and Community Rail lines, such as the lines from Watford Junction to St Albans Abbey, Bletchley to Bedford and between Kidsgrove and Crewe.

The route provides a critical North – South spine route for freight between the Channel Tunnel and the southern ports to terminals in the West Midlands, North West and Scotland.

**Route O – Merseyrail**

The Merseyside routes are largely radial in nature and connect central Liverpool with the rest of the Merseyside region. There are two core lines: the Wirral Line has a circular route in central Liverpool and runs under the River Mersey to the Wirral, with routes to Chester and West Kirkby and branches to New Brighton and Ellesmere Port; and the Northern Line which operates from Hunts Cross in the south to Liverpool Central and Moorfields, with branches to Southport, Kirkby and Ormskirk.

There is no major freight traffic on the route.
**Route strategy**

Our strategy outlines the route’s journey to sustainably renewing, maintaining and operating the railway efficiently on a whole-life, whole-system cost basis. It builds on the successes that the industry has achieved over Control Periods 3 and 4 to underpin the plans for CP5 and projections for subsequent Control Periods.

This Route Plan articulates the LNW Route strategy for operating, maintaining, renewing and enhancing the rail network in the final two years of Control Period 4 (to March 2014) and sets out the Route’s strategic direction for Control Period 5 (to March 2019).

The transition to becoming a devolved Route during CP4 has started to yield positive changes in how the Route operates. Some of these improvements have been most prominent in system sustainability and the culture in which the Route operates. In particular, there has been strong enthusiasm and engagement with key internal stakeholders during the construction of this plan.

Devolution has introduced additional efficiencies by placing the Route closer to the customer and is driving innovation and promoting investment-based local decision-making.

Total average passenger demand in the last year across the Route increased by more than 2.4% and freight demand also continued to grow steadily. Similarly, between 2010 and 2011 passenger through-put increased at our managed stations; for example, at London Euston the increase was 16% and at Birmingham New Street it was 9%.

In CP5, thirteen franchises will be due for re-letting for lead and non-lead Operators which are likely to affect performance expectations and ambitions for the Route, as well as the way in which performance planning and delivery is conducted.

**Baselining**

The route applied a ‘building block’ methodology to develop and measure the potential impact the variations in policy, previously committed enhancements (CP4) and HLOS project proposals will have on the Route’s expenditure forecasts in CP5. We started with the baseline expenditure projections for operating, maintaining and renewing the steady-state network, then overlaid distinct ‘Steps’ to determine the incremental costs associated with enhanced infrastructure investments. Adding these tiers together enabled the Route to calculate a gross funding requirement across CP5.

**Route availability**

The route is developing more innovative ways to balance the needs for access to the network. These include exploring the financial trade-offs and strategies that ultimately reduce the impact of disruption to the passenger. Some of these strategies touch upon delivery methods, technological advancements and working patterns. It is anticipated that these will help the route deliver upon the promises it made to help our customers grow their weekend travel markets.

**Enhancements**

The route will seek to exploit, where practical, opportunities to align enhancements with asset renewals or refurbishments. Similarly, future asset work-banks have been carefully assembled with alignment synergies and efficiency in mind. In some cases, it has been prudent to profile certain asset renewals across future years in order to maximise whole-life cost.
Our customers and stakeholders

The Route hosts a significant number of train and freight operators with which we take pride in promoting a partnering relationship. We also recognise that the quality in a service or a product is not just about what you put into it; it’s what our customers get out of it that matters.

Passenger Operators

Arriva Trains Wales
ATW operates long distance services between North Wales and Manchester via Warrington Bank Quay and Stockport, between mid-Wales and Birmingham International via Wolverhampton, and between South Wales and Manchester via Hereford. ATW also operates local services between Crewe and Chester and Wrexham to Bidston.

The Arriva group was awarded the Wales and Borders franchise in 2004 for a 15-year term.

Chiltern Railways
Chiltern Railways operates services on the main line between London Marylebone to Birmingham Snow Hill and also between London Marylebone and Aylesbury Vale Parkway. These services support long distance, local commuter and leisure flows between Birmingham, London Marylebone, Banbury, Leamington Spa, High Wycombe and Aylesbury. A small number of services also operate to Kidderminster and Stratford-upon-Avon, offering these towns a direct link to London.

The Chiltern Railways franchise commenced in 1996 and in 2002 a new 20-year franchise was awarded in return for commitments to invest in network enhancements.

Its long franchise period is currently unique to Chiltern and this franchise length has provided the operator with opportunities to invest in major infrastructure modifications to support its business development requirements. Enhancements have been delivered through the Evergreen Project, which is currently in its third phase and has successfully implemented capacity increases and journey time improvements on the main line. Recent improvements delivered as part of Evergreen 3 have permitted 100mph running on an additional 50 miles of the main line route, helping to deliver significant journey time improvements.

CrossCountry
CrossCountry provides long distance intercity and inter-urban services outside London, linking Scotland and the North East with the East and West Midlands, the South West and the South Coast. Birmingham New Street is a key interchange point for all CrossCountry services.

The CrossCountry franchise was awarded in November 2007 and is due to run until April 2016.

East Midlands Trains
East Midlands Trains operate the service between Derby and Crewe via Stoke-on-Trent and between Liverpool Lime Street and Nottingham then on to Norwich.

The East Midlands Trains franchise commenced in November 2007 and, subject to achievement of performance targets, runs to March 2015.

First Great Western
First Great Western operates long distance services between Hereford and London Paddington via Worcester and local services between Banbury and Oxford and between Worcester and Great Malvern.

The franchise commenced in April 2006 for a period of 10 years, with a possible break point after seven years.

London Midland
London Midland is the principal operator of inter urban and suburban services in the West Midlands area. It operates local commuter services from the central Birmingham stations to destinations in the West Midlands region including Worcester, Leamington Spa, Stratford-upon-Avon, Coventry, Wolverhampton, Walsall, Hereford, Redditch and Lichfield. Local services also support commuter travel between urban centres outside central Birmingham, including Nuneaton, Coventry, Shrewsbury, Wolverhampton and Hereford and Worcester.

London Midland also operates longer distance services between Birmingham New Street and Liverpool and between Liverpool/Crewe to Birmingham and London Euston (via Northampton).

The London Midland franchise was awarded in November 2007 for a period of eight years.
London Overground Rail Operations Limited
London Overground Rail Operations Limited (LOROL) operates the services on the DC Lines between London Euston and Watford Junction. The concession is let by TfL and runs for seven years from 2007.

London Underground Limited
London Underground Limited (LUL) Bakerloo Line services operate on the DC lines between Queens Park and Harrow and Wealdstone.

Merseyrail
Merseyrail is the principal operator of services within the Merseyside area, operating a fifteen-minute frequency service on the third-rail DC lines, and, with connections, serves commuter and leisure markets between Liverpool and North Wales, Chester, Preston and Southport.

The current franchise, owned by Merseyside Passenger Transport Executive, operates under a consortium for 25 years, due to run until 2028. The franchise is operated by Abellio and Serco.

Northern Rail
Northern Rail is presently the largest operator providing local commuter and inter-urban services, operating around Cheshire, Merseyside, Greater Manchester and Lancashire and Cumbria in the North. It connects to the North East via five routes across the Pennines – the Hope Valley via Huddersfield, the Calder Valley, Settle to Carlisle and Newcastle to Carlisle. Services also extend into the North Midlands, in particular North Staffordshire and to Buxton in the Peak District area of Derbyshire.

The franchise is due to run until April 2014.

Southern
Southern provides an hourly service linking East Croydon (via Clapham Junction) to Watford Junction and Milton Keynes Central.

The franchise runs to July 2015 with the option for extension to 2017.

TransPennine Express
TransPennine Express (TPE) operates regular inter-urban services throughout northern England, including services from Manchester Airport to Preston, Blackpool, Barrow-in-Furness and Windermere. Its services also link the North West and the North East along the Liverpool, Manchester, Huddersfield, Leeds, York, Newcastle, Bradford and Sheffield rail corridors.

In addition, TPE operates an hourly service between Manchester Airport and Edinburgh and Glasgow.

The current franchise has recently been extended in a way that incorporates the flexibility to terminate the franchise between April 2014 and March 2015.

Virgin Trains
Virgin Trains operates long distance passenger services between London Euston, the West Midlands, the North West, North Wales, Glasgow and Edinburgh. Virgin Trains will continue to operate services on the West Coast Main Line until at least 2014 following a wider review of the franchise bidding process.

Open Access Operations
In addition to the franchised passenger operators listed above, there are open access operators which hold licences to run supplementary services on parts of the network.

West Coast Railway Company Ltd operates to various chartered destinations and has access to maintenance and stabling facilities at Crewe.

Other open access operators with aspirations to run services on LNW include Alliance Rail Holdings (for direct services from Leeds/Bradford Interchange/Blackpool and Carlisle to London) and Grand Central Railway Company (for services between London Euston and Blackpool). Both companies have applied to the Office of Rail Regulation seeking track access rights for these proposed services.
Freight Operations

Britain depends on a robust rail network to move freight promptly and reliably across large parts of the country. Nationally, rail freight plays a pivotal role in reducing road congestion and carbon emissions; it is estimated that each freight train takes about 60 HGVs off the road.

The growth in rail freight on LNW has been a tremendous success story during CP4. CP5 brings new challenges and the Route is actively preparing to support its continued success by developing strategies that embrace the anticipated CP5 funding for the Strategic Freight Network (SFN) and third party investments to expand and develop freight terminals.

In common with other intermodal rail services, high levels of right-time performance are paramount given rail's role within a much larger distribution network for the major supermarkets and logistics suppliers.

DB Schenker Rail (UK) Ltd
DB Schenker Rail (UK) Ltd is the largest freight operator in Great Britain. It is organised into three market-based groups:
- Construction (including aggregate, cement, domestic waste and infrastructure services)
- Industrial (including the movement of raw materials such as coal, metal and petroleum products)
- Logistics (which offers supply chain services for international and intermodal services).

Core flows for DB Schenker on LNW are Domestic Intermodal, Channel Tunnel traffic, Maritime Intermodal, Royal Mail services, Automotive services, Oil, Coal, Steel, Scrap products and Infrastructure services for Network Rail.

Direct Rail Services
Direct Rail Services (DRS) is a wholly-owned subsidiary of the Nuclear Decommissioning Authority (NDA) and operates core flows from DIRFT to Scotland (Mossend, Coatbridge and Grangemouth), to South Wales (Wentloog) and to Purfleet.

Freightliner Group Ltd
Freightliner operates throughout Great Britain and has two divisions: Freightliner Limited and Freightliner Heavy Haul Limited.

Freightliner Ltd is the largest rail haulier of deep sea maritime containers. This traffic type is expected to grow for all operators following enhancements to gauge on both Southampton and Felixstowe routes.

Freightliner Heavy Haul Ltd is a significant conveyor of bulk freight and its core flows on LNW are Coal, Aggregate, Cement, Waste and Infrastructure services for Network Rail (for network maintenance).

GB Railfreight (GBRf)
GB Railfreight operates many services throughout Great Britain including container services from Felixstowe, coal and biomass to power stations and infrastructure services for Network Rail. On LNW, its core flows consist of Maritime Intermodal traffic, importing Channel Tunnel volumes, Biomass, Rolling Stock delivery movements (recently London Underground) and Infrastructure services for Network Rail.

Colas Rail
Colas Rail operates a small number of daily services including timber traffic from Carlisle to Chirk and also steel traffic from Immingham to Washwood Heath.
Key Stakeholders
The Route has a large number of key stakeholders that range from the Office of Rail Regulation and the Department for Transport through to Transport for London and the large number of local Government Offices (Metropolitan and County Councils).

In addition, the Route accommodates three Integrated Transport Authorities (ITAs) which are responsible for specifying and implementing local transport policies. Network Rail has a significant role in supporting local transport policies and promoting public transport in local regions. The Route is therefore committed to developing and embracing the close partnership arrangements that it has in place with the ITAs:

- **Centro** is the West Midlands Integrated Transport Authority. It promotes and develops public transport (bus, rail, tram) across the seven District Councils which make up the West Midlands County – Birmingham, Coventry, Dudley, Sandwell, Solihull, Walsall and Wolverhampton.

- **Transport for Greater Manchester (TfGM)** is the public transport body responsible for co-ordinating public transport services (bus, rail, tram) throughout the ten local authorities in Greater Manchester area.

- **Merseytravel** is the operating name for the Merseyside Integrated Transport Authority (ITA) and Merseyside Passenger Transport Executive (PTE). The Authority is responsible for overseeing and coordinating the public transport network (bus, rail, Mersey road tunnels and Mersey Ferries) in the Merseyside area.

- **Merseyrail** is a unique structure, under which rail services have been delegated by Parliament to the Merseyside Integrated Transport Executive. There is a concession agreement between the operator (Serco and Abellio) and Merseytravel.

- **Transport for London (TfL)** is the integrated transport body responsible for the Capital's vast transport system. Similar to the ITAs, the primarily role is to implement the Mayor’s wider transport strategy for London and manage transport services across the capital for which the Mayor has responsibility. TfL public transport responsibilities include London’s buses, London Underground, Docklands Light Railway (DLR), London Overground, Tramlink, London River Services, Victoria Coach Station and promoting a range of walking and cycling initiatives.
Route safety improvement plan

Safety is the route’s number one priority and we have one clear objective which is to achieve a culture of zero harm, where everyone goes home safely, every day. Safety will continue to be reported every period and measured by the Passenger Safety Indicator and Fatalities and Weighted Injuries. This provides us with an ongoing tool for continuous measurement of the success of our Route Safety Improvement Plan.

Neglecting safety has the potential to affect the lives of our employees, passengers and the travelling public. Other consequential impacts are the knock-on effects to train performance, our reputation and our financial position. The route believes that the key to managing safety successfully is to understand and control the risks associated with operating the business.

The route has developed a Route Safety Improvement Plan (RSIP) which is aligned to Network Rail’s corporate direction on safety and takes into account local needs. The RSIP is linked to the route’s key risk areas, which follow Network Rail’s key safety risk areas of: workforce, public and passenger safety.

<table>
<thead>
<tr>
<th>Area</th>
<th>Principal Risks</th>
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<tbody>
<tr>
<td>Workforce Safety</td>
<td>• Track worker safety</td>
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<tr>
<td></td>
<td>• Leadership and Competence</td>
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<tr>
<td></td>
<td>• Engagement</td>
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<td></td>
<td>• Well being</td>
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<td></td>
<td>• Designing in safety</td>
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<tr>
<td>Public Safety</td>
<td>• Level crossings</td>
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<td></td>
<td>• Suicides</td>
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<td></td>
<td>• Trespass</td>
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<tr>
<td>Passenger Safety</td>
<td>• Trains passing signals at danger</td>
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<tr>
<td></td>
<td>• Passenger safety at managed stations</td>
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<td></td>
<td>• Passenger interface between train operating companies and NR managed stations</td>
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</tbody>
</table>

The plan details the key ‘hard’ outcomes for each risk area. As our safety culture continues to improve, we have established a guide of ‘softer’ measures to help determine how close we are to achieving our aim.

<table>
<thead>
<tr>
<th>We will see…</th>
<th>We will hear…</th>
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</thead>
<tbody>
<tr>
<td>• People working safely</td>
<td>• ‘Management don’t want us to break the rules’</td>
</tr>
<tr>
<td>• Well managed risks</td>
<td>• ‘We know and understand why the rules are here’</td>
</tr>
<tr>
<td>• Designed in safety</td>
<td>• Praise for working safely</td>
</tr>
<tr>
<td>• Better understanding of each others roles</td>
<td>• People talking about their errors and not hiding them</td>
</tr>
<tr>
<td>• Closer working with more challenge</td>
<td>• People being comfortable with safety and not just process driven</td>
</tr>
<tr>
<td>• Consistency</td>
<td></td>
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<tr>
<td>• Individual and team responsibility</td>
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</table>

Having identified the route’s key risk areas, various view points determined the gap between where the route is currently and where we want to be, using the approach above.
**Risk management**
Effective risk management is vital to proactively and sustainably improving safety. The route will continue to use the well defined risk assessment and control principles to identify and reduce hazards. Once identified, we determine the risk and apply sensible risk elimination or control measures using the established ‘so far as reasonably practical’ test.

**Assurance**
It is important that the Route Safety Improvement Plan has strong governance arrangements in place to ensure that it is doing what it seeks to achieve. To facilitate this, the route will use six key assurance arrangements described in the table below.

<table>
<thead>
<tr>
<th>Arrangement</th>
<th>Description</th>
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<tbody>
<tr>
<td>Route’s Business Risk Management Programme</td>
<td>Standard business risk management approach taken to identify risks to the delivery of the RSIP and the implementation of the necessary controls. Reviewed by Route Executive quarterly.</td>
</tr>
<tr>
<td>Network Rail’s NCAP Audit Programme</td>
<td>Undertaken by Network Rail’s Safety &amp; Sustainable Development audit function. Audits seek to determine the level of compliance against management standards. Standards determined by risk.</td>
</tr>
<tr>
<td>Route Safety Steering Group</td>
<td>In CP4 the route established a Route Safety Steering Group which comprises of members of the Route Executive and the route’s lead Trades Unions Safety Representatives. One of the roles of this group is to review the strategy and the tactical actions being taken to ensure that they are having the desired affect on the risks identified.</td>
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<tr>
<td>Line Manager self assurance process</td>
<td>Line managers are asked on an annual basis to complete a legal compliance type check list associated with basic safety legislation. The results of which are used to identify trends which feedback into the tactical actions to be taken.</td>
</tr>
<tr>
<td>Planned General Inspections</td>
<td>Undertaken by Line Managers in both Operations and Maintenance these are periodic inspections of the workplace. The results of which are used to identify trends which feedback into the tactical actions to be taken.</td>
</tr>
<tr>
<td>Safety Tours</td>
<td>Undertaken by the route’s Senior Leaders they are less structured than Planned General Inspections and whilst they focus on an element of physical hazard identification they are more focused on understanding the culture of the workplace. Again the results of these are used to identify trends which feedback into the tactical actions to be taken.</td>
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Workforce safety

Safety is everyone’s responsibility and everybody is accountable for their own safety. The route will continue to promote the culture where everyone not only follows rules, but is prepared to speak out, speak up and contribute to solution generation.

The route employs around 6,500 people and a significant number of contractors who help support the CapEx organisation, primarily in the renewals and maintenance activities.

The Route has two targets in the area of Workforce Safety which are:
1. **REDUCE** employee and contractor reportable accidents
2. **INCREASE** accident and close call reporting levels.

In order to achieve these goals the following work streams will be focused upon during CP5.

**Safety leadership and culture change**
This is a national programme being driven by Network Rail’s Safety & Sustainable Development Team. The Route will continue to utilise the tools that the programme offers.

**Life Saving Rules**
During CP4 the route is introducing a set of ‘life saving rules’, which aim to address the highest risk activities undertaken by our people, those being:

- Being hit by a train
- Working with electricity
- Working at height
- Working with moving equipment
- Driving.

In order for the rules to be ‘how we do things round here’ the route will continue to embed them into the route’s culture throughout CP5.

**The Big Picture**
This is a behavioural change programme aimed at employees and uses a ‘picture of working life’ to facilitate a coaching discussion between the team and their manager. The purpose is to establish what things are really like, what is stopping them achieving the safety goals and culture they want and crucially, how they can overcome these blockers.

These workshops are due to commence during the latter part of CP4 with a new workshop (and a different picture) running on a six monthly cycle. Currently the picture is defined by the national programme; however, during CP5 the route intends to take more ownership of this by creating its own.

**Safety conversations**
A well known driver of safety culture is the level and commitment shown to safety by the organisation’s leadership team. The Safety Conversations programme aims to help Network Rail’s Executive and Senior Leaders improve the way in which they have effective conversations with their people about safety. The programme is supported by targeted coaching post intervention.

The route intends to use this programme during CP5 and deploy it to a wider audience than just the relative small number of Executive and Senior Leaders. The objective is to embrace a larger population of people managers.

**Leadership**
As outlined above leadership is fundamental in improving safety, though traditional approaches focus on people at very senior levels in organisations. However any manager of people is a safety leader; therefore, the route will continue to help its managers understand their safety responsibilities – taking more ownership of day to day safety issues.

**Culture and behaviours**
Improving safety is inextricably linked to improving the overall organisational culture. The route is firmly committed to developing and promoting a culture which is based on trust and transparency. During CP5 the route will focus on making safety decisions more transparent to help the route’s managers to talk those on the front line about safety in a way that is open and drives debate. Similarly the route will focus on creating a culture where people can point out about errors or mistakes knowing that they will be treated fairly and consistently. The primary drivers will be learning and development, unless there is clearly blatant disregard for safety.
Excellence
All too often Health and Safety is about disciplinary action when people have not followed a safety rule or forgotten to wear their protective equipment. Whilst there is a place for such action, praising people for working safely is as, if not more, important. During CP5 the route will continue to focus on promoting this approach and identify and publicise ‘workforce heroes’.

Similarly the route will continue to ‘shout about’ its safety improvement programmes that make a real difference both internally and within the rest of the organisation in order to say ‘well done’ and promote organisational learning.

Track worker safety
The principal risk facing people working on or near the line is the obvious factor of being hit by a train. The Life Saving Rule is primarily related to helping reduce this risk.

During CP4 the route has moved progressively towards the use of a Green Zone working environment rather than using Red Zone protection. However, achieving 100 per cent of Green Zone working is challenging, primarily due to the density of traffic and restrictive engineering access arrangements being in place. It is anticipated that the introduction of plain line pattern recognition technology will help the route reduce further the incidences of Red Zone working. Additionally, the route will be deploying T-COD devices where track circuits are installed; this enables an increased level of protection to workers through the maintaining of signals at danger.

At locations where Red Zone working remains, the route will continue to use LOWS and TOWS technology in parallel with exploring new alternative methods and technology.

Manual handling
Injuries as a result of lifting and carrying items are one of the top accident causes within the industry and the route. The route will continue to manage these risks. However, as well as managing accidents the route needs to think about the longer term impact of manual handling on workers who will be working for potentially a considerably long time.

Taking cognisance of this during CP5, the route will increase focus on looking at ways to eliminate or significantly reduce the need to manually handle items and looking outside the industry to utilise alternative thinking.

Health promotion and education
As outlined above with the changes in working habits and expectations it is important the route takes a longer term view of employees’ health. In CP5 the route will look to expand the current Health Fair programme to include all parts of the route, contingent labour contractors and its lead Train Operating Companies.

Slips, Trips and Falls
Slips, trips and fall type accidents are likely to continue, especially around areas on or near the line due to poor underfoot conditions. However, the route anticipates the frequency and severity will reduce through the continual promotion of the risks and modest investment; for example, improving the lighting and installing walking routes.

Electricity
Working on or near live electricity is a hazard of working on an operational railway which is likely to increase as the route moves towards more electrification. The route has overhead line and DC conductor rail so electrical arrangements for working safely with electricity are well understood.

In CP5 the route will focus on trying to improve further these arrangements to find other ways work can be done with the DC conductor rail isolated and this is linked to the Red – Green Zone work outlined above.
Public and passenger safety

Passenger volumes are estimated to dramatically increase throughout CP5 and the route will focus more on improving passengers’ experience of the railway. In 2011/12 over 139 million people passed through one of our 4 managed stations and many more travelled across the route.

In CP5 the route will focus on Level Crossings, Route Crime incorporating theft and vandalism, as well as suicide prevention.

Our aims are to, by the end of CP5:

- **REDUCE** the route’s level crossing risk, through various initiatives which include, where practical, the closure of level crossings.
- **REDUCE** suicides on the railway and linked reduction in train delay and cancellation.
- **REDUCE** the number of trespass incidents and linked reduction in train delay and cancellation.
- **REDUCE** the amount of vandalism and theft and linked reduction in train delay and cancellation.

**Suicide prevention**

Sadly the railway is an easily available choice for people wishing to end their own life, the route has taken steps throughout CP4 to reduce the ‘attractiveness’ of the railway to those people who intend to commit suicide.

The Route will continue this work in CP5 looking to work in a more expansive way with the Samaritans, install additional prevention hardware, e.g. fencing, intelligent CCTV and the introduction of a dedicated suicide prevention role.

The Samaritans partnership on the route has also promoted a proactive and focus approach on reducing fatalities/suicides. This category has proven more difficult to mitigate, but the CP5 plan will contain continued and fresh initiatives, particularly on the West Coast route.

**Route crime theft and vandalism**

The issue of Route Crime is broad and one that impacts not only safety, but train performance and the overall cost of running the railway. Throughout CP5 the route will ramp up its activities in this area by building on previous work undertaken.

To prevent route crime hotspots, the route will specifically focus on trespass, vandalism and engaging the wider communities we operate in. Strategies developed in CP4 to reduce cable theft have been successful over the past 18 months and the continuation of this strategy in CP5 is important.

**Passenger safety**

**Seasonal management**

There are now more occurrences of extreme weather and the timings of seasonal change are shifting. This requires a proactive approach to preparing for seasonal and weather changes and where possible, pre-empting change using the tools available.

The Route has a successful, established process which works well; however, the route is taking the approach that there is always room to improve. The Route will partner with the Operators, in line with the Railway Operational Code, to further refine and improve the route’s seasonal arrangement and planning processes. These changes will be documented in the Seasonal Calendar. This will include reviewing the process in totality and exploring new technologies.

**Platform train Interface**

The route already has Joint Safety Improvement Plans with each of its four Lead Train Operating Companies, an element of which addresses this issue. During the latter stages of CP4 and throughout CP5, the route intends to increase focus in this area. The forthcoming refranchising provides an opportunity to specify improvements to reduce the risk further.

**Signals Passed at Danger (SPADs)**

A catastrophic risk for passengers is that related to a train passing a signal at danger and then hitting another train at the conflict point beyond.

The route will continue to use the existing Network Rail standard to undertake a risk assessment on signal overruns and where the risk is sufficiently high, take steps to reduce it either through protecting the signal by fitting the Train Protection Warning System or other methods like reducing line speed.

The route will continue to work with the Train Operating Companies and its own signalling community to reduce further the number of SPADs.
Slips, Trips and Falls
The route has, in CP4 established a working group focusing on safety improvements in managed stations aimed at reducing these accidents.

In CP5 the route will continue to focus on this and to help drive the necessary engagement each managed station will be asked to produce their own safety improvement plan based on their local issues whilst making use of Route resources and corporate knowledge.
Level Crossing safety

The route has nearly 770 Level Crossings. The risks associated with level crossings are well publicised and the consequences of not managing them effectively can result in severe reputational damage for the organisation and the industry as well as the obvious pain and grief for those involved.

The Route intends to continue to manage the risks associated with level crossing misuse and, to drive further improvements in our approach by:

- partnering with key stakeholders to find alternative, safer ways to cross the railway before closing the level crossing; and where this is not possible.
- introducing further risk control measures to reduce the chances of misuse.
- working collaboratively with the local community to educate people using the crossing about how to do so safely.
- taking enforcement action against those misusing level crossings.
- seeking innovative technologies to make level crossings safer if closure as the first option is not available.

This work will be aided by the introduction of dedicated Level Crossing Managers in the remaining years of CP4 and into CP5.

The Route’s intention, by the end of CP5, is to close a number of level crossings and further reduce the risks at others. The Route shall require a significant proportion of the £65m available nationally, which the route will want to manage independently. Over the coming months the route will be developing its view for the next control period to determine a detailed plan and scope costs.

MCB-OD

The MCB-OD level crossing technology is a fully automated system requiring no intervention from the signaliser in normal operations. As a standalone level crossing scheme or as part of a re-signalling, MCB-OD provides a re-control opportunity for locally controlled crossings. The technology has been successfully trialled on an operational crossing at Filey and is approved for use across the network.

Level Crossing risk deduction and closure

The Route anticipates a funding requirement from the England & Wales level crossing risk reduction fund to enable delivery of level crossing risk reduction and, where practical, to support complete closure.
Sustainable development

Sustainable development is “development that meets the needs of the present, without compromising the ability of future generations to meet their own needs”. Network Rail’s sustainable development aim is: “To deliver a railway fit for the future”

Environmental sustainability is increasingly important for the rail industry and the use of rail to move people and goods has been identified as critical to achieving the long-term goal of reducing carbon emissions. The route is committed to contribute towards these objectives and the Route Plan includes initiatives such as managing waste and recycling rail on to lower category routes. In line with Network Rail’s national policy, the route proposes to enhance its focus in this area.

**Sustainable Development Improvement areas**

There are a number of key areas where the route can make material changes in order to facilitate Network Rail achieving its Sustainability Objective:

- Safety & Wellbeing
- Energy & Resources
- Climate Change Adaptation
- Buildings & Land
- Environmental Protection
- Communities
- Accessibility & Inclusivity
- Employees.

**Energy and Resources**

Opportunities to reduce energy consumption, waste generation and generate green energy are widely available and in some places yet to be exploited. Additional opportunities to promote sustainability through maintenance activities and renewal investments are also open for development.

A large impact on sustainable energy production will be achieved through Network Rail’s Strategic Sourcing (SS) and National Delivery Service (NDS) working with suppliers to provide the most sustainable options for a range of resources; particularly electricity.

We will purchase from these business units to support the national framework contracts. This support will be maintained whilst SS and NDS are able to demonstrate the network-wide business benefits of a sustainable approach. Following the development of a self-generation policy setting out minimum requirements by Asset Management the route will ensure this is incorporated into our designs and will seek opportunities for this in the mean time.

The route has started to partner with passenger and freight operators to support energy efficiency improvements and exploit the potential to part-fund schemes and share benefits.

**Waste management**

The route will focus on managing waste through the life cycle of its creation by designing out potential waste creation in projects, reducing the amount of materials used and maximising the potential for recycling waste from all activities. Closer working with Strategic Sourcing will help maximise the efficiency of national waste contracts.

Closer partnering with the National Delivery Service to create a commercially viable method for the route to reuse materials is an area where greater focus will be applied. The route is also exploring ways in which to measure waste output. The data generated will enable the route to monitor and measure waste in order to drive waste improvements.

**Climate Change adaption**

The impacts of changing weather patterns and the perceived links with climate change are not fully understood. However, the route recognises that failures attributable to climate & weather are becoming more common and the consequences have a significant impact on the running of a safe and reliable railway. In order to build resilience into the asset, the plan proposes to include a modest funding mechanism designed to support Climate Change mitigation measures.

In addition, the route will support the wider industry programme FRACAS (Flood Risk Assessment under Climate Change). The programme is designed to educate local teams to ensure that climate change is adopted into the consciousness of the business.

The route’s asset management strategies and enhancement programs consider and design in environmental mitigation measures, e.g. raising location cabinets above changes in predicted flood levels. In order to obtain a better understanding, the route continues to work alongside the Environmental Agency to understand the predicted changes.
Buildings and land
The large number of buildings provides an opportunity to reduce energy consumption and improve energy efficiency. The route’s Accommodation Strategy proposes to rationalise and consolidate properties in order to reduce the number required. The replacement and refurbishment of structural assets across the route will be reviewed prior to expenditure and exploration of opportunities to improve the whole life cycle sustainability of those projects will be considered, e.g. retro-fitment of buildings with energy efficient technology.

The route is considering setting minimum specifications for sustainability in its buildings portfolio. The use of the national assessment tool (BREAAM) will be mandated and the industry recognised carbon calculator will be used to enable carbon output to be measured.

The route acknowledges the ongoing need to comply with the legislation associated with invasive species and Sites of Special Scientific Interest (SSSIs). The Route has established a budget for managing its activities in accordance with this legislation.

Environmental protection
NR has a legal obligation to protect the environment within which it operates. The Route will continue to work alongside the appropriate organisations to ensure ongoing operations; infrastructure maintenance; and, enhancement activities have minimal impact on the aesthetics of the environment and it surroundings. Any major projects will automatically have environmental impact assessments and will specify sustainable options to our suppliers using the S&SD guidelines.

Communities
The Route traverses major cities and numerous smaller towns, villages and rural areas. At present, the route’s policy is to be a good neighbour to the communities we operate in. Moving forward, the route will go beyond delivery of this policy by embracing partnerships with Local Authorities and involving the community to promote social regeneration.

Accessibility and Inclusivity
NR understands the important social role played by public transport in improving accessibility, minimising social exclusion and enhancing social cohesion. Network Rail has adopted an ‘access for all’ programme at stations which the route will continue to drive locally.

CP5
The Route’s CP5 activities are likely to include the following, taking into account Network Rail’s emerging view of them:
- Sustainable procurement
- Whole life approach to waste management and alternative uses for waste
- Working with our customers to improve their energy efficiency
- Self-generation of electricity
- Optimising weather resilience
- Climate change and plans for the impact on our assets and train performance
- Communication of or role in climate and weather resilience
- Sustainable new build and major refurbishment projects
- Energy/resource efficiency retrofitting
- Behaviour change to enhance energy efficiency
- Understanding and sustainable protection of lineside vegetation
- Performance risk associated with lineside neighbours land
- Establish, quantify and account for contaminated land
- Manage contaminated land appropriately
- Reflect management of contaminated land in investment plans
- Steps to reduce green house gas emissions and other pollutants
- Improvement in Operational environmental risk management.

Details on Network Rail’s Sustainability Policy can found at: www.networkrail.co.uk/publications/sustainability-update/2012
Route People Plan

People Development
Delivery of the outputs specified in the HLOS and those objectives set by the route need to be supported by the right processes and delivered by people with the right skills.

The further development of the route’s people, and honing of existing skills, feature high on the route’s list of priorities - as does retaining people with key technical capabilities.

The route has developed a Route People Plan which is designed to focus on the development of the route’s employees at all levels. The specific identification and development of those employees with the potential to progress within the organisation and contribute in key roles will be one of the primary elements. This will be achieved through a systematic process of talent identification and succession planning based on an understanding of people’s leadership and management capabilities. This information is used to drive robust development plans which maintain and enhance personal capability in line with the needs of the route.

Supported by the Professional Development and Training function, the route provides development for all areas of the business, from executive leaders and senior leaders to first, second and front line managers. Development interventions include:

- Senior programmes delivered by the University of Warwick, providing nationally recognised qualifications
- Increased focus on multi-skilling opportunities as new technologies are developed and deployed.
- Front-line programmes aimed at first, second and frontline managers, including the Practical Leadership Programme, Introduction to Management Programme, Team Leaders Development Programme and the nationally recognised Certificate in Leading and Managing Teams
- Coaching & mentoring.

The route also deploys the use of cross industry secondments and project based development, as well as offering industrial placements and a graduate development programme to attract and grow talent.

Additionally, in terms of technical and competence training the route is moving towards a system of role based capability rather than task based and monitoring via competence assurance systems. All front line employees will be trained on core technical skills as a minimum supplemented by specific technical skills (assessed as frequently/rarely used and deployed as required).

The route proposes to engage more closely with the Network Rail apprentice training scheme in order to offer wider engineering based training and progression opportunities. These are intended to include more involvement within the route Asset Management teams.
Route Performance Improvement Plan
Performance improvement plan

Operational performance and reliability will continue to be a key influence on the route’s investment strategy and decision-making process, as it has been throughout the route’s history. The delay minutes totals at the end of each year of CP4 have been better than the indicative targets included in the delivery plan for CP4, representing the route’s best ever performance.

Route Performance in CP4

The route has achieved year on year improvement during CP4, in spite of facing considerable performance challenges:

- The December 2008 WCML Timetable increased the train numbers and shortened journey times, plus all routes had additional services compared with CP3 exit position.
- Increase in Delay Per Incident (DPI).
- Unprecedented growth in passenger numbers.
- Increased freight traffic.
- Major projects (Evergreen 3 (Chiltern) and Birmingham Gateway).
- Two long, severe winters in 2009/10 and 2010/11.
- Evolution of cable theft as a major performance issue.

A number of these issues will continue to impact performance throughout CP5, e.g. continuing growth in passenger and freight markets and, the ongoing risk of external causations; such as, fatalities, cable theft and severe weather. In addition the level of committed enhancement and renewal activity will in itself import performance risk.

Projected CP4 Exit Points

Route performance targets for the remainder of CP4 have been agreed with Lead Operators through the 2012/14 JPPIP and Network Rail target-setting. We assume that we will achieve the targets and will exit CP4 at the level shown in the following tables. This will require significant effort and focus over the remainder of the Control Period as the targets are challenging and the route is currently behind target.

The challenging CP4 targets are an important factor when considering the CP5 target levels. The increased package of major enhancement schemes planned for CP5 presents a significant risk to maintaining CP4 performance levels.

The Route’s results for years 1-3 of CP4 and targets for years 4 and 5 are shown in the adjacent tables, with a breakdown by operator.
## CP5 Trajectories

The HLOS includes a requirement that the MAA of the combined PPM for train services in England and Wales should be 92.5% at the end of CP5 and the MAA for CASL should be 2.2%. As the biggest Route, LNW is conscious that its contribution will be key to the achievement of the output measures.

A range of PPM trajectories and an exit point for CASL have been produced for each of our lead operators, based on an initial assessment of risks and opportunities. They have been shared with our lead operators and the Network Rail National Performance team and represent our best estimate based on current knowledge. They should be seen as indicative at this stage and are subject to refinement through the Schedule 8 benchmarking process and JPIP planning with operators.

The Route delay minute trajectories were compiled using a mixture of Route and National team modelling.

### Indicative Route Delay Minute Trajectory

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### Lead Operators

#### Virgin Trains

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#### London Midland

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<tr>
<td>CASL MAA% Higher Exit Range</td>
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Key Performance Improvement Initiatives

Performance on the WML is fundamental to the route, and key performance improvement initiatives have been developed to help achieve the regulatory PPM target for Long Distance Sector services on this line. Particularly relevant to our CP5 Performance planning is the creation of two nationally-managed improvement initiatives designed to underpin CP4 delivery as part of the Long Distance Recovery Plan (LDRP). The schemes are at an early stage and, although targeted at CP4 performance delivery, they will also be relevant to CP5.

Enablers

- Development of unified performance system(s) with alliance partners – as the route moves towards working in alliance arrangements with each customer, this is expected to include much closer working within the respective performance teams. This may include unified systems and pooling of people resources.
- Rules Change – A review of existing Operational Standards and procedures.
- Freight Board outputs – A nationwide review of how freight trains interact with the network and establishment of initiatives to reduce delay to all network users.
- ORBIS – delivery of targeted, technology-enabled asset info should improve performance and safety through more efficient and effective maintenance and renewals.

Asset Performance Improvements

- Remote Condition Monitoring – Phase 3 of RCM implementation will be substantially complete at the end of CP4. The benefits targeted in CP5 are mainly cost efficiencies, but there will still be some performance benefit realised from increased understanding and use of the facility.
- Asset Stewardship initiatives – Asset Reliability Improvement plans will be developed to meet regulatory outputs. The Route will ensure that there is complete alignment and integration with JPIL plans.
- Auto reconfiguration of signalling power supplies – The provision of auto reconfigurable power supplies at various locations is included in this plan. The provision of such systems has already been successful at WCML locations, providing continuity of signalling in the event of cable theft or power supply failures.
- Enhanced Bridge Strike mitigation – The route has done significant mitigation within CP4 and further enhancements have been included in the CP5 submission.
- Level crossing closures – The route is fully engaged with the national Level Crossing risk reduction programme. Appointment of Level Crossing managers across the route will embed the programme further within the route. Over the duration of CP5, the route proposes the closure of at least 200 crossings through support from the various funding arrangements likely to be available.

Timetabling

- Development of timetable for performance – This project will review timetables and rules in conjunction with customers, in order to identify and eradicate pinch points and deliver a timetable that leads to performance improvements. Initial quick wins were identified for the December 2012 timetable but the main focus is on December 2013, which will be the timetable plan that takes the industry into CP5.
- Event Steering Groups – All significant timetable changes in CP5 will be designed using an all industry Steering Group to produce a timetable that makes the best decisions on trade-offs between capacity and performance.
- Further developments of ITPS – The Integrated Train Planning System has been upgraded to improve its reliability. Further developments of functionality are planned during CP5 to support the other timetable improvement work streams.

Real-Time Operations improvements

- Focus on Possessions – Nationally led programme to reduce possession over-runs with specific focus on management improvements for maintenance worksites.
- Traffic Management – A major national initiative to deliver a step change in industry performance by enabling the proactive management of traffic through integrated people, processes and technology. The migration to Traffic Management depends on the Network Operating Strategy and the creation of Rail Operating Centres. Traffic management will develop on the route within the latter stages of CP5.
- Control Centre actions – Nationally led initiative with two key constituents:
  - Increased intervention by the National Operations Control to support and guide routes, particularly in respect of major incidents.
  - Carry out a detailed survey of all activities and processes carried out in Route Controls, identify best practice and share across all controls.
- Innovation – The Route will continually seek to make the best use of innovation for performance improvement. Initial targets will be to investigate use of GPS for train reporting and utilising benefits of on-train Remote Condition Monitoring.
- Regulation Trials – Whilst the route chose not to take part in the regulation trial for Long Distance services, it has followed similar principles by agreeing to introduce additional Train Running Controllers within Birmingham control. The posts specialise in protecting the PPM and CASL of long distance services by monitoring the progress of services which are running close to failing either measure and positively intervening via signallers, station staff and Train Operator controls. The posts will be in place from December 2012 and are expected to save an average of five long distance services per day from failing PPM. Funding is via the Performance Improvement fund through to the end of CP4 and their continuation into CP5 is included in this Route plan.
- Red Route – A national initiative being trialled in late 2012. The aim is to define a geographic route section critical to performance of Long Distance services and develop specific actions to maintain the throughput of trains in their scheduled slots.
Key Performance risks
Incidents and events that have a negative impact on the operation of trains and the network pose a continuing risk to performance. The route has in place effective risk management practices to mitigate their impact and maintain high levels of performance. Risks can present themselves in a number of ways, as summarised below.

Renewal and enhancements schemes
The Route has a large amount of major schemes committed to be delivered in CP5 and a number of other equally significant schemes that are in early planning stages but not yet committed. Whilst it is planned that there will be performance benefits from these schemes when complete, many will have significant performance impact both during construction and post delivery through:
- Increased numbers of possessions being taken on the route
- Additional speed restrictions following engineering works
- Bedding in problems as new infrastructure and equipment settles down
- Time taken for staff to adjust to new layouts and working practices.

The Route will factor these risks into performance targets and trajectories.

Traffic Growth and Capacity
CP4 has seen unprecedented levels of traffic growth on the route and this is predicted to continue through CP5 and beyond. The predicted levels of traffic growth across the route, which have been factored into the performance plan, are shown in the LNW Route Data Book.

Right Time Railway concept (RTR)
The route is already involved in a number of Right Time Railway (RTR) projects with our customers. A commitment to the concept is one of the key values adopted by the route at devolution and we will accelerate and improve our contribution to RTR initiatives during CP5.

Cable Theft
We expect cable theft to be a significant factor in CP5, even though the number of incidents affecting performance has reduced in the latter stages of CP4. The Route needs additional funding in CP5 to continue three key initiatives which have reduced the number of incidents:
- Partnership with Smartwater – needs extended through CP5.
- Special Operations Team and Cable Theft specialist post – funded via Performance Improvement Team but only until the end of CP4.
- Provision of Scamp vehicles, pre-loaded with cable and jointing materials, available for 24/7 call out. This is funded until the end of CP4 and needs extended for CP5.

Further progress against cable theft will require a programme of target hardening measures (e.g. cable burying, fencing enhancements and CCTV camera deployment). This plan includes provision for a separate fund managed by the Route Cable Theft Specialist.

Fatality prevention and mitigation
The route introduced mitigation measures to reduce the impact of fatalities on performance during CP4, including operational changes developed with British Transport Police. We are seeking funding to continue to develop these initiatives and reduce the impact on performance.

Asset Performance
In CP4, the Route Performance Team has worked closely with Delivery Units and Maintenance Improvement on initiatives to improve asset performance which will continue in CP5 via the Delivery Unit Reliability Improvement Group.

During CP4, the Performance Improvement Fund has funded reliability initiatives and this will need to continue in CP5, or else the route will look to include provision for a Route Performance Fund managed by the Route Performance Manager.

Incident Management and passenger information
The very highest standards of incident management are essential to deliver good performance. Responsibility for this rests within the two Operations controls located at Birmingham and Manchester. The Route’s strategy is for train operators to commit to a time following each incident by which services will be operating to their normal timetable.

The Passenger Information During Disruption (PIDD) process has been enhanced in CP4 with the creation of Passenger Information Controllers in Birmingham control. Their remit is to ensure the best possible flow of operational information to Network Rail staff and train operators for dissemination to passengers. Creation of the posts allows incident controllers to concentrate on incident management and ensures that the provision of operational information is carried out to a consistently high standard.

To bring further improvements to PIDD during CP5, we wish to secure additional funding to create information controller posts in Manchester Control based on the Birmingham model.

PPM Management
The Route introduced additional Train Running Controllers in Birmingham control charged with ensuring the maximum achievement of PPM and CASL by Long Distance Services. These new roles have made a significant difference to PPM/CASL performance on the route.

The route seeks additional funding to retain the posts in CP5. This will be a key measure in maintaining CP4 exit levels and also beneficial in securing further improvements. Whilst the role is currently targeted at Long Distance services the remit of the posts can be changed as circumstances dictate to focus on other sectors or specific train service groups.
Weather management
Co-ordination of the preparation for and mitigation of the effects of the seasonal challenges presented to performance is the responsibility of the Seasonal Delivery Specialist (SDS). On a Route as large as LNW, the weather conditions and issues can vary greatly between different areas. During the severe winters of 2009 and 2010 and the poor autumn performance experienced in 2010, it has been evident that the role is under-resourced within the route – having one post, the same as much smaller, single area routes.

If the route is to maintain CP4 exit level performance and reach HLOS commitments, robust mitigation of weather related performance issues will be essential. Therefore, this plan seeks to secure additional funding for a second seasonal delivery post on the route.

Performance Planning and Management
The risks presented in CP5 mean that a robust performance plan will be an essential element for achieving the HLOS performance commitments.

Project management resources have been added during CP4 via the Performance Improvement Fund. The two additional Project Managers in LNW have produced significant improvements to the structure of the performance plan and the process. They also support Delivery Units to develop delivery plans for performance and reliability initiatives.

CP5 Performance Trajectory Assumptions
The performance targets in this plan are based on the following key assumptions:

- Sufficient funding is available to deliver the initiatives described.
- Traffic Growth occurs at broadly the rate predicted for both Passenger and Freight services and particularly that the level of increase in delay minutes as a result of the predicted traffic growth is in accordance with the modelled values.
- The major timetable changes planned do not result in a significant increase in Delay Per Incident.
- No additional services and journey time reductions introduced beyond the level that may be required in the HLOS.
- Current Franchise geography and TOC performance commitments continue.
- CP4 Exit level forecast in current two year JPIP is achieved.
- Enhancements and major renewals schemes are as documented in the performance plan in terms of number, scope and timing and the impacts are as predicted.
- Operator on self performance remains no worse than CP4 exit levels.

The Route Performance Team has asked each operator for a view on the level of ‘TOC on Self’ delay assumed for CP5. In each case, the response indicated a flat trajectory from CP4 exit position before traffic growth is factored in. Given that PPM is a joint measure, the route may wish to challenge this approach with lead operators to seek some improvement across the Control Period.
Capacity and capability

Capability is measured by several specific factors which include gauge, route availability (RA) and network capacity (signalling headways). Present capability varies across the route and is in many cases a reflection of the service specification for the lines of route.

Capacity utilisation is high on the key inter-city, inter-urban and suburban lines within this Route, and there has been considerable growth in passenger and freight traffic in recent years.

The West Coast Main Line in particular is operating close to capacity on large sections including between London Euston and Rugby, Norton Bridge and Weaver Junction and Euston Junction to Carlisle station. The London to Manchester passenger market is the fastest growing long distance London market with passenger demand predicted to increase by between 54 and 61 per cent over the next ten years. Future growth on various sections of the route will be difficult to accommodate without affecting performance.

In the North West, the nature of the services through or to the centre of Manchester and Liverpool is highly complex, with a wide range of stopping patterns, destinations and linkages between services. The existing mix of fast and stopping services means that capacity is fully utilised at a number of key sections. High utilisation often leads to performance risks, and restrictions and alterations to services.

Similar issues are evident in the West Midlands area, where local commuting has grown substantially in recent years. There is significant peak rail travel into the key centres, particularly Birmingham city centre, and overcrowding is present on some services during this time. Key routes into the city centre are also busy outside of the peak period, with rail services providing access to leisure, education and other social activities. The Coventry to Birmingham and Wolverhampton route is operating close to capacity particularly between Birmingham New Street and Birmingham International.

On the Chiltern line, the level of demand can vary by time of day and day of the week, with demand at its highest during the weekday morning three-hour peak period. There is a more even flow of passenger demand outside of the peak periods, and recent analysis of passenger flows indicates that the evening peak period is generally later than in the West Midlands area, from 18:00 to 20:00 hours.

Sustained passenger growth on the Merseyside network has led to standing on a number of services in recent years, particularly into Liverpool during peak times. Lines which experience particularly high utilisation at peak times include between Birkenhead Hamilton Square and Chester, and between Walton and Ormskirk.

Some key capacity constraints on the route are:

- restrictive station layouts, in particular at Salford Crescent, Liverpool Lime Street, Preston, Lancaster, and Carlisle.
- restrictive approaches to stations at Manchester Piccadilly, Birmingham New Street and Preston.
- single line sections between Watford Junction and St Albans Abbey, between Leamington Spa and Coventry, between Fazakerley and Kirkby and between Saltney Junction and Wrexham North Junction.
- peak hour constraints at London Euston station caused by limited platform lengths on some platforms, occupation times and platform end conflicts.
- limited capacity at key junctions including Stafford North Junction, Stafford South Junctions, Norton Bridge Junction, Sandhills Junctions, Hunts Cross West Junction, Bidston East Junction.

In terms of freight capacity, there has been substantial growth in both domestic and maritime intermodal traffic in recent years, stimulated most recently through the Strategic Freight Network gauge clearance works between Southampton and the West Coast Main Line. As a result, some termini on the route are now operating at or close to capacity. Key capacity issues for freight growth in the route are:

- insufficient provision of 775m loops on the Cherwell Valley constrains freight train lengths and freight capacity.
- the steep gradient of the Lickey Incline, between Barnt Green and Bromsgrove, impacts on capacity utilisation particularly for freight traffic.
- restrictive access arrangements at Kingsbury terminal for services from the North East limits capacity and impacts on performance.
- limited entry and exit speeds of passing loops for freight services affecting time taken to clear and then restart long trains.
- limited capacity for traffic serving the Trafford Park terminals (near Manchester) due to restricted train paths through Manchester Piccadilly and poor track configuration at the terminal.
- limited passing loops for freight services and passing loops with restrictive length, in particular on the West Coast Main Line north of Preston where high speed passenger services run down freight services.
- lack of suitably gauged diversionary routes on some core sections, notably the Cherwell Valley and also the WCML north of Preston to Scotland.
- difficulties timetabling further freight services at desired departure times from the expanded DIRFT terminal.
Improving capacity and capability in CP4

Significant investment has taken place during CP4 to accommodate the substantial growth in passenger and freight demand. These enhancements are the key stepping stones which support the continual growth in our railway.

Major committed enhancements completed or due for completion within CP4 include:

- **Platform lengthening** works at various locations across the route to facilitate the operational plans to deliver the CP4 HLOS capacity metrics for Manchester, Liverpool and Birmingham.
- **West Coast – Pendolino (Class 390) Lengthening** – Additional Class 390 vehicles have been procured by the DfT in partnership with Virgin Trains for strengthening WCML long distance services. Existing Class 390 sets are being extended from 9 to 11-car and 4 new 11-car Class 390 sets were procured to improve fleet availability and to strengthen the busiest flows.
- **Enhancements** have been incorporated into a major programme of re-signalling and remodelling. The core renewals will deliver modern signalling equipment, and transfer of control to Signalling Control Centres. Schemes delivered in CP4 include Water Orton, Walsall, Stourbridge to Hartlebury, Rochdale and Stalybridge.
- **London Midland – 110 mph project** – London Midland are in the process of increasing the speed of some services from 100 to 110 mph, allowing additional paths on the WCML into London Euston by operating two 110 mph trains into the path occupied by the one 100 mph service.
- **Strategic Freight Network** schemes to support growth in rail freight and reduce conflicts with passenger services, include:
  - W10 gauge enhancements between Southampton and the West Coast Main Line via Basingstoke, Reading, Didcot Parkway and Leamington Spa (completed March 2011).
  - gauge enhancements between Felixstowe and Nuneaton to provide an alternative W10 gauge route from Felixstowe to the Midlands, avoiding London (completed April 2011).

### Gaps at the end of CP4

During CP4, a geographical programme of Route Utilisation Strategies has been completed, which assessed the future requirements for the rail network in CP5 and beyond. These strategies have assessed whether the current network capability and committed schemes are sufficient to meet passenger and freight service requirements in CP5 and beyond. Where gaps have been identified, they have analysed options and recommended a strategy.
Improving passenger capacity and capability in CP5

CP5 Summary of traffic changes
The Route embraces the investment in enhancements that will reshape the network and generate improvements in service frequencies and journey times and add capacity. This section summarises the key HLOS specified enhancements, third party schemes and supporting Route-driven enhancements and highlights the anticipated outputs.

Long distance
TransPennine Express – Manchester to Scotland service enhancement
Following the electrification of Ardwick depot and Manchester to West Coast Main Line route via Wigan and later Bolton, TransPennine Express services between Manchester Airport and Glasgow are proposed to operate an hourly service with 4-car trains. Until further suitable electric rolling stock becomes available, certain weekend and holiday high peak periods may require 6-car units to strengthen specific services to meet demand.

Interurban services
Northern Hub/North West Electrification/North TransPennine Electrification
To meet conditional outputs aimed at supporting economic growth in the North of England, substantial investment in infrastructure is committed during CP4 and CP5. This investment, to be delivered through the Northern Hub project and electrification programmes will improve service frequencies, journey times and connectivity across the whole of the region, and deliver significant capacity benefits and operational flexibility at Manchester Piccadilly station.

On completion, the Northern Hub will improve the capability of the network across the north of England, including doubling the frequency of services between Sheffield, Leeds and Manchester and Liverpool via Chat Moss.

Project development work indicates that the hub interventions will facilitate an additional 700 trains per day and 3.5 million more passenger journeys per year across the north of England. There is a major interface between the electrification schemes and the Northern Hub project and together they will deliver significant service improvements and help to reduce the long term costs of operating the railway in the North West.

Evergreen 3 – Phase 2
Evergreen 3 Phase 2 is a project led by Chiltern Railways and forms part of its franchise commitment to deliver additional capacity. The project output is a new London Marylebone to Oxford service, with the service pattern planned to be two trains per hour all day in each direction. Chiltern Railways has a franchise commitment to start this service in December 2014, although this is subject to further development work. This scheme has a key interface with East West Rail and the two projects will need to be closely aligned.

Leamington to Coventry capacity enhancement
This is part of a wider ‘Electric Spine’ programme, which will create a high-capacity passenger and freight electric railway corridor from the South Coast through Oxford, Bletchley, Bedford via the Midland Main Line to the East Midlands and the North West. Capacity enhancements on the route between Leamington Spa and Coventry have been identified as required to support the future electrified services planned to operate on the ‘electric spine’ route.

Suburban and commuter services
Northern Hub/North West Electrification/North Trans-Pennine Electrification
On completion, the Northern Hub delivers a significant improvement to the capacity of the network, facilitating an additional 700 trains per day across the North of England. With a wide ranging timetable recast, this includes increased services on the local routes from Chester, Liverpool and Warrington via Newton-le-Willows, Hadfield and Glossop, Blackburn, Burnley, Rochdale and Chinley to and from Manchester.

Bromsgrove and Redditch Cross City service extensions
In order to deliver increased capacity on one of the busiest commuter corridors in the West Midlands, enhancements schemes are committed in the form of service improvements between Redditch/Bromsgrove and Birmingham New Street. These service enhancements are due to be implemented in CP5 and will provide an extra train per hour between Redditch and Birmingham New Street (increase from two to three trains per hour) and three trains per hour between Bromsgrove and Birmingham New Street.

Coventry to Nuneaton Rail upgrade
Coventry City Council, with support from Warwickshire County Council and Centro, are promoting a third party scheme to deliver two new stations and increased frequency from one to two trains per hour between Coventry and Nuneaton through the day, doubling the line capacity. The current plan is to operate 2-car trains with the scheme due to complete in 2014.

Watford DC line train lengthening
LOROL proposes to strengthen its Watford Junction to London Euston service during peak hours, by running longer trains. The aspiration is to strengthen the service to 5-car units and to increase service provision to 4 trains per hour.
**East West Rail (EWR)**

EWR is a named CP5 HLOS scheme supported by the East West Rail Link Consortium. It would upgrade the Oxford/Aylesbury – Bletchley – Bedford railway, including the disused section between Claydon and Bletchley, to passenger standards to provide a through service between Oxford/Aylesbury and Milton Keynes and between Oxford and Bedford in support of economic growth and development. It has environmental benefits in encouraging transfer from private to public transport and relieving road congestion in these towns.

A basic service pattern is under consideration for the December 2017 timetable change. Rolling stock assumptions are being reviewed after the HLOS ‘Electric Spine’ announcement.

**Birmingham New Street – Gateway project**

Commitment was made in CP4 for the £600 million investment project to transform New Street station into a modern, welcoming and accessible gateway and transport hub for Birmingham and the West Midlands. The project will improve the station environment and passenger services through increased passenger capacity, improved access, better pedestrian links to and through the station, retail development and improved facilities. The first half of the new station is due to open in April 2013 and full completion scheduled for March 2015.

**West Coast Main Line Stafford area improvements (capacity upgrade)**

The project will provide additional capacity on the WCML and through the Stafford area, to deliver the DfT’s indicative timetable specification.

The scope includes:

- grade separation of Norton Bridge Junction, planned for completion by December 2017.
- increased speed on the slow lines between Doxey (Stafford) and Crewe Basford Hall, from 75mph to 100mph in 2015.
- line speed improvements on the fast lines in the Norton Bridge area.
- line speed improvements through Trent Valley Junction.
- provision of Stafford freight loop.
- Stafford area re-signalling.
- remitted renewals in the Stafford station area.

**West Coast Main Line power supply upgrade**

This programme commenced in CP4 to deliver an upgraded traction power supply system to support the West Electricitation programme and the operation of the Stafford service specification. The project works will renew and upgrade the remainder of the 25kV power supply equipment on the WCML between North Wembley and Whitmore (due in April 2014) and Whitmore and Strickland (due for December 2017 timetable), with an upgraded Autotransformer (AT) traction power supply and distribution system. The upgraded power supply will address the current traction power supply constraint which impacts on line speed and capability for WCML services on the busier parts of the route.

**North West electrification**

The full programme of electrification is due to be completed in CP5. The project will deliver a rolling programme of electrification including AC overhead electrification and associated power supplies/distribution. Other works in the scope include signalling immunisation, track lowering and bridge reconstructions.

The project will be delivered in four phases:

<table>
<thead>
<tr>
<th>Phase</th>
<th>Routes</th>
<th>Target completion date</th>
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</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>Manchester (Castlefield Jn) to WCML (Newton-le-Willows/Lowton Jns)</td>
<td>December 2013</td>
</tr>
<tr>
<td>Phase 2</td>
<td>Liverpool (Edge Hill) to WCML (Earlestown), Huyton to Wigan, Ordsall Lane Jn to Manchester Victoria</td>
<td>December 2014</td>
</tr>
<tr>
<td>Phase 3</td>
<td>Preston to Blackpool North</td>
<td>March 2016</td>
</tr>
<tr>
<td>Phase 4</td>
<td>Manchester to Preston (Ordsall Lane/Deal St Jns to Euxton Jn)</td>
<td>December 2016</td>
</tr>
</tbody>
</table>

**North Trans-Pennine electrification**

The project is planned to increase timetable capacity between Manchester and Leeds via Huddersfield. The benefits of electrification will lead to shorter journey times and a reduction in the average speed differential between local and express services, creating added route capacity, compared to the use of diesel services. There are also potential long-term benefits through the conversion of inter-urban, long distance and freight services to electric traction.

The project will deliver AC overhead electrification and associated power supplies/distribution for:

- Manchester Victoria to Stalybridge Junction including the new bay platform at Stalybridge.
- Guide Bridge West Junction to Copley Hill East Junction via Huddersfield.
- Neville Hill West Junction to Colton Junction.
- Micklefield Junction to Selby Station.
- Ashburys West Junction to Philips Park Junction/Baguley Fold Junction.
Electric Spine
The HLOS specification outlined the Government’s strategy to create a high capacity passenger and freight electric railway corridor. For the route, the key lines and enhancements required to form the ‘electric spine’ are 25kV AC overhead electrification between:
- Leamington Spa – Coventry capacity enhancement with additional double track.
- Coventry – Nuneaton.
- Oxford – Bicester Town – Bletchley – Bedford with double track (part LNW Route).

In order to address on-train capacity and connectivity gaps identified, the capacity on the line between Leamington Spa and Coventry needs to be increased. The increased capacity will also help to support freight growth, as identified through SFN forecasts.

Walsall to Rugeley electrification
The electrification of the route between Walsall and Rugeley Trent Valley is a specified HLOS project. The HLOS recognises the scheme’s regional and strategic value, including its contribution to accommodating increased commuter demand into Birmingham.

Bromsgrove and Redditch Cross City service extensions
Service improvements between Redditch/Bromsgrove and Birmingham New Street will be delivered by enhancements schemes to deliver increased capacity on one of the busiest commuter corridors in the West Midlands. These projects were committed in the CP4 Delivery Plan:
- Redditch Branch – provision of a passing loop between Alvechurch and Redditch and a second platform and footbridge at Alvechurch station. The key output is increased capacity between Redditch and Birmingham, provided by increasing the Cross City service to Redditch from 2 to 3 trains per hour. Completion due in August 2014.
- Bromsgrove electrification between Barnt Green and Bromsgrove – this will enable the extension of 3 Cross-City services an hour from Longbridge to Bromsgrove. The Bromsgrove station relocation project is a prerequisite for the Bromsgrove electrification scheme outputs. Planned for completion in May 2016.
# Capacity data

## High Level Output Specification (HLOS) route or city: Euston

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<tr>
<th></th>
<th>AM 3 hour peak</th>
<th>AM 1 hour peak</th>
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<tr>
<td></td>
<td>Forecast demand in 2013-14</td>
<td>Extra demand to be met by 2018-19</td>
</tr>
<tr>
<td>Number of passengers*</td>
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<td>1,200</td>
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<table>
<thead>
<tr>
<th></th>
<th>Passenger vehicle arrivals</th>
<th>Number of seats</th>
<th>Total passenger capacity**</th>
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<td>Forecast capacity at end of Control Period 4</td>
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<td>700</td>
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<td></td>
<td>Forecast capacity at end of Control Period 5</td>
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## High Level Output Specification (HLOS) route or city: Marylebone

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## High Level Output Specification (HLOS) route or city: Birmingham

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* Number of passengers as specified in the HLOS
** Total passenger capacity includes an additional allowance for standing on short journeys of 20 minutes or less
### High Level Output Specification (HLOS) route or city: Manchester

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### High Level Output Specification (HLOS) route or city: Liverpool (excl. Merseyrail)

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<td>19,600</td>
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<td>5,300</td>
<td>7,400</td>
</tr>
</tbody>
</table>

* Number of passengers as specified in the HLOS
** Total passenger capacity includes an additional allowance for standing on short journeys of 20 minutes or less
Improving freight capacity and capability in CP5

Freight growth forecast summary
The Route uses agreed freight forecasts developed as part of the Strategic Freight Network (SFN) to predict traffic level increases and demand levels when developing and assessing business enhancements.

Our forecasts are developed for 2019 and 2030, based on national principles:
- substantial growth in intermodal freight, as per the SFN forecasts, but with a delay of three years in achieving the forecasts (to reflect the effects of the recession);
- coal traffic held at 2011/12 levels until 2019 (except flows to Didcot and Ironbridge, known to be closing in 2015), then declining in the longer term in line with SFN forecasts;
- growth in other commodities in line with SFN forecasts.

Generic risks include the timing of port expansion; planning consent for intermodal terminals, the extent to which biomass develops as substitute for coal-fired power generation and the development of the Channel Tunnel freight market.

Projected Route freight traffic

Growth of Daventry International Rail Freight Terminal (DIRFT)
Owner and developer ProLogis has major expansion plans. Currently the existing DIRFT complex serves circa 14 daily trains rising to 15 in 2013. ProLogis plans to replace the existing facility with a larger one, which will cater for 775 metre trains and include warehousing and storage. Its future plans are to run c. 32 daily trains.

Growth of Domestic Intermodal
In 2011/12, Tesco made a significant investment in modal shift to rail and it is anticipated that some of its competitors will follow suit. Traditionally domestic intermodal has concentrated on the Anglo-Scots flows via the WCML, but the Tesco model also sends traffic to the South East, Wales and North Wales. The route anticipates that other end-customers will follow this trend, centred on DIRFT and the West Midlands.

Southampton to West Midlands Corridor
The Port of Southampton is the UK’s second largest Container Port with much of the traffic bound for the West Midlands and the North West. This puts increased pressure on the capability and capacity of the Cherwell Valley and Coventry Corridor. Two SFNS schemes in development aim to increase train length and train capacity along this route with Loop enhancements at Fenny Compton, Hatton, Dorridge and Washwood Heath all funded. Further proposals to improve junction speeds at Leamington and to enhance Bordesley Loop are being developed.

WCML North of Preston
The Anglo Scottish route remains one of most important in the UK with increased demand to run both more trains and lengthen existing ones. North of Preston Diesel hauled trains are limited to 84 SLU which is a major growth constraint. The SFN is seeking to improve the capacity and capability of this section to enable more trains and longer trains to operate. There are currently 27 freight trains per day in each direction. This is forecast to increase to 36 freight trains per day in each direction by 2019 and to 48 trains per day in each direction by 2030.

New Terminals (West Midlands)
Two new terminals proposed for the line between Wolverhampton and Stafford will cater for 775 metre intermodal trains. If either proposal progresses, it will place further pressure on the West Midlands network.

New Terminals (Bedford – Bletchley)
Two terminals are proposed on the Bedford – Bletchley line to cater for intermodal traffic, for which gauge enhancements works will be required as the route is only cleared to W8.

3MG (Ditton)
The proposed expansion of the existing facilities at Ditton could result in 16 Intermodal trains per day to and from major ports, as well as domestic traffic. 775 metre trains are an aspiration.

Port Salford
This is a new terminal being developed on the Chat Moss Line serving Manchester, Liverpool and the North West. The project is planned on the basis of 16 freight trains arriving daily and will include warehousing, storage facilities and intermodal transfers.
Biomass
Liverpool Bulk Terminal is making a significant investment in handling facilities for Biomass, as are many other ports around the UK. Most of the generators are evaluating the potential of Biomass with many considering either co-firing with coal or complete conversion. At this stage, it is too early to predict in detail what the impact of Biomass will be but it has the potential to generate significant extra traffic on the route.

Energy From Waste
Proposals for Energy from Waste plants are proposed at both Runcorn and Ince & Elton. These propose to use rail to transport waste from around to country to the plant, to be burnt to generate power.

London Gateway
This new port is due to open in Q4 of 2013. As well as serving the London Market it is expected that it will generate traffic for the West Midlands, the North West and Scotland with traffic routed via the WCML.

Strategic Freight Network – agreed candidate schemes
- Capacity requirements WCML North of Preston
There is a workstream looking at freight capacity north of Preston on the WCML that will assess what options may be appropriate to cater for the forecast increase in freight and passenger traffic between Preston and Mossend, in the periods up to 2019, and between 2019 and 2030. Options will not be restricted to infrastructure enhancements, but may include timetabling solutions and routing options. GRIP 3 feasibility work should be completed by mid 2013. The current position is that the SFN Steering Group have prioritised the loops at Tebay and Beattock for lengthening, subject to further development work.
- Capacity requirements Southampton to West Coast Main Line
Feasibility work is being undertaken along this corridor to assess the options of increasing freight capacity. Assessments are being undertaken on the route to see where signalling headways can be reduced and junctions remodelled to create extra capacity.
Capability outputs

Line Speeds
Line speeds vary across the route; some corridors enjoy higher line speeds in line with rolling stock capability and journey time requirements, others are still yet to receive enhancement in order to maximise these opportunities. The WCML route (fast lines) between London Euston and Preston has a line speed of between 110 and 125 mph for class 390s. The prevailing line speed on the suburban and rural routes ranges from 50 to 75 mph.

Predominant Line Speeds LNW South

The West Midlands section of the WCML route via Coventry towards Birmingham and between Wolverhampton and Stafford has line differential speeds ranging between 90 and 125 mph. Line speeds of 90 mph to 125mph are available on the Midland route between Birmingham New Street and Derby. Other secondary and rural corridors within the West Midlands have slower prevailing line speeds which are predominately dictated by track geometry, these range between 40 mph and 75 mph.

On the Chiltern Main Line, recent line speed improvements (Evergreen 3 – Phase 1) have helped to increase speeds up to 100mph on a large portion of the route between London Marylebone and Birmingham Snow Hill. In the North West, prevailing line speeds are lower than elsewhere and range between 40 and 75 mph (sections from Liverpool to Manchester via Warrington, Manchester Piccadilly to Cheadle Hulme and parts of the Hope Valley). The lowest prolonged passenger speed is 35 mph on the Manchester to Castlefield corridor. Remaining freight-dominated lines have speeds between 20 and 45 mph.

Predominant Line Speeds LNW North

On the Merseyside network, maximum line speeds are up to 60 mph, with notable sections of low line speed between Wigan Wallgate and Wigan Wallgate Junction, from Canning Street to Conway Park, between Dee Marsh and Shotton and Southport and Meols Cop.

Despite the significant freight operations in the area, some freight only sections operate with line speeds as low as 35 mph for long sections.
**Electrification**

The WCML is electrified with 25kV OHLE for high speed intercity, inter-urban and freight services traversing the full length of the route. Suburban services in the London area, between Watford Junction and London, are provided with 750/650DC third and fourth electrified lines. The Watford Junction to St Albans Abbey branch line is also electrified.

**Electrified Routes LNW South**

In the West Midlands, the majority of the cross country routes are not electrified. Currently, there is OHLE on the Cross-City route from Redditch to Lichfield and on the WCML through Birmingham New St station to Stafford and the Grand Junction Line with a spur that includes Walsall station.

Presently the north is electrified from Liverpool Lime Street to Allerton, from Winwick (via Earlestown), Newton-le-Willows and Golborne, the Manchester to Hadfield/Glossop route, the Manchester to Crewe routes via Stockport and the Styal line, and the Stoke-on-Trent route from Cheadle Hulme and Colwich.

The Merseyside network is electrified using 650DC third rail. The conductor rail network is split into two distinct systems: Wirral lines and Northern lines, both of which have their own traction power supplies.
Gauge overview
Several gauge clearance inconsistencies and ‘gaps’ remain across the route, including some corridors that connect to other Network Rail Routes. It is anticipated that these gaps will reduce during CP5 as further investment emerges to support the freight market. However, the Strategic Freight Network in CP4 set the initial foundations which made a start in significantly enhancing gauge capability over the network.

Gauge LNW South

Gauge LNW North
**Route availability**

The Route has a published Route Availability between RA7-9, with the exception of the section between Birkenhead and New Brighton on Merseyside network which is RA6. RA9/10 traffic may be permitted to operate via special RT3973 certification.

**Route Availability LNW South**

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**Route Availability LNW North**
Projects

The following interventions have been identified as illustrative schemes or schemes required to deliver the HLOS capacity metrics for the route.

Opportunities for further enhancements in CP5
The following schemes provide a ‘once in a life-time’ opportunity to enhance the network and will have a significant impact on the route.

Route H North West:
- Weaver to Wavertree resignalling enhancements
- Dinting, Hadfield and Glossop service improvements
- Huyton and St Helens resignalling
- Blackpool line upgrade (part of electrification programme – linespeed upgrade)
- Ashton Moss resignalling
- S&C and track renewals programmes including Ashburys, Manchester Piccadilly and targeted locations on the Buxton line
- Journey time improvements between:
  - Preston to Ormskirk
  - Roses line (Gannow to Hall Royd Jn)

Route M West Midlands & Chilterns:
- Birmingham New Street area resignalling enhancements
- Banbury area resignalling
- S&C Track renewals programmes including Galton Junction, Bushbury Junction
- Journey time improvements between: Coventry and Nuneaton

Route N West Coast Main Line
The Croxley Rail Link project will provide through Metropolitan line underground services between Central London and Watford Junction station on the former Croxley Green branch line, enabling direct access for passengers on the WCML from Watford Junction to stations into Central London without the need to travel to London Euston. The project is funded by Hertfordshire County Council (HCC) and DfT, with a contribution from Watford Borough Council. The new rail link is scheduled to open by 2016.

Other key projects being developed are:
- Watford area resignalling enhancements
- Colwich and Rugeley resignalling enhancements
- Macclesfield area resignalling enhancements
- Warrington Area Plan
- Preston station area resignalling and remodelling
- Carlisle station area resignalling and remodelling

- S&C Track renewals programmes including Carlisle, Preston, Crewe, Carnforth North, Wembley North and Central, Hanslope Junction, Acton Branch Junction
- Journey time improvements between:
  - Northampton and Rugby
  - Nuneaton and Rugby
  - Rugby and Tamworth
  - Congleton to Prestbury (Macclesfield resignalling)

High Speed Rail Development
There are several significant workstreams currently being undertaken on High Speed Rail development that will affect the route:
- the London Euston Station reconstruction and staging works
- two new HS2 stations at Birmingham Curzon Street and Birmingham International
- a new HS2 maintenance depot at Washwood Heath in Birmingham
- HS2-compatible trains running onto the WCML (joining at Handsacre Junction)
- Development of the ‘Y’ network (including new stations at Manchester and joining the existing WCML at Golborne Junction).

Further information is available from the High Speed Two development team.

Depot and stabling enhancement for extra trains
North West
With the expansion of the electrification network during CP5, there will be additional electric rolling stock vehicles that will need to be maintained in the North West. This will concentrate on providing both capacity and functionality for the increased EMU fleet.

 Midlands
With the expansion of electrification in the West Midlands during CP5, there will be additional electric rolling stock vehicles to be maintained.

As the current EMU maintenance depot at Soho is at maximum capacity, a further location will need to be identified. There will also need to be additional stabling facilities in the area and potential locations have been identified.

Chiltern Railways is assessing a new maintenance and stabling facility at Banbury to cater for its expanding fleet.
Operator aspirations to support capacity

Chiltern Main Line Train Lengthening
Chiltern Railways is proposing to support its operational plans to achieve CP5 HLOS metrics by train lengthening from 7- to 9-car trains at five stations (Bicester North, Haddenham and Thame Parkway, Beaconsfield, High Wycombe and Princes Risborough). Further development of these options will need to be undertaken.

Liverpool South Parkway turnback
The proposed turn back at Liverpool South Parkway will allow an increase in frequency of service to 18-20 trains per hour through Liverpool Central. The increase in through services will also reduce crowding of the island platforms at Liverpool Central.

Liverpool Lime Street capacity enhancements
It is proposed that capacity enhancements will be required in CP5 to support anticipated passenger growth and plans for additional and longer trains in the North West. Development work is focused on platform numbers and lengths, capacity at the station throat and congestion on its approaches. Platform lengthening, construction of new platforms and remodelling of the station throat layout are potential solutions that are being investigated.

Birmingham Snow Hill capacity enhancements
Proposed capacity enhancements are being assessed on the Birmingham Snow Hill line. Options include a new turn back facility at Rowley Regis and the reinstatement of Birmingham Snow Hill platform 4. This will enable a different service pattern to be operated on the Snow Hill lines. This may provide an opportunity to provide additional vehicle arrivals in the peak, further development work will need to be undertaken to assess this.

West Midlands Train Lengthening
Platform lengthening has been identified by operators on a number of routes in order to deliver the HLOS metrics. The Wolverhampton to Shrewsbury line has been identified as a route for further development. The electrification of the Walsall to Rugeley line is also likely to require platform lengthening works. This will require further development once rolling stock assumptions are known.

Future Electrification
Following the HLOS announcement of the ‘Electric Spine’ proposal – there is potential for other routes to be electrified in future Control Periods.

Key routes that should be considered focus around the West Midlands area. There are currently only three routes into Birmingham that are 25kv electrified:
- Coventry/Birmingham/Wolverhampton/Stafford
- Redditch/Birmingham/Lichfield
- Walsall/Birmingham

The following routes should therefore be considered for future electrification:
- Inter-urban:
  - Derby/Birmingham/Bristol
  - Nuneaton/Birmingham
  - Leamington Spa/Solihull/Birmingham

- Urban Services:
  - Kidderminster/Birmingham/Stratford Upon Avon
  - Wolverhampton/Shrewsbury

Other routes on the route to be considered for 25kV electrification include:
- Crewe/Chester
- Warrington/Chester
- Bolton/Blackburn
- Lostock to Wigan
- Windermere branch
CP4 and CP5 Operating Delivery Plan

The route has constructed an Operational Plan that is robust for the remainder of CP4 and sets a firm base in readiness to commence CP5. The Operating Plan explores areas where the route can realistically reduce the cost of operating without compromising safety and performance.

A significant proportion of the efficiency saving is attributable to the transfer of various signalling areas to the established Signalling Centres (SC) and new Route Operations Centres (ROCs). This is expected to reduce annual operational expenditure by £8.34 million by the end of CP5 compared to the exit rate of CP4.

The West Midlands Signalling Centre has been established during CP4 and by the end of the Control Period will cover the Snow Hill Lines from Warwick to the Western Route boundary at Droitwich as well as the Coventry, Walsall and Bescot areas. During CP5, the Banbury to Warwick and Cross City Lines will be added along with the present Wolverhampton and New Street PSB areas. Rugby ROC will be constructed during CP4 and commissioned in CP5; the plan is to transfer control of the Stoke and Rugby SCC areas to the new facility during CP5 followed by the Wembley Mainline area in CP6. It is expected that there will only be one mechanical signal box remaining on LNW(S) by the end of CP5.

In the northern part of the Route, there has been some consolidation of control during CP4 to existing control sites. In particular, Stalybridge, Ashburys and Guide Bridge SBs have been combined together within the Manchester South SC building and supervision of a number of level crossings is being consolidated at Preston PSB. Manchester ROC is under construction with completion expected in 2013/14. During CP5, the ROC will take control of the Huyton area and much of the Chat Moss Line followed by the route from Weaver Junction to Liverpool Lime Street and the existing Warrington PSB area. Priority is being given to these areas because of synergies with NW electrification works and Northern Hub schemes. Further areas will be added during CP6.

CP4 Ongoing delivery
Operational base inclusions (Structural Change)
The following items are included within the 2013/14 OpEx cost base and throughout CP5. These are currently funded in CP4 separately from the route financial targets. These funding mechanisms include HLOS Performance Funding, Community Safety Fund and National Level Crossing funding:
- Additional Long Distance PPM Controllers currently funded through HLOS Performance Funding.
- Cable Theft Prevention Team and SCAMP Vehicle currently funded through HLOS Performance Funding.
- Level Crossing Managers and Safety Compliance currently funded outside of the Route.
- Smartwater Cable Theft Prevention. This is funded in CP4 through the HLOS Performance Fund.
- Performance Project Managers currently funded through HLOS Performance Funding.
- Safety Funding.

CP5 additional inclusions (Structural Change)
The following items are inclusions over and above the CP4 2013/14 OpEx cost base:
- Gateway (New Street) increased Operational Costs (non-qualifying expenditure) excluding Utilities and insurance.
- Additional cable theft prevention and fatality mitigation costs.
- Manchester Information Controllers. Additional resource to mirror the resource availability in Birmingham Control in order to deliver HLOS outputs.
- Additional Safety Fund and deployment – Includes three Community Safety Partnership Groups across the Route to develop and sustain community projects to divert people away from known fatality/trespass hotspots and Specific Sites of Scientific Interest.
Asset renewals and technology

Throughout the remaining years of CP4, there are numerous projects, renewals and technological interventions being explored in order to become safer, reduce cost and generate efficiency. Due to their scale and complexity, several will go on beyond CP4.

Signalling
A significant portion of the work-bank is complete. However, the larger GRIP 5-8 committed schemes (Stalybridge and Walsall re-signalling projects) are still to be delivered in CP4.

The signalling RAM team is also reviewing the installation of new technology at level crossings in order to make them safer, including the conversion of MCB or CCTV level crossings to Manually Controlled Barrier – Obstacle Detection (MCB-OD).

This technology is fully-automated requiring no intervention from the signaller in normal operations. As a standalone level crossing scheme or as part of a re-signalling, MCB-OD provides a re-control opportunity for locally controlled crossings. It has been successfully trialled and is approved for use across the network.

CP5 strategy
The route is exploring avenues to reduce its annual operating costs by £15.13m per annum (includes £4m Structural Change and ROC-driven OpEx savings) through technology and operational performance initiatives. A number of these strategies have been deployed in CP4 and provide a foundation to construct new innovations that deliver further business benefits, e.g. accelerated renewal investment to reduce OpEx and longer term CapEx costs.

Route Operating Centre (ROC)
The route has developed a plan to migrate all LNW Route (and some Great Western Route) signalling locations into 3 ROCs (West Midlands, Manchester, Rugby). The present strategy is aligned with the signalling work bank and is consistent with the funds presently made available in CP5. The strategy to date has successfully reduced operational and asset maintenance costs.

The headline savings for CP5 are:
- 339 reduction in conventional signaller posts
- 29 new workstations, manned by 176 new ROC workstation posts
- 174 net reduction in posts
- £58m per annum reduction in signaller payroll OpEx by end of CP5
- West Midlands SC (WMSC) 18 out of 19 workstations by end CP5
- Manchester ROC 12 out of 29 workstations by end CP5
- Rugby ROC 8 out of 12 workstations by end CP5
- 62 box closures (average 1 per period) – 98 left to close after CP5.

West Midlands SC (WMSC)
The 19 workstations are generous relative to the allocation of 13 anticipated to be needed with ARS+. Completing the build up of WMSC gives certainty to the ongoing delivery programme, enabling it to be delivered efficiently by our framework contractor. The role of WMSC in CP6 and beyond will be reviewed for further expansion.

Manchester ROC
The ROC will be built by January 2014 and will initially host 12 workstations, providing signalling control for the majority of the Manchester conurbation, the Liverpool non-third rail network and the WCML around Warrington. Longer term, the ROC has the capacity in design for 48 workstations and can provide sufficient space to accommodate other roles, if required. This provides a flexible arrangement, within the constraint of conventional signalling workstations.

Rugby ROC
The build completion date is planned for February 2015 when it will be ready to receive Stafford workstation and the potential early delivery of Norton Bridge. The ROC requires 16 workstations (13 with ARS+) and there will be sufficient operating floor space to accommodate 13 ECRO and flight technicians and a control office if required.

It is proposed the ROC will incorporate the existing Maintenance Delivery Unit accommodation and future provisions for integration of train operators controls and additional signalling needs.
**Key risk to delivery**
The availability of Network Rail and signalling supplier resources to deliver the CP5 programme are considered a risk as it is likely there will be competition between suppliers for key specialists.

**ORBIS technology**
The Route is working alongside the ORBIS technology team to review emerging technological solutions that will reduce maintenance and operational expenditure. The route’s Asset Management Strategy, Maintenance Strategy and Operations Plan contain several ORBIS-related savings assumptions.

**(ORBIS) Track View**
Along with several others, the route is reviewing the utilisation of Track View, an airborne inspection system that can identify a significant number of infrastructure related items. The Route believes this technology could be further advanced for proactive fault finding before failure occurs, removing the need for certain cyclic inspection regimes. This reduces the need for staff to walk the track and promotes safety. Over CP4 and into CP5, the Route will work with the ORBIS team to develop this technology further to meet the Route’s requirements.

**European Rail Traffic Management System (ERTMS)**
Re-signalling the Cumbrian Coast in CP6 with ERTMS will take place following train fitment; the successful fitment of equipment to aging rolling stock is one of the significant elements in the ERTMS programme. The signalling plan for CP5 assumes no volumes; however, the plan does include expenditure (circa £18m) developments prior to planned installation in CP6.

The Northwest Electrification programme will fund and undertake the re-signalling of the Preston to Blackpool in order to exploit efficiencies through alignment with the CP5 electrification programme. A whole life cost assessment has demonstrated that full re-signalling is the most cost effective option and provides the realisation of further operational benefits with the migration of control to the Manchester ROC.

The ‘hybrid smooth’ work-bank builds on the ‘targeted renewal’ work-bank to include additional elements of ERTMS, Modular and NOS strategies. These activities are considered a variance to policy.

**Variance to policy**

**Network Operations Strategy (NOS)**
Several of the re-signalling projects are aligned to the delivery of the NOS programme. Depending on NOS, project staging will drive the opportune time to consolidate signalling control to the appropriate ROCs. Associated with the re-control are increases in MCB-OD level crossings renewals and conversions. This technology provides the option to realise OpEx benefits.

Where signalling renewal/modernisation interventions are scheduled for CP5, similarly targeted tactical interventions; an additional assessment (business appraisal) has been undertaken to analyse business practically. The appraisal includes establishment of the optimal time to re-control an area into one of the planned ROCs. The proposed locations for the ROCs are Manchester (Ashbury’s), Birmingham (Saltley) and Rugby (West Coast South).

NOS Schemes under business assessment include: Ditton, Rugby SCC, Stoke SCC and Warrington.

The route believes this will generate steady operational savings and enable future implementation of the Traffic Management Systems.

**Perceived operating risks in CP5**

**Network Availability**
Efficient access for the CP5 re-signalling projects in GRIP stages GRIP 5-8 represent a significant risk to the delivery, in particular the WCML and associated service groups. The re-signalling schemes at risk are: Watford, Stafford, Allerton & Speke, Macclesfield, Liverpool Lime Street and Birmingham New St.
Emerging Qualifying Expenditure (QX)
The Birmingham New Street ‘Gateway’ project significantly enhances the capacity and environment at Birmingham New Street station. Consequently, on completion of the project in 2015, the QX charges for the station will increase. The increase in QX is primarily driven by the following factors:
- Operationally maintaining a larger station concourse which provides increased passenger circulation areas
- Maintenance for newly installed assets for vertical circulation – new lifts and escalators to meet DDA requirements and provide access for all
- Increased cleaning and maintenance regimes associated with these enhanced facilities.
- Facilities management and the significant increase in utilities charges.

In order to subsume the emerging increase in QX expenditure, the Route and DfT are discussing the inclusion of the increased QX costs within new franchises as and when they are let. However, incumbent franchises will not financially contribute until the franchises are re-specified. As a result, Network Rail seeks industry funding to close the QX funding gap between present franchises and the franchises re-letting stages.

The initial estimate, based on forecast 2012/13 rates, of the emerging increase in QX charges is £2.2 million pounds.

Network Operating Strategy
The CP5 NOS re-controls have significant risks associated with their delivery as they are dependent on new technologic developments. This also introduces a degree of uncertainty associated with the unit rate as, work-type and re-control on this scale, compounded by new ‘novel’ technology, has yet to be tested with the signalling market. Additionally the access required for this work has not been fully established and there is dependency on the timely construction of the Rugby ROC.

Associated with the NOS re-controls are the MCB OD level crossings conversions. This is also emerging technology and full technical requirements and constraints will only be established as the development goes from trial to national rollout. The unit rates are not established for this technology.

MCB OD and other level crossing renewal volumes are significantly increased in CP5 nationally and the signalling market may not be able to deliver the volume increase or technology at all of the identified level crossings.

- Technology risk of MCB-OD (Manual Controlled Barrier – Obstacle Detector) for level crossing renewals.
- Technology risk of Remote Interlocking Interface (RIIF) unit for re-controlling existing interlockings into the ROC.
- The results of the suitable and sufficient risk assessment may require a different type of crossings at sites planned for like for like renewal.
- Access on West Coast for re-control of interlockings into the ROC.
- The scope of Northern Hub on the planned re-signalling and re-controls, and the industry resource capability to deliver both the condition led renewals and enhancements.
ORBIS is a key enabler for our efficiencies

Our plans for CP5 include a variety of efficiencies which vary in impact across different Routes and asset types. ORBIS is a key enabler for many of these efficiencies. ORBIS is focused on providing routes with better asset information, in a readily usable form, and advanced decision support capability, enabling the Route to achieve efficiencies through improving decisions and is required to effectively implement CP5 policies. The level of efficiencies attributable to ORBIS across routes is consistent with the £270m identified in the IIP business case.

**ORBIS Overview:** ORBIS is a major programme of Asset Information capability enhancements that provides a vital enabler for condition-led asset policy implementation, enabling us to better manage our asset base for less, and better exploit existing railway system capability.

**Efficiency Treatment:** Routes propose two different treatments for recognising ORBIS efficiencies, either: to split out ORBIS as a separate efficiency component, acknowledging that additional process or working practice changes will be required within route asset management and infrastructure maintenance to realise the efficiency; or to leave ORBIS embedded as a key enabling component across identified efficiencies. Most routes have applied a combination of these two treatments. Where ORBIS is split out as a separate efficiency component it is expected that additional changes will be required within Route asset management and infrastructure maintenance to realise the efficiencies. Where ORBIS is not split out it is acknowledged as a key enabling component required to achieve identified efficiencies.

**Renewals:** ORBIS will provide better information to support CP5 asset policies, focusing effort on critical assets, identifying opportunities for refurbishment and life extension, while assisting with effective prioritisation of renewals activities. ORBIS supports Routes in Track, Signals, E&P and B&C renewals. Full Track efficiencies are recognised from 2016/17, other efficiencies are expected to ramp up from 2015/16.

- Track renewal plans have been reduced based on ORBIS capabilities; including Linear Asset Decision Support (LADS), which overlays different sources of information to enable a better understanding of condition, degradation, impact of interventions, and underlying root cause; S&C verification and S&C criticality; enabling Routes to make better informed choices.
- Signals renewal plans have been reduced based on ORBIS decision support using full asset inventory and condition information, rather than the current sample, identifying optimum renewal points, creating scope and value engineering efficiencies across maintenance delivered renewals, minor works, and major schemes.
- E&P renewal plans have been reduced based on ORBIS improving asset information and providing decision support capability. Better condition data supports a fundamental E&P policy shift from time to condition based intervention, leading to a move from renewals to refurbishment in a number of major asset types including DC distribution, AC distribution/OLE, electrical traction equipment, and signalling power cables, as well as fixed plant.
- B&C renewal plans have been reduced in structures, buildings and earthworks, based on ORBIS support for risk based renewals policies providing better understanding of asset risk profiles, and decision support in conjunction with the BCAM transformation.

**Financial benefit:** ORBIS financial benefits, c. £270m in efficiencies, are primarily achieved through reduction in asset renewal volumes, implementation of lowest whole-life cost management policy for each asset type, based on driving effective CP5 policy implementation decisions. In making this readily accessible ORBIS smart-phone and tablet-based handholds will eliminate paperwork, avoid future cost of positive reporting, improve incident response time and accuracy, and improve operational safety. These reductions will be enabled by ORBIS but require different processes or working practices within route asset management and infrastructure maintenance to realise the benefits. ORBIS is funded to support the business change activity required.
**Non-financial benefit:** ORBIS will support a range of non financial benefits, including:
Asset Management policy optimisation, better management of safety risk, safer working documentation, location improvement, improved investment planning, improved RAMPs, improved operational performance, regulatory compliance and reputation benefits. ORBIS will help routes to avoid recording asset condition information on locally held pieces of paper, unnecessarily renewing infrastructure assets, planning work from outdated schematics, wasting time trying to locate an incident, rebuilding a network model each time it is required, re-surveying project sites and assets that have already been recently surveyed, unnecessarily printing and distributing thousands of tons of paper.

**Benefits-led:** The ORBIS programme has accelerated activity in advanced decision support across Track, Signals and E&P. ORBIS will continue to be benefits-led and work closely with Routes to ensure optimum realisation of benefits and efficiencies. Typically for a benefits-led programme, which is creating and exploiting new capabilities, the efficiencies mix identified in SBP shows changes from IIP. Further change can be expected over the course of CP5 as new opportunities for information exploitation emerge.
Heritage considerations

Network Rail currently has over 800 signal boxes, of which around 90 are considered listed buildings, imposing legal requirements for infrastructure maintenance. A significant proportion of these signal boxes is located in the Manchester and Lancashire areas. The route is in dialogue with Preservation Societies and Museums to explore removal for alternative uses.

English Heritage is undertaking a national review of all signalboxes and its report is due in March 2013. In the meantime, we are actively partnering with English Heritage and other preservation Societies.

Over CP4 and throughout CP5, NOS and the steady state renewals programme will gradually decommission these assets as re-control of signalling transfers to the national ROCs. We recognise the need for a coherent national strategy to manage these assets carefully off the national network in order to comply with standards, contribute towards Network Rail’s sustainability policy and reduce the liability they impose on the Network.

Local initiatives

Alliancing

The Route has worked with Train Operators to explore and develop Alliance frameworks to exploit mutual potential cost savings and revenue improvement opportunities. These have progressed at different speeds by the nature and intensity of the relationships between the two parties. Whilst there are, as yet, limited work streams delivering tangible results, the willingness to work together is creating the potential for adding future value.

It is anticipated that the route will be able to generate efficiencies through these closer working agreements once established, but the timing to realise such opportunities will reflect the franchise change programme.

The route is faced with a competition before the end of CP5 on eleven of its franchised customers’ operations, which limits the horizon against which benefits can be realised, and consequently the amount of effort that the parties are prepared to put into the process. As longer term franchises are awarded, there should be greater opportunity to create a formal Alliance structure and realise the true benefits of closer working and cooperation.
Strategic overview

This section specifies the route’s Asset Management plans to be deployed during CP5 and the proposed renewal strategies that will drive efficiencies. The asset stewardship plans developed under each of the respective functions are largely in accordance with corporate asset policy. Where the decision to make a variation has been proposed, the variance in volume and consequential expenditure has been quantified.

Some of the drivers for the deviation from policy include:
- Areas where there is a significant safety-related benefit.
- The cost effective alignment of a renewal activity and/or an enhancement.
- Contribution towards the delivery of HLOS metrics, e.g. performance.
- Additional funding from a third party, e.g. Local Enterprise Partnerships (LEP).

In all accounts, each decision has been supported by detailed evidence and has been built around the key principle of whole-system, whole-life cost and set the firm foundations upon which to build a robust asset base for future Control Periods.

Enhancement and renewals integration

Opportunities for integrating renewals in major enhancement schemes to deliver efficiencies in CP5 will be explored. This may include bringing forward renewals where whole-life cost analysis demonstrates business efficiency e.g. Blackpool North Line Upgrade, bringing forward S&C renewals provides opportunities to remodel, reducing base assets counts and offers future savings in maintenance costs.

Asset strategy

The route has applied a ‘building block’ methodology to illustrate and measure the impact on the route’s expenditure forecasts in CP5 of potential variations in policy, proposed additional investments to reduce future cost and the HLOS project proposals. This methodology involves starting with the baseline expenditure projections for operating, maintaining and renewing the steady-state network, then overlaying distinct steps to determine the incremental costs associated with enhanced infrastructure investments. Adding these steps together enables the Route to calculate a gross funding requirement across CP5.

Detailed within the functional strategies are specific additional ‘volume’ activities that each of the Route Asset Managers (RAM) believes offer value for money in respect to whole-life cost and efficiency generation.

Route criticality

The route criticality measure comprises five criticality grades (Bands). The level of criticality by corridor varies by asset discipline and these feed into a principal Route criticality band. The route has a total of 91 SRS’s which cross in to other Network Rail Routes. The allocation of SRS into a criticality band has been determined by plotting the SRS against a quadrant of impact that has two primary driving influences – financial cost of a likely incident (Schedule 8) and the frequency of asset failure (failure rate).

Route Criticality forms one of the ingredients used, as a guidance tool, to underpin each asset stewardship policy. The respective asset policies have been used during the decision making process to drive and shape the appropriate investment in the route’s infrastructure for CP5; for example, when determining whether to renew or refurbish an asset.

Future Control Periods

The route recognises that aiming to take a position as world leaders in rail is a long and steady process that will take years of careful planning, steady investment and dedicated people. We have developed a strategic picture for Control Periods beyond CP5. The figures generated are only indicative at this stage but are intended to provide a clear line of sight for future years.

Risk mitigation and monitoring

There are a number of risks identified within this Plan that have the potential to delay works or reduce/eliminate the achievable efficiency. Between now and the start of CP5, the route will be exploring mitigation measures and developing contingency plans to reduce the overall risk to an acceptable level.
Track

Present asset condition
Overall, the condition of track (including switches & crossovers) across the LNW Route is relatively good due to historic investment. However, there remain isolated pockets where track renewal and/or refurbishment are still required in order to sustain performance throughout the last two years of CP4.

These pockets contain several strategic corridors that have older track formations consisting of continuously welded rail on ageing concrete sleepers and ballast which is close to life expiry. Despite the increases in tonnage and traffic on these routes, it is estimated that some concrete sleepers may have a considerable amount of life remaining should the ballast be cleaned.

The south of the route is primarily formed of continuously welded rail set on concrete sleepers, including the WCML between London Euston and Crewe, West Midlands radial routes and the Chiltern mainline corridor. Eliminating the majority of the jointed track from all running lines has been one of the successful key strategies deployed throughout CP3 and CP4. Further north, there is a mix of track formations that range from: contemporary continuously welded rail set upon on concrete sleepers on higher criticality routes; through to bullhead jointed track on wooden sleepers on sub-urban and rural routes.

The route has the highest proportion of rail that has exceeded 700 Cumulative Equivalent Gross Million Tons (CEGMT) – a point at which increasing levels of rail breaks can be expected. Throughout CP4, the utilisation of the High Output relaying system has been deployed on the WCML in order to mitigate rail breaks as a result of exceeding 700 CEGMT. High Output techniques continue to be the only viable option to sustain the track asset on the WCML, since they deliver high renewal volumes. However it remains challenging to use High Output equipment cost effectively on midweek nights due to diminishing network access opportunities on the WCML.

The number of bumps registered by class 390 rolling stock (Pendolino) has dramatically increased over the course of CP4 on the WCML, despite 80 per cent of track quality being classified as good condition. Analysis by engineers has proved that the interaction between the Pendolino rolling stock and the infrastructure is unlike any other rolling stock/track interface on the network and that track standards for intervention limits need to be re-evaluated.

Asset quantities

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<th>Asset Type</th>
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<tr>
<td>S&amp;C Units</td>
<td>Number</td>
<td>5,362</td>
</tr>
</tbody>
</table>

Track policy principles
Consistent with all asset functions, the Track Policy has been determined by route criticality. On higher criticality routes (1 and 2) the policy promotes an approach based on service life of the asset, driving a renewal need in order to improve or sustain performance. On lower criticality routes, the policy specifies higher maintenance and refurbishment activity in order to maintain today’s performance levels.

More specifically, the asset policy dictates the removal of all pre-1976 rail in Track Category 1A and 1 in Quadrant 1A and 1B within CP4. However, despite the significant focus, sections of rail meeting this criterion will remain at the commencement of CP5. The expected volume remaining will be predominantly rail on 10mm pad sleepers, i.e F40 and G44 sleeper types.

Asset performance and reliability
Following completion of the West Coast Route Modernisation (WCRM) project in 2008, the modernised components on the route between London Euston and Crewe should be performing robustly, generating minimal failure related incidents. However, the fast lines between London Euston and Rugby are performing less robustly than that anticipated; as a consequence the route regularly fails to achieve agreed industry performance targets. Analysis suggests that this is due to four primary factors:

- WCRM legacy – poor quality in ballast renewal, focus was directed on sleeper spacing moving from 26 to 30 sleepers per length.
- Class 390 rolling stock (Pendolino) – the new rolling stock has an impact on the asset formation different to that expected.
- Traffic and tonnage increases – significant increase in traffic and tonnage eroding asset life, greater than expected/modelled.
- Engineering Access – the reducing network availability make the use of High Output technology or effective maintenance regimes inefficient in the white space agreed.

Throughout the remainder of CP4, a significant number of interventions to sustain asset reliability on the WCML have been deployed, these include, targeted ballast and rail renewals. It is expected that this strategy will continue throughout CP5.
CP4 Strategy
During the last 18 months of CP4, the route has undertaken major remodelling at some junctions. There remain eight locations, Lancaster, Watford Junction, Landor Street and Water Orton which are challenging in respect of design and delivery.

The Route Asset Manager (Track) recognises the efficiencies that maybe generated by incorporating enhancements to the network with renewals; additionally, the same principle applies with aligning multi-functional renewals activities and enhancements. However, it should be acknowledged that this can often generate inefficiency due to project staging (e.g. unused asset life) post GRIP 4.

Track strategy CP5

Conventional plain line
Heavy Refurbishment (concrete, MO) is defined as medium output ballast cleaning; however, in agreement with the Head of Asset Management (Track), all conventional renewals that are less than full renewal are included within this category. This includes items such as Cat12 formation only treatment of which there is a significant volume in CP5.

A similar position is reflected in the volumes for High Output rail and sleeper relay whereby, targeted volumes north of Preston are required to conclude undelivered WCRM activity. The volume is specifically targeted to the areas where a deficiency in the number of sleepers per length (from 26 to 28/30) and the replacement of pads (from 5mm pads to F27 or SHC) is necessary.

Due to the ever increasing challenges to balance network availability on the WCML in CP4, the plan includes a re-profiled amount of volume which has been re-scheduled for the early part of CP5. The additional volume will facilitate sustained route availability for EPS running and ensure that we enter CP6 in a robust position.

Alignment of Plain Line track renewal with the investment proposed under HLOS has not been factored in to the plan. The RAM anticipates that efficiencies may emerge as the detailed outputs (line speeds, tonnages and rolling stock) for each scheme become known through the GRIP process. As the schemes progress this will be continually evaluated for the impact on the business plan and some re-aligning of the plain line requirements may be undertaken.

Rail
The volumes for rail renewal (both rails and singular) are compliant to modelled volumes. This volume shall be primarily deployed to target the removal of all remaining pre-1976 rail from route criticality bands 1 and 2. During the latter parts of CP5, the route will commence the elimination of pre-1976 rail from lower criticality banded routes.

Opportunities will be exploited to replace jointed rail on lower banded criticality routes and replace it with cascaded Continuous Welded Rail (CWR). It is anticipated that the replacement with CWR will reduce maintenance liabilities and preserve CP4 performance levels.

Complete trax
This category includes renewals termed “conventional” or those sites that can not be treated by High Output Plain line renewals. The volume is model compliant for CP5 and involves ballast and formation renewal which is primarily targeted for high criticality routes. The route’s higher criticality routes will be treated as priority with smaller volumes being undertaken on routes that fail to respond to refurbishment techniques.

Plain line refurbishment
This work includes Medium Refurbishment (concrete) and Medium Refurbishment (other). The volume will treat sleepers and/or ballast at locations that will respond to interventions or are considered appropriate to achieve the maximum life from the asset’. The volumes are compliant to the model and are within the agreed parameters.

Switches & Crossovers (S&C)

Abandonment
The amount of S&C abandonment is below that modelled. The route will take the opportunity to rationalise S&C that is not used nor has a strategic purpose, e.g. performance – used to recover the train service. Where possible, the route will seek to exploit opportunities to abandon redundant assets at locations where renewal/enhancement are being undertaken. This is seen as a positive step by the route for the continued sustainability of the asset and every opportunity will be sought to increase the reliability of the asset.

Full renewal
Full renewal of S&C volume is compliant to the model for CP5. Enhanced investment over the past decade has compensated for the lack of investment in the previous decade. As a result, the asset is in a better condition whereby, S&C can be renewed in a steady state. As a direct result, the programme of S&C renewals has been built upon a continuing steady state in a sustainable manner.
Heavy refurbishment (S&C)
This is where the asset is treated by replacement of ballast and some rail and bearer components to extend the life of the asset without the need to renew. It is mainly undertaken on lower criticality routes but some re-ballasting will be undertaken on higher criticality routes where the treatment can be effectively targeted.

The early years of the control period are low in volume but are ramped up towards the end to be compliant to CP5 volumes. This is intentional to allow the business to secure the equipment and methods yet to be determined. The total target to complete by end of CP5 will be 363 units which is 7 under modelled.

Medium refurbishment (S&C)
In order to extend the life of the asset without the need to renew, the asset is treated by replacing rail and bearers only. It is mainly undertaken on lower criticality routes but some will be undertaken on higher criticality routes where the treatment can be effectively targeted. The plan proposes to deliver 75 units on higher criticality routes (1 and 2) with the remaining 472 units on 3 and below. The total target to complete by end of CP5 will be 547 units which is 18 units under modelled.

The volume is compliant for the control period.

Drainage
The plan for CP5 has been created using the latest data from the national drainage survey – undertaken in CP4. This has allowed the route to create water-tight plans to target renewals and refurbishment. The drainage plan is designed to slowly ramp up towards the final year of CP5 and continue on an even trajectory throughout CP6.

In order to successfully manage drainage going forward, the route proposes to create a dedicated RAM for drainage. This role will be responsible for all drainage elements (track, Geo-Tech and Structural).

Level Crossings
The route has 132 road vehicle level crossings. The asset is renewed based on condition and service life, the average service life being 18 years. The route’s plan for Level Crossing renewal will ensure the design life is being achieved and all condition required renewals are delivered. It is expected that user work and foot path crossings have a lifespan of 10 years. The Route Plan proposes 42 renewals of vehicular crossing, 408 pedestrian footpath and 239 user-worked. The route will explore in partnership with local Stakeholders/funders and neighbours, the practicality of closing up to 200 level crossings cost efficiently throughout CP5.

Fencing
The fencing plan aims to renew ‘very poor’ fencing and return poor fencing to ‘good’ condition during CP5. This will reduce the impact of trespass and vandalism and cattle incursion. This will enable a steady state, pro-active maintenance plan to be introduced during CP6. It is worth noting that dry stone walling makes up approximately 5 per cent of the Route’s boundary. Broadly, dry stone walling is ten times more expensive than class 3 fencing to maintain and 4.5 times the cost to renew.

Variance to policy
The route anticipates a significant amount of enhancement investment over the remaining years of CP4 and throughout CP5. This investment presents the route with the ideal opportunity to realise efficiencies by aligning the rationalisation and acceleration of S&C renewal with proposed enhancements specified within the HLOSs. However, the route is undergoing an evaluation exercise to align, where practical, renewal and enhancement activities, e.g. North West Electrification.

Specific risks
ORBIS
The route believes the ORBIS program will provide improved asset knowledge and tools to assist with creating the strategy for delivering renewals and maintenance work. If the ORBIS project is to be successful, the IT solutions and software will need to be proved effective. There is a risk that the base asset information is outdated which may provide incorrect solutions and outputs.

Refurbishment of plain line and S&C
The route will be undertaking significant refurbishment of S&C and plain line, using techniques and systems still in development. There is a risk that development of equipment and plant could delay implementing new working methods, consequently impacting efficiency.

Refurbishment activity will require the development and training of the route’s people to enable teams to be fully skilled to deliver refurbishment works. This may introduce a risk of low productivity whilst delivery teams build competence and confidence in delivering this work.

The aspiration is for refurbishment work to take place during midweek possessions.
**Conventional Plain Line renewals**
Complying with the track policy reduces the amount of renewals work on lower criticality band lines. There is a risk of faster deterioration rates in asset life if refurbishment work does not take place as previously identified. In this instance conventional plain line renewals may need to be moved from high criticality routes to prevent the imposition of condition of track speed restrictions. This will then impact delivery of the original planned work.

**S&C renewals**
S&C renewals relies on skilled teams to deliver within the possession times available. There is a risk to the delivery of S&C if skilled and competent teams cannot be resourced to deliver work during midweek possessions. This is not limited to Renewal, with the advent of Heavy Refurbishment and the increase in Medium Refurbishment for S&C, consideration to suitable skill levels and equipment must be a high priority.

**Network access**
There is a risk that the level of access required to undertake Heavy Maintenance of S&C is equal to that of the renewal requirement – this may require week end access to deliver. There is a proportion of Heavy Maintenance required on High Criticality routes that may require week end access to deliver equal to that of renewal.

**General**
The resource required for all track works is at a premium, especially with S&C (Kirow Cranes, Tilting wagons etc.) and with the HLOS projects in CP5 and continuing enhancements from CP4 there is a high probability, that on occasions, the most effective resource is over subscribed. This will result in either works being altered or reprogrammed. Such instances will result at best in higher than anticipated costs and at worst imposition of speed restrictions until the resource can be either re-planned or alternative methods adopted.
Signalling

Present asset condition
The signalling base asset condition, as measured by the Signalling Infrastructure Condition Assessment (SICA) tool, has shown improvement over CP4. The improvement has largely been attributable to the significant renewal investment in CP4 driven by asset condition, obsolete components and failure risk. However, there remains a significant quantity of 1960s Geographical interlockings, controlled by push button panels, to be eliminated despite renewal expenditure in CP4.

As the residual CP4 signalling renewals and targeted life extension activities are completed, the overall asset condition will improve throughout the remainder of CP4 and well in to CP5.

Asset quantity
Signalling technologies vary from the predominance of smaller signal boxes operating mechanical interlocking in the north through to large signalling control centres with Visual Display Unit (VDU) workstations operating electronic interlockings (SSI) on West Coast South and in the West Midlands Signalling Centre. There are four primary signalling types on the route:

<table>
<thead>
<tr>
<th>Signalling Technology Type</th>
<th>Proportion in LNW route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Inter-locking</td>
<td>33%</td>
</tr>
<tr>
<td>SSI/CBI (Solid State Interlocking)</td>
<td>36%</td>
</tr>
<tr>
<td>Westpac MKIIIa and GEC Geographical inter-lockings</td>
<td>15%</td>
</tr>
<tr>
<td>Remainder; free wired, route relay, miniature lever frame</td>
<td>16%</td>
</tr>
</tbody>
</table>

Asset performance and reliability
Overall the signalling assets are performing as expected given their age profile and engineering expectation. There is a diverse range of signalling types in existence across the route. The varying mixture of age profiled signalling technology provides significant challenges to maintain and manage. Mechanical signalling equipment is reliant on dwindling spares and specialised professional expertise/resources to undertake the scheduled maintenance work.

In accordance with national policy, the route proposes to utilise pooled national resources to undertake specialised maintenance tasks for mechanical interlockings, while progressively replacing them with modern signalling equipment.

In the West Midlands, there is condition led renewal of all 1960s Geographical Systems that contain obsolete relay types and have age related safety risks associated with their components. These factors are driving the requirement for complete signalling renewal at Bescot, Walsall, Wolverhampton and Birmingham New St PSBs.

Similarly, the 1970s electronic and 1980s processor based systems are also becoming increasingly difficult to maintain, introducing a performance risk, arising mainly through the lack of available spares. Targeted interventions including renewal of electronic systems to extend the life of signalling assets and deal with obsolete equipment.

The Chiltern corridor is fitted with Automatic Train Protection (ATP) which is a track/train fitted safety system dating from 1980s. This ATP system is obsolete technology and complete renewal of this system including the on-board train equipment is no longer supported. A joint strategy to look at options to address this in CP5 is being developed with the primary passenger operator.
Further north, a signalling system, unique to the UK, was installed on the Crewe to Stockport corridor. The technology was originally designed for DC overhead traction and was modified for compatible use with 25kV AC overhead traction. Since commissioning there have been a number of reliability issues related to trackside equipment which has required additional mitigation measures to be introduced, e.g. additional efficient cyclical maintenance activities.

**Signalling policy principles**

Similar to the track policy, the Signalling Policy for CP5 places more emphasis on the whole-system whole-life cost basis; this is a step change in comparison with CP4.

This principle maximises the utilisation of individual asset elements that make up the signalling system, adopting a ‘targeted’ renewal policy for the discrete parts of the signalling system rather than full re-signalling. The benefit is that each individual system element is utilised for its maximum life, avoiding part of the asset being renewed with a significant residual life remaining. The work-bank is built up from the ‘targeted renewal’ base to consider other wider policy requirements and the wider businesses initiatives; ERTMS strategy; Modular signalling; Consolidate operational controls Network Operating Strategy (NOS); and efficient delivery to generate a ‘Hybrid Smooth’ work-bank for CP5 and beyond.

**Remaining challenges in CP4**

The largest of the GRIP 5-8 committed schemes still to be delivered in CP4 are Stalybridge and Walsall re-signalling projects. At a construction level, both projects are ‘on-track’ to their commissioning date and are considered to have a low delivery risk. In volume terms, the first three years of CP4 have delivered approximately 60 per cent of the re-signalling SEU with 40 per cent remaining to be delivered.

In regards to level crossings, approximately 50 per cent of the Level Crossing Equivalent Unit (LXEU) have been delivered in the first three years of CP4 with 50 per cent of the LXEU remaining with the majority of these in the final year 2013/14.

Minor works and partial renewals are progressing well and it is anticipated that the majority of committed volumes of CP4 will be achieved.

**Signalling strategy CP5**

The signalling strategy is in line with the national asset policy and Network Rail’s wider business objectives. The signalling uses the developed ‘targeted renewal’ work-bank and the ‘hybrid smooth’

The targeted work-bank for CP5 focuses on re-signalling the larger (PSBs) in the West Midlands, these are Wolverhampton and Birmingham New Street. The route is presently considering which of the signalling activities will be relocated to the West Midlands Signalling Control Centre (WMSCC) or the new ROC.

Specific to the WCML, the full renewal activities increase with CP5 re-signalling planned at Watford, Stafford, Macclesfield, Speke and Allerton. Areas may be relocated directly to the appropriate ROC dependent upon completion timeframe of the ROC.

Supported by asset condition, the targeted renewal strategy for CP5 includes the full re-signalling of Signal Boxes with electro-mechanical interlockings that are over 50 years in age. Specific locations include: Banbury, Stafford, Macclesfield, Gresty Lane, Halton Jct, Runcorn, Speke, Allerton Jct, Liverpool Lime Street and St Helens This reduces the reliance on the specialised mechanical signalling resources to fault and maintain.

In line with policy, the full re-signalling of 1960s PSBs at Wolverhampton, Birmingham New Street and Watford will be undertake due to the obsolescence and condition of the equipment and asset. The renewal of the signalling at Watford and Birmingham New Street areas will pose a significant challenge due to the intense levels of traffic and available network access.

As part of the re-signalling the route will seek to exploit opportunities to abandon redundant assets at locations where renewal/enhancements are being undertaken. Rationalisation of signalling equipment that is not used nor has a strategic purpose, e.g. in line with track abandonments, will be assessed prior to removal.

The targeted renewal volumes include partial renewals associated with the replacement of electronic systems on the north of the WCML. These will be carried out in order to extend asset life and to facilitate re-control to the Manchester ROC. The mechanical train stops in Merseyrail are planned to be renewed with an alternative to extend the life of the signalling asset until re-signalling with ERTMS.

The targeted renewals for level crossings include the condition led renewal volume of 12 level crossings over CP5. Prior to committing significant expenditure, the route will examine and promote opportunities to close the crossing first. Failing the option to close, synergies between the level crossing component renewals outlined in track have been explored in order to realise possible efficiencies. The renewal process requires that the crossing is risk assessed and various options to improve the safety are considered. Dependant on crossing type and risk assessment outputs, a strategy to renew the crossing is devised. Based on analysis the plan has considered the requirement to upgrade certain level crossings types, e.g. high scoring AHBs where renewal will likely introduce a full barrier crossing with Obstacle Detector (OD). As part of the NOS schemes, several level crossings are being assessed for suitability to convert manually controlled crossings to OD.

The CP5 targeted renewals minor works activities will include:

- The Chiltern corridor – which is presently fitted with Automatic Train Protection (ATP) System.
- Various Train Operated Points.
- First generation Axle Counters and their power supplies.
- Renewal of the obsolete mechanical train stops on Merseyrail with an alternative – this also facilitates the planned introduction of new Class 3xx rolling stock.
Geotechnical assets (Earthworks)

Asset condition
The route has a large number of cutting slopes formed from variable glacial deposits which are susceptible to failure as a consequence of prolonged or sudden extreme wet weather. These deposits occur widely, but are more dominant in the northern part of the route – WCML north of Preston and on the Settle and Carlisle route. Further south assets are more vulnerable to slower modes of failure which generally occur following several shorter intense periods of wet weather.

The former tend to occur rapidly, importing significant safety risk where they occur in the path of trains, whilst the latter are generally slower, leading to deterioration in track quality on embankments and impacting performance through the imposition of temporary speed restrictions.

In common with all other routes earthworks, assets greater than three metres high are split into 100m (5 chain) lengths for asset management purposes. They are examined and scored to determine asset condition, the table below summarises the route’s current earthworks condition.

<table>
<thead>
<tr>
<th></th>
<th>Incomplete</th>
<th>Poor</th>
<th>Marginal</th>
<th>Serviceable</th>
<th>Totals</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embankments</td>
<td>1,726</td>
<td>977</td>
<td>6,961</td>
<td>7,180</td>
<td>16,844</td>
<td>49.7</td>
</tr>
<tr>
<td>Cuttings</td>
<td>2,092</td>
<td>791</td>
<td>5,624</td>
<td>6,855</td>
<td>15,362</td>
<td>30.1</td>
</tr>
<tr>
<td>Rock Cuttings</td>
<td>188</td>
<td>105</td>
<td>653</td>
<td>763</td>
<td>1,709</td>
<td>4.8</td>
</tr>
<tr>
<td>Totals</td>
<td>4,006</td>
<td>1,873</td>
<td>13,238</td>
<td>14,798</td>
<td>33,915</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>11.8</td>
<td>5.5</td>
<td>39.0</td>
<td>43.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Active mineral extraction on the route is limited, with one active coal mine (at Daw Mill near Coventry), surface quarrying for aggregates for construction purposes and some limited deep mining for Gypsum.

Ancient abandoned mine workings for coal, iron, gypsum and salt are, however, commonly present at shallow depth below the railway in the West Midlands, Cheshire, Lancashire and parts of Cumbria. The majority of these have not been stabilised and may be susceptible to collapse.

The National Mining Team at Derby has comprehensive documentation on ancient mine-workings, but the precise locations are frequently not known. Confirming their presence, condition and works required to stabilise them requires desk study and ground investigation by the route team. Untreated ancient mine-workings therefore remain a significant risk to both safety and performance where collapse could occur beneath track, earthworks or structures.

Geotechnical policy principles
The CP4 Policy development lacked comprehensive earthworks examination data in a consistent format across all Routes and this restricted the analysis which could be undertaken to establish the most cost effective balance of activities to deliver a ‘Steady State’ asset condition.

The policy encouraged remediation of embankments to ensure there was no detriment to published line speed through poor track geometry. Earthworks failure analysis data for the past seven years, as part of the policy review for CP5, revealed that delay minutes attributable to earthworks steadily reduced under the CP4 policy. However, there has been little evidence to suggest that the earthworks investment has reduced the number of cutting slope failures or the number of derailments.

The new CP5 policy has been applied to produce a bottom-up work-bank divided into Renewals, Refurbishment and Maintenance activities for Earthworks and Drainage assets. The CP4 earthworks policy committed to maintain the earthworks assets in a ‘Steady state’ condition through delivery of remedial works prioritised on the basis of condition and Route Priority. Those categorised as ‘Primary’, ‘London South-east and Commuter’, and ‘Main Secondary’ were remediated to improve asset condition through preventative renewal, in accordance with industry best practice. Intervention on lower category ‘Other Secondary’, ‘Rural’ and ‘Freight’ Routes occurred in CP4 only when sites deteriorated to the point where intervention was necessary to prevent sudden failure, and then were only repaired to stabilise the identified mode of failure and restore safe function.
Remaining challenges in CP4

Capital expenditure
Delivery against the existing work-bank remains challenging. The variance to target includes overheads, efficiencies and unallocated budget – which is maintained as a reserve to manage and respond to emergencies, or urgent works as a consequence of sudden changes in the rate of asset deterioration.

Whilst the expenditure required to achieve a smoothed delivery profile was maintained at around the required level (£15m p.a.) for the first two years of CP4, the following factors have contributed to a sharp ‘dip’ in delivery during 2011/12:
- Delays to individual schemes which formed part of multi-scheme packages established to gain tender efficiencies in 2010/11 led to delay of those packages into subsequent year’s construction seasons (2012/13).
- Protracted land access negotiations and the presence of species protected by legislation continue to cause considerable delay to delivery on many schemes.
- Overly stretched route Geotechnical resource has struggled to balance the demands of the ‘domestic’ business plan programme with those of National initiatives (e.g. CP5, Buildings & Civils transformation programme, National Risk Reduction programme).

The route is actively addressing the above issues, but there remains a consequential risk for CP4 cost and volume delivery.

Operational expenditure
In 2011/12, the route Earthworks Exam Database (EED) included approximately 29,200 individual earthworks requiring examination dependant on condition (1, 5 or 10 yearly). On LNW approximately 5,700 sites were subject to examination at a cost of around £310,000 with a further £22,000 allocated to cover the administration.

During CP4 a central exercise identified a further 7,350 ‘Grey Assets’ absent from the EED. In 2011/12 a brief visual inspection and risk assessment was undertaken which established the number of new ‘earthworks’ for inclusion in the next annual examination task-list at 4,006.

Geotechnical strategy CP5
In common with other assets, the condition of all earthworks is constantly deteriorating and these asset deterioration rates remain very hard to measure consistently. The soil and rock slope hazard indices recorded during our examination programme provide a proportion of Poor, Marginal and Serviceable assets and the ratio of these categories at any given time provides the best means of monitoring change in asset condition in the absence of any other robust tools.

As in CP4 the policy aim in CP5 is to maintain consistent earthworks asset condition. Better quality information and analysis tools help in establishing what interventions will bring the greatest benefit to asset condition for the least intervention cost, and studies undertaken in the development of the CP5 Policy have established a range of interventions which fall into the categories of Renewal, Refurbishment or Maintenance. By applying the policy to carefully balance application of these interventions it is possible to reduce costs and yet maintain asset condition at CP4 exit levels.

In order to be successful, the Policy also has to address derailment risk which Earthworks and Drainage assets may import. The Policy therefore provides tools to target expenditure at those locations where the consequences of earthworks asset failure would be greatest in terms of safety impact, for example on high speed, multiple track routes and/or on the approach to tunnel portals. By marrying this ‘consequence’ factor to the level of ‘hazard’ presented by the assets, the CP5 Earthworks Policy robustly manages risk for the first time.

In addition to the core asset management activities, the CP5 plan includes provision for ancillary activities (e.g. mine-workings and monitoring). The policy tools separate out all drainage from earthworks activities, to facilitate the separate policy statement on drainage.

The drainage asset in totality remains a critical asset which needs further intrusive analysis and planning throughout CP5. Therefore, in order to maximise value and generate a robust renewal and maintenance strategy for CP5; the route has taken the option to remove drainage activity from maintenance delivery units’ responsibility.

Climate change
A generic allowance of £3.91m has been made within the plan provision for the impacts of climate change. This is considered appropriate to manage the increased rate of deterioration due to background changes in temperatures, rainfall patterns and the impact on asset condition as a consequence of more vigorous vegetation growth or raised groundwater levels.

The increased prevalence of unpredictable isolated storm events during the summer months has a severe impact on safety and performance as a consequence of unforeseen earthwork failure. The route proposes to implement a suite of technological measures that include the installation of weather stations, live weather tracking and remote condition monitoring of vulnerable and high failure consequence assets to manage the risks associated.
In addition, during dry summers the removal of soil moisture by the root systems of trees leads to desiccation shrinkage of high plasticity clays (as prevalent in the southern and central parts of the route) and this leads to track defects and gradual deterioration in earthwork asset condition. The route proposes to implement a cyclical programme of tree management on embankments on susceptible geologies to reduce this, and prolong asset life.

Earthworks examinations
Earthworks examination rates (values) proposed in CP5 are those used when examination was previously undertaken within Route: £85 and £110 for soil slopes and rock slopes respectively. The latter is cross referenced to Scottish office rates from 2002/3. This was introduced in response to concerns over asset examination quality, and those examinations remain our principal means of safely managing the asset.

Whilst this represents a significant initial cost increase into CP5, it is likely that the examination process may be changed, possibly to a risk based prioritisation system using a revised version of the 065 examination. This would mean fewer, more critical sites examined at a higher frequency – possibly a two tier exam process. This would obviously bring cost savings were it to be introduced.

CAPEX delivery strategy
The strategy in CP5 will explore alternative methods and delivery mechanisms for schemes in the business plan. Initial discussions have been held with the newly established Route Works Delivery Organisation and with external project management consultancies. The discussions will also explore options for fast tracking schemes to the end of the financial year.

Variance to policy

Run-on/Run-off issues
One initiative proposed by the Structures Asset Management team is to accelerate waterproofing of their under-bridge asset where track and formation renewals are being undertaken over structures. The geotechnical team propose to adopt an area of asset responsibility which has traditionally fallen between track, structures and earthworks and address poor track quality issues associated with “run-on” to and “run-off” from under-bridge structures at the same time as these other works are underway. A funding allowance has been made based on the delivery of improvements at five structures per year.

Cross-discipline benefits would be seen in reduced track component degradation, reduced track maintenance, reduction in TSR/ESR risk and reduced structure and earthwork degradation.

Drainage maintenance access provision
With the increased CP5 Policy emphasis on delivering low complexity/low cost interventions, such as drainage refurbishment and maintenance it is recognised that the full benefits of the work done can only be realised in the longer term by providing better and safer access to maintain assets as required by current legislation.

The route is proposing to invest in enhanced drainage maintenance access including the construction of drainage access steps on earthworks, improved personnel or vehicular access-ways to already installed drainage, and installation of places of safety from which for example, culvert headwalls can be cleared of debris at times of extreme weather.

This programme will be run in conjunction with the increased investment in drainage maintenance, refurbishment and renewal, and will include installations at frequent flooding sites or locations where there are known maintenance issues on already installed and functioning drainage. The provision allows for measures to be installed at 50 locations each year in CP5.
Structures

Asset condition
The route has a significant number of structures with an age profile ranging between 100 and 180 years old; some are the original structures from when the railway first opened. Based on current intervention rates in CP3 and CP4, the age of the asset continues to increase and the condition of the asset continues to reduce, as evidenced by the quantitative condition scoring process (BCMI), condition modelling and through an increase in the number of asset failures.

A review of policy and processes identified the need for a more rigorous process of asset inspection and assessment in order to maintain the risk profiles at acceptable levels – this output has been adopted for the remainder of CP4.

Policy principles overview
Network Rail is updating its national structures policy. In order to minimise the impact of a sudden increase in cost driven by the new policy in CP5, the expenditure impact will be phased over a greater time period – CP5 and CP6. An interim policy to reflect the phased approach is currently in development.

The policy endeavours to arrest the deterioration of structure assets and to return asset performance to a level consistent with the route safety and performance targets.

Asset quantities
Structure type and quantity

<table>
<thead>
<tr>
<th>Type</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Structures</td>
<td>56</td>
</tr>
<tr>
<td>Culverts</td>
<td>4,536</td>
</tr>
<tr>
<td>Footbridges</td>
<td>329</td>
</tr>
<tr>
<td>Former Bridges</td>
<td>544</td>
</tr>
<tr>
<td>Retaining Walls</td>
<td>4,548</td>
</tr>
<tr>
<td>Overbridges</td>
<td>2,719</td>
</tr>
<tr>
<td>Underbridges (incl Viaducts)</td>
<td>4,381</td>
</tr>
<tr>
<td>Tunnel Bores</td>
<td>290</td>
</tr>
<tr>
<td>Tunnel Shafts</td>
<td>287</td>
</tr>
<tr>
<td>Tunnel Portals</td>
<td>422</td>
</tr>
<tr>
<td>Sea Defences</td>
<td>52</td>
</tr>
</tbody>
</table>

Structure age and stock %

<table>
<thead>
<tr>
<th>Age</th>
<th>Stock %</th>
</tr>
</thead>
<tbody>
<tr>
<td>145 yrs old or older</td>
<td>35%</td>
</tr>
<tr>
<td>110-145 years old</td>
<td>23%</td>
</tr>
<tr>
<td>51-110 years old</td>
<td>19%</td>
</tr>
<tr>
<td>50 years old or younger</td>
<td>23%</td>
</tr>
</tbody>
</table>

SCMI Score (Bridges) % Stock

<table>
<thead>
<tr>
<th>Score</th>
<th>Stock %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 45</td>
<td>5%</td>
</tr>
<tr>
<td>45-74</td>
<td>64%</td>
</tr>
<tr>
<td>75 and over</td>
<td>31%</td>
</tr>
</tbody>
</table>

Remaining challenges in CP4
The critical challenges remaining in CP4 are:
- Achieving and maintaining a compliant position for inspections and assessments.
- Development and embedding the new policy and supporting systems.
- A higher than planned expenditure on delivering inspections and examinations following asset failures at Stewarton and River Crane mean overall volumes will be less than originally planned.

Structures strategy CP5
The Structures’ Asset Management Team is schedule to expand prior to the start of CP5. The planned increase follows the recommendation suggested in a resourcing benchmarking exercise undertaken by Network Rail/Arup/ORR. The additional resource will manage, review and process actions arising from the more intrusive inspection and assessment processes that are required to manage the ageing assets in a safe condition.

The route’s preferred option to ‘in source’ repetitive inspections and contractually ‘out source’ specialist elements of work or when specific work activities peak. It is anticipated that internalising structures inspections will generate efficiency opportunities through planning integration and simplification of the examination review process.

The route proposes the implementation of a preventative maintenance regime that is designed to maintain asset condition through efficient rectification of minor structure component defects. It is anticipated that deployment will be in conjunction with pre-planned intrusive examinations that have network access schedule in advance.
A summary of the volumes by asset type are as follows:

**Underbridges and overbridges**
The Underbridge and Overbridge volumes have been determined from the top down model based on the emerging policy. The intervention strategy will comprise a significant increase in minor maintenance volume to address a backlog of structure component defects.

In order to facilitate costs to be reduced in CP5, not all interventions will align with lowest whole-life costs. Introduction of a planned preventative maintenance regime is proposed to reduce asset deterioration and move our interventions to lowest whole-life costs.

**Major structures**
The bottom-up plan indicated that expenditure in CP5 will increases due to the renewal requirements at 56 complex structures. Similarly interventions are proposed at 20 major bridges in CP5 as part of a long term sustainable approach to maintaining these critical assets in a safe and serviceable state. The largest item of work is schedule for the 49 spans on Whalley Viaduct. The work is to prevent pier settlement caused by the deterioration of the original timber piles.

**Tunnels**
Tunnel volumes have been determined by a combination of: a bottom-up work-bank developed from the tunnel management strategies comprising non-standard specific interventions; and standard tunnel lining repairs determined by a top down model.

A number of significant work items include:
- The completion of the hidden shaft investigation works is now programmed to be complete in CP5 in line with emerging policy. A provision for the treatment of confirmed hidden shafts is included.
- It is assumed that the relining works to Holme Tunnel will commence in CP4 but requires funding at the start of CP5.

**Minor Assets**
Minor assets comprise footbridges, retaining walls, culverts and sea defences. The volumes proposed have been a continuation of CP4 levels of activity, except for culverts and retaining walls. Renewals of culverts and retaining walls have been increase due to the number of failures to occur over CP4, full or partial renewal will be undertaken where necessary. This is recognised by the emerging policy through new proposed prioritisation tools and the adoption of condition marking.

**Other CAPEX**
Other CAPEX provides for other miscellaneous activity that cannot be predicted from the modelling activity, such as scour risk mitigation and bridge strike mitigations.

Maintaining compliance to the new inspection and assessment regime through CP5 requires an overall increase in expenditure in comparison with CP4.
**Variance to policy**
This section details the additional volumes/initiatives that are deemed to have value for money in respect to whole-life cost will drive further efficiency generation and have synergies with other renewal/enhancement activity or meet/contribute towards the HLOS requirements.

The principle to generate efficiency through incorporating enhancements into the network with renewals applies with aligning multi-functional renewals activities. Recognising the alignment synergies the plan for structures includes ‘Step 2 above policy’ investments for CP5.

**Under-bridge water proofing**
Penetration by water is the precursor to the principal modes of degradation for all under-bridge material types. Water membrane failure leads to corrosion, freeze-thaw damage, loss of bedding mortar, increased vegetation growth and chloride attack of concrete. To prevent these modes of degradation it is necessary to install waterproofing membranes below the track formation. Undertaking waterproofing necessitates the removal and replacement of the track and its formation.

The plan proposes to undertake more under-bridge waterproofing by delivering it as part of the planned track renewal activity on critical routes so delivering a 40 year waterproofing cycle.

**Accelerated replacement of long timber bridges**
Long timber under-bridges interrupt ballasted track systems with a traditional fixed track form that requires increased track and structure inspection and maintenance to maintain in a safe condition. Consequently they present increased safety and performance risk to the rail network.

Presently, the replacement of the bridge would be considered when a need for a structures intervention has been identified or as part of determining the Lowest Whole-life Cost strategy for the structures asset. Long timber renewals would be planned and undertaken assuming there would be no change to the supporting structure.

The proposal is to accelerate structures renewals to deliver a modern structure supporting a conventional ballasted track. Deck replacement will be undertaken if supported by a whole system lowest whole-life cost analysis which allows for reduced safety and performance risk supported by replacement.

**Enhanced bridge strike mitigation**
Enhanced bridge mitigation activity comprises:
- Completion and review of robustness assessments to support SBSI dispensations to mitigate the impact of strikes.
- Minor works interventions to maintain warning signs and liaison with Local Highway Authorities to promote initiatives to reduce probability of strikes.
- Incorporate bridge strike mitigation into planned renewals such that DOUBLE AMBER dispensations are achieved.

The proposal will undertake the above together with:
- Accelerated renewal or installation of CPBs at critical bridges to improve dispensations.
- To fund highway improvements and interactive signs to reduce the probability of strikes.

**Accelerated renewals associated with planned enhancement schemes**
Preferred interventions to achieve line speed, gauge or electrification enhancements at Structures assets will be identified to minimise project cost rather than lowest whole-life cost for the asset or railway system as a whole.

Where preferred intervention to deliver LWLC goes beyond project liability supplementary renewal funding will be provided. If this funding is not available, a sub-optimal solution will be progressed and the opportunity to reduce future cost to maintain the asset is lost.

It is proposed to provide funds to ensure whole system lowest whole-life cost options are progressed without reducing basic renewal activity thereby delivering reduced future renewal costs.
Buildings

Present Asset Condition
Further portfolio rationalisation and investment is required in CP4 to deliver sustainable whole-life asset costs and reduce significant and unsustainable volumes of unpredicted asset failures, reactive maintenance interventions and expenditure. The condition of Route stations by Station Stewardship Measure (SSM) is shown below.

Station Stewardship Measure

<table>
<thead>
<tr>
<th>Station Category</th>
<th>CP4 Exit</th>
<th>Sept 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2.38</td>
<td>2.42</td>
</tr>
<tr>
<td>B</td>
<td>2.38</td>
<td>2.42</td>
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<tr>
<td>C</td>
<td>2.39</td>
<td>2.43</td>
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<tr>
<td>D</td>
<td>2.51</td>
<td>2.54</td>
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<tr>
<td>E</td>
<td>2.52</td>
<td>2.54</td>
</tr>
<tr>
<td>F</td>
<td>2.56</td>
<td>2.61</td>
</tr>
<tr>
<td>Light Maintenance Depots</td>
<td>2.11</td>
<td>2.13</td>
</tr>
</tbody>
</table>

Asset quantity
The route has responsibility for circa 3,500 customer critical building assets.

Customer Critical Buildings 2,952
- Managed Stations
  - Birmingham New Street
  - Liverpool Lime Street
  - London Euston
  - Manchester Piccadilly
- Franchised Stations (All Categories) 567
- Traction Maintenance Depots 21
- Operational Buildings 2,500
- Maintenance Buildings 120

Buildings policy principles
In line with core Asset Management strategy, the route has sought to achieve sustained condition of its building assets through increased use of the asset knowledge contained in OPAS. This ensures that focused interventions and planned preventative maintenance is undertaken, supported by reactive and minor emerging works at appropriate points in the assets’ degradation cycle.

The route’s objectives are:
To retain safe performance by:
1. Using asset knowledge to drive decision-making.
2. Directing interventions to high safety risk and performance issues.
3. Prioritising assets by Asset Risk Score (ARS) and Percentage Asset Remaining Life (PARL).
4. Taking account of customer imperatives.

To sustain overall condition by:
1. Targeting interventions on poor condition and utilising inspections, PPM and minor emerging works on all assets.
2. Working with our customers and stakeholders to carry out interventions that meet the wider industry aspirations.

Remaining challenges in CP4
Throughout the remaining years of CP4, the following key challenges are critical to ensure that the route is prepared and in a robust position for delivering the CP5 plan:
- Securing sufficient funding resource in CP4 for the Design and Development of those projects in the CP5 programme that is required for early mobilisation/delivery.
- Restructuring the maintenance delivery organisation to ensure it has the correct resource profile, skills and capabilities to deliver significantly increased volumes in CP5.
- Delivering a robust Route Accommodation Strategy to ensure that our MDU and Operational Property portfolio is optimally aligned with the future needs of our business.
- Confirming the future delivery strategy for Operational Property Inspections (Civils Examination Framework Agreement – CEFA).
CP5 buildings strategy

In respect to managed and franchised stations, the strategy is to move towards delivering a more sustainable and affordable estate over CP5. Strategic initiatives have been ‘within policy’, include proportionally sizing the asset portfolio to suit modern day requirements, improving BREEAM and CEEQUAL outputs and resilience to extreme weather events. Further work will be carried out to secure greater collaboration with Train Operators to promote the efficient management of stations in CP5; this will include a review of leasing arrangements and exploring ‘Alliancing’ initiatives.

The route will continue to promote the most efficient delivery of station repairs and renewals by taking an integrated approach to implementing interventions at franchised and managed stations. Synergies between projects delivered by third parties, Train Operators and Network Rail will be exploited in order to deliver the most efficient outputs. The strategy for buildings has been aligned to the emerging policy modifications that will be specified in the CP5 policy later in the year.

Summarised below are asset strategies for each asset type:

Stations
To maintain the buildings, services and curtilages at all stations at CP4 exit condition at portfolio level. Ensure continued functional and safe operation of the railway for customers, staff and other users.

- West Coast Franchise will have an impact currently our CP5 plan. The plan currently includes renewals for the 17 West Coast Trains Franchised Stations – however these maybe removed from the plan as and when the assets are transferred to the new franchisee on FRI lease arrangements.
- Plan Risks, the main risk noted is current estimates for Moorfields and Hamilton Square Station (both Merseyrail Franchised Stations), which are greater than currently planned (at £3,200k each). The latest Level 4 estimate for Moorfields Station is £17m and Hamilton Square Station is £9m largely due to unforeseen changes to scope and lack of any suitable unit rate date in the initial estimates.
- Managed Stations, Euston noting the impact of HS2 and how this affects renewals verses minor works/reactive costs.
- New Stations, currently there are three new stations planned for operation during CP5 and we have considered budget impact (mainly for Minor Works and Asset Examinations).

Light Maintenance Depots
To maintain light maintenance depots let under the Depot Access Conditions at CP4 exit condition at portfolio level. Ensure that buildings, services, curtilage and operational plant remains functional and fit for the purpose of the Train Operator’s business in respect of berthing, cleaning, fuelling, tanking, effluent discharge, train maintenance and repair.

Volume above policy
This section details the additional volumes/initiatives that are deemed to: have value for money in respect to whole-life cost, drive further efficiency generation, have synergises with other renewal/enhancement activity or, meet/contribute towards the requirements (targets) specified in the HLOS.

The volumes/initiatives for Step 2 are supported by business appraisals that demonstrate the business value for the additions in expenditure, these are contained in appendix A.

Environment
Proposal is to install voltage power optimisation equipment and intelligent controls to lighting installations at category A-C stations. It is estimated that these interventions will deliver a 43% reduction in power consumption and energy costs.

Background
Network Rail is committed to improving the energy performance of its building assets and to achieve ratings of ‘very good’ or ‘excellent’ in any new build or retrofit project under the Building Research Establishment Environmental Assessment Methodology (BREEAM) and reduce energy consumption in its managed and franchised stations, depots and commercial premises.
Objective
This proposal demonstrates a positive management intervention strategy to deliver measurable reductions in energy consumption and improvements in the BREEAM ratings of its existing building stock together with genuine efficiency savings over CP5 and beyond.

Passenger Safety Index improvements
We propose to improve the Passenger Safety Index by accelerating a £18m programme of platform reconstruction interventions so that stepping distances at stations where there are significant variances to current standard are improved such that there is a measurable reduction in train boarding and alighting incidents.

Background
Network Rail has made a clear commitment to put safety into practise by looking at a range of initiatives aimed at directly improving the safety of the public and the Passenger Safety Indicator (PSI).

Objective
This proposal demonstrates a positive management intervention strategy to deliver measurable improvements in safety performance and passenger experience at stations in CP5 and later.

Accommodation strategy
Network Rail is committed to providing accommodation to its core maintenance and operational functions that is optimised in terms of its:
- Facility
- Strategic location
- Size
- Utility

Although there has been a significant investment in the MDU Depot portfolio over CP3 and CP4 this has largely been without the benefit of a ‘whole business’ approach and recognition of the requirements of the future organisational structure and delivery outputs.

There is an opportunity to ‘right size’ the MDU Depot and operational property portfolio in order to provide fully integrated and optimised facilities that provide agile working environments that are suited to effectively and efficiently supporting the needs of the business rather than the business ‘having to make the best of what it has got’.

The route’s MDU Depot and operational property portfolio is the culmination of the business and wider industry’s evolution rather than a strategic plan to provide accommodation that supports the key outputs and capabilities required to optimally maintain and operate the railway.

This previously fragmented asset portfolio has suffered from a lack of investment in timely maintenance, repair and renewal.

Consequently the portfolio:
- does not effectively/efficiently support the business in the delivery of its key outputs
- is expensive to maintain and operate
- is substandard/suboptimal in terms of its facility and utility.

HLOS Compliant
Remote condition monitoring
The proposal is to install Remote Condition Monitoring to critical line side equipment buildings.

Background
Network Rail is committed to improving operational performance, service punctuality and the reliability of its assets and infrastructure by utilising new asset management technology to reduce exposure to asset failure.

Objective
This proposal demonstrates positive management intervention to deliver measurable improvements in operational performance and genuine efficiency savings over CP5 and beyond.
Electrical and Plant (E&P) policy overview
The CP4 policy was based on the age of the asset where renewal was based on a single pre-defined lifespan (nominal asset life). The Electrical Power Asset Policy for CP5 is notable for its shift in focus from the fixed time-interval interventions used in CP4. The shift in policy focuses on renewal or refurbishment interventions where scope and timing are explicitly linked to asset condition scores and route criticality banding. In addition, on certain key asset types (e.g. signal power distribution systems) the policy uses route criticality to drive the choice of engineering solutions to be adopted for a renewal. However, it should be acknowledged that the route criticality ranking is not necessarily the same for all E&P asset types. The variances between E&P asset type can often generate conflict and/or the misalignment between functional renewal/refurbishment strategies. These conflicts have influenced some of the rationale for deviated from policy.

The committed electrification projects will increase the route’s electrified asset considerably. We are in the process of reviewing the asset policy ‘route criticality’ bandings to reflect the impact(s) the anticipated increase in traffic may have.

Asset condition
Fixed plant
Throughout CP3 and CP4, signal power supply assets, predominantly generators, transformers and change-over panels, have been steadily renewed in order to maintain or improve their condition and reliability. To maximise the efficiency, majority of the system cables and switchgear which distributes power to line side signalling equipment, has been renewed in line with re-signalling projects undertaken over the last 10 years on the southern part of the route. However, on the northern part of the route there remains more than 200km of signal power cable and line side power equipment dating from the 1960s and early 1970s.

Overhead Line Equipment (OLE)
In the London Euston area the OLE equipment is MK3B which was upgraded in 2000. OLE on the slow lines (WCML) from Kensal Green to Liverpool Lime Street (via Weaver Junction) is largely 1960s Mk1 equipment. However, the equipment on the fast lines was upgraded to UK1 as part of WCRM. North of Weaver Junction towards the Scottish border, the OLE is primarily 1973 Mk3 (UK1). The OLE has been subject to a programme of “Campaign Changes” where specific component failure modes have been targeted to improve reliability.

Conductor rail
A rolling stock project on Merseyrail during the 1990s removed the outermost set of collector shoes that were located underneath the cab ends of each train. The project was intended to mitigate the impact of acts of vandalism where trains hit obstacles placed on the line. As a result, the occurrence of single-shoe contact increased, creating localised burning and the accelerated wear of the conductor rail. During CP4, circa £1m was invested to repair conductor rail head damage due to previous modifications on the Merseyrail fleet.

Traction distribution
As part of the West Coast Power Supply Upgrade (WCPSU) project a number of ageing 25kV substations have been replaced by modern Gas Insulated Switchgear substations. WCPSU Phase 3A will renew the substations on the WCML between Wembley and Whitmore. The asset technical life of the remaining 25kV oil-filled switchgear was extended during CP4.

The rectifiers on the Euston – Watford DC line will have been renewed during CP4. On the Merseyrail D.C. railway, planned renewal of our traction transformer-rectifier sets is not expected until CP7 based on the Asset Policy Technical Life.

A CP4 programme of 11kV power cable renewals on the Merseyrail system is replacing over 20km of early 1970s XLPE (cross-linked polyethylene) insulated cable vulnerable to failure as a result of latent manufacturing defects. The system still has approximately 5km of life-expired 1958 vintage cables that have caused service-affecting failures and fall due for renewal in CP5 on the basis of 60yr asset technical life.

Asset quantity
Electrification by STK (National)

<table>
<thead>
<tr>
<th></th>
<th>AC OHL</th>
<th>AC/DC</th>
<th>DC</th>
<th>DC OHL</th>
<th>None</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNW Route</td>
<td>2,828</td>
<td>8</td>
<td>292</td>
<td>0</td>
<td>3,930</td>
<td>7,085</td>
</tr>
<tr>
<td>Network Total</td>
<td>8,058</td>
<td>39</td>
<td>4,471</td>
<td>39</td>
<td>18,503</td>
<td>31,108</td>
</tr>
</tbody>
</table>

Remaining challenges in CP4
One of the major challenges during the remainder of CP4 will be the management of outdated signal power distribution systems which presently under-perform.

We expect to maintain the current high levels of short-notice signalling system disconnections for urgent power cable testing and repair to ensure that system and workforce safety is maintained.

Preventing failures of 1960s signalling power distribution equipment in the Crewe area will continue to be a key challenge until re-signalled, now scheduled in CP6. The plan makes provision in CP5 for “reactive” spot renewals of signal power cables in this area, using remotely-monitored earth leakage measurement systems to predict and prevent cable failure.
Despite the significant investment, some signalling power cables and line side power distribution equipment that is over 40 years old and in poor condition will remain in the north of the route at the exit of CP4. This is due to the volume of equipment in need of renewal and the challenges faced to gain access to schedule the renewal.

Improving the reliability of OLE against a backdrop of increased use and reduced engineering access is another key challenge facing the route in CP4. These factors make it more difficult to gain access for planned preventative maintenance and to conduct follow-up inspections to identify faults that have caused automatic tripping of 25kV traction power supply circuit breakers. These challenges are being addressed by developing a reliability-centred OLE maintenance regime and by deploying a web-based tool that uses wireless communications to provide real-time, remote access to information from the 25kV relays that detect OLE system faults. This enables the location for follow-up OLE fault investigation to be pin-pointed.

A change of standards and working practices in CP4 means that manual conductor rail wear gauging is no longer permitted with the conductor rail energised. This has adversely impacted the rate at which conductor rail wear can be measured. Whilst the safety implications are well understood, not having the ability to accurately determine the required rate of steady-state renewal is of real concern. Getting train-borne conductor-rail measurement operating regularly on the Merseyrail system is a key priority. However, this presents its own challenges; technical issues with the laser-based measurement system and vehicle gauge clearance have so far frustrated efforts to get regular and reliable vehicle-based conductor rail measurement systems operating on the route.

**Electrification and Plant strategy CP5**

**Overhead Line Equipment (OLE)**

The route intends to place less reliance on manual methods of OLE inspection. The proposed strategy will make greater use of vehicle-mounted systems for the measurement of condition parameters and use High Definition (HD) cameras on helicopters and measurement trains to provide more reliable, early identification of developing defects. The route anticipates the implementation of a Reliability Centred OLE Maintenance regime that’s currently in development to be in place for CP5.

OLE structure foundation repairs and cantilever frame renewals (due to advanced corrosion and loss of tube wall-thickness) are indicated for CP5. These are required sooner than the OLE life cycle model estimates; contravening the engineering policy. If Mk3 OLE structures and foundations are to attain the 90yr asset technical life, the foundation and cap damage need to be repaired.

Throughout CP4, the route will have completed most of the highest priority OLE Campaign Changes, targeting specific component failure modes assessed as having the greatest safety or performance impact. The route will continue this strategy into CP5 and it is expected that in CP6 wholesale OLE mid-life refurbishment will commence for Mk1 OLE on route sections designated in route criticality band 1 between Euston and Stafford.

**Signalling Power**

Where the renewal of the signalling power distribution is scheduled on the highest criticality routes, these systems will be specified as fully auto-reconfigurable. This will allow cable faults/thefts to be automatically isolated from the power supply/located immediately without impacting the train service. It will also reduce the amount of time employees are required trackside searching for cable theft/fault locations.

In addition, where previous re-signalling projects made passive provision for future installation of auto-reconfigurable technology, these sections will be retro-fitted with the equipment. The decision to retro-fit signalling equipment has been based on route criticality and the perceived risk to performance.

Signalling power cable renewals are proposed for the 1971 signal power distribution systems on the north of WCML. The decision to renew acknowledges the deteriorating condition and performance of the equipment. Renewal will continue on a reactive basis till at least 2030 when ERTMS deployment is planned. Acknowledging the CP5 EP Policy requirement for individual power cable insulation values to be periodically measured, the route has planned for renewal using a power system architecture that allows individual cables to be taken out of service for testing or repair without impact on the train service.

**Traction Power Distribution**

The CP5 Route plan proposes rationalisation of grid connections for 25kV traction power supplies following WCPSU Phase 3B, Transpennine Electrification and NW Electrification to provide operating and maintenance efficiencies. The 25kV switchgear between Euston Junction and Carnforth and, between Penrith and the Scottish border will be refurbished rather than fully renewed. This shall provide a cost-effective life extension until at least 2030 where renewal will be aligned to ERTMS deployment. A new traction power supply and distribution system should be developed for these areas of WCML North in CP7 to support the route capacity available with ERTMS.

**AC Distribution: 25kV Oil-filled Switchgear**

Undertaking the top-down modelled renewal of 25kV switchgear in the north of the route will leave isolated switching stations equipped with 1960 oil-filled switchgear until at least 2020. The reliable and safe use of this oil-filled high-voltage switchgear relies on a diminishing pool of maintenance expertise of which poses a significant risk. As a result, it is proposed that the remaining oil-filled switchgear substations in the northern part of the route are all renewed in CP5.
DC Distribution
The top-down modelled renewal volumes do not allow for renewal of the 1958 vintage 33kV grid power transformers and 'Grid' oil-circuit breakers at Shore Road substation. These assets are critical to operation of the Merseyrail system, providing power supplies for:
- >100 STK of d.c. electrified route and
- 3 underground stations in Liverpool and
- tunnel emergency evacuation lighting
- a major pumping station that operates continuously to prevent flooding of the underground railway.

Although these assets are operated and maintained by Scottish Power Energy Systems, as sole-user assets, Network Rail is responsible the full cost of renewal. By end of CP5, both the transformers and 33kV oil switchgear will have exceeded their nominal asset technical life; therefore, this plan proposes renewal in 2016.

Variance to policy
In response to the anticipated increase in traffic as a result of the planned enhancements, the Route has taken the option to deviate from the route criticality based CP5 E&P policy requirements for some asset renewals.

- Renew and reconfigure 4.2km length of 650V signal power circuit at Windsor Bridge (Salford) in conjunction with Northern Hub (Inner) works. Enables reduction in number of signal power supply installations.
- Age-driven renewal of last remaining 16nr 25kV bulk-oil switchgear from 1958. Policy requires condition driven renewal. These become singular asset types. Continued safe and reliable use depends on a dwindling pool of maintenance expertise.
- Decommissioning of Speke 25kV traction power supply DNO grid connection to reduce OPEX costs following NW Electrification and WCPSU Phase 3B works.

Point heating
The point heating renewal policy has been substantially modified for CP5 and is based upon an interpretation of SRS criticality banding. On certain areas, the route has modified the centrally-led ranking of route sections; for example where heating would not be renewed on key regional routes that are currently heated, e.g. Liverpool to Manchester. The RAM team has devised an alternative approach that deploys a hierarchy of heating solutions which can be used for planned renewals. Heating solutions are allocated in accordance with the Key Route Strategy (KRS) which safeguards the continued operation of selected routes in adverse weather.

Specific risks
Overhead Line Equipment (OLE)
The top down modelling suggests that the criticality band 1 mid-life refurbishment is not required until it is between 55 and 65 years old. As a result, mid-life refurbishment is not required until CP6. There is a risk that the OLE deteriorates at a greater rate than anticipated and mid-life refurbishment becomes necessary during CP5.

DC Train fleet (Merseytravel)
There is currently insufficient information on the technical and mechanical elements of the new rolling stock anticipated on the Merseyrail DC network to understand what electrification infrastructure works might be required to support this. For example, it is not known if the fleet will be light or heavy weight, dual voltage, have regenerative braking or air-conditioning.

Future electrification
Nationally there is an unprecedented level of electrification planned during CP5. There is a risk that this will saturate the labour and materials market delaying delivery and/or substantially inflating prices nationally. This would result in the forecast efficiencies not being achievable.
Telecoms

Route characteristics
The Telecommunications assets/services present on the route are categorised into three main groups, these are:
- Network Services
- Railway Operational Telecommunications
- Station Information Security Systems (SISS)

Network services
Network services on the route are provided by a variety of legacy transmissions which range from vintage and differing manufactures systems, also in use are some leased services, e.g. British Telecom. Presently FTN is being rolled out across the rest of the route and the current completion date is scheduled for mid 2014. However, along the WCML between London Euston and Crewe, and between Stoke-on-Trent and Manchester Piccadilly, older legacy systems will remain and will be renewed as part of a separate project scheduled in 2017. Older legacy transmission systems pose a number of risks due to the general age profile, the availability of some components and equipment becoming obsolete.

Railway Operational Telecommunications
The route has numerous signalling control system types which range from Signalling Control Centres to lever frame signal boxes. Consequently, this broad variation results in the need to maintain differing telecommunication types.

Delivery plan for final year CP4
Schemes being delivered in the final year of CP4 include renewal of Public Address Systems on a number of Northern Rail and London Midland stations, CCTV systems on a number of Merseyrail stations, Public Address on the five Merseyrail Underground stations, the telephone concentrator system at Sandhills IECC, and voice recorders at a number of signal boxes in the North West.

Output objectives
The Asset Stewardship Indicator is used as the specific indicator for Network Rail Telecoms. It combines observed condition of telecoms assets and the number of telecoms failures that cause delay in excess of ten minutes. This KPI is used for scoring Telephone Concentrators.

CP5 Scope of works
Major schemes being delivered in CP5 are the West Coast South GSM-R and Transmission system, DOO Mirror renewal or recovery on London Overground, London Midland and Chiltern stations, CCTV renewal at 32 London Midland stations, SISS renewal (PA, CIS and CCTV) at 17 Virgin stations and SISS renewal at various Northern and Merseyrail stations.

Efficiencies
Telecoms Asset Management are carrying out targeted renewals throughout CP5 and continue to reduce asset risk by migrating, where possible, circuits onto FTN cable and transmission where life expired systems exist. The Telecoms Decision Support Tool (DST) assists in this process by allowing the Engineers to score individual assets and to build effective work packages.
Maintenance

Overview
The Maintenance plan has been constructed jointly with Asset Management taking account of the following:
- Safety – System safety and people safety. Both improve the safety of the maintenance workforce. Firstly by reducing the need for them to work on or about the infrastructure and then providing an environment in which they can work safely if it is unavoidable for them to work trackside.
- Asset Policies/Strategies – generates maintenance volumes which link maintenance activity to renewals volumes, traffic changes, changes in technology, driver for greater mechanised treatments.
- National Initiatives – directly link to safety and asset policy/strategy including items such as Reliability Centred maintenance, Intelligent Infrastructure, Asset information and Standardisation.
- Local initiatives – driving improved utilisation of resources.
- Structural Changes – required for example to comply with changes in safe systems and standards.
- National guidance and policies including those relating to IR.

Maintenance efficiency is based on the following principles:
- Eliminate the need for an activity, e.g. criticality based maintenance replacing time based.
- Simplify activities, e.g. standardisation of working practices.
- Rationalise activities, e.g. improved planning enabled by ORBIS.
- Automate activities where justified, e.g. helicopter/trainborne inspection of OLE.

Asset strategies
Track
CP5 policy is to ensure that track asset condition remains constant with targeted renewals and maintenance interventions.

The key focus will be on maximising the:
- Benefits of mechanical inspection and maintenance processes such as Plain Line Pattern Recognition (PLPR), Video Inspection of S&C, S&C stone blowers and machines such as the Bracke, Bushfighter and drain clearance Road Rail Vehicles (RRVs).
- Efficiency of On Track Machines to ensure that intervention is targeted at the optimal locations and that production rates per shift are improved to deliver the enhanced RAM volumes with the same number of machine shifts as in 2012/13.
- Benefits released by the ORBIS Asset Information project and Risk Based Maintenance. (The route is predominantly WCML and only 8.5% of the route falls in criticality bands 4 and 5.)

The condition and age of fences and boundary walls and consequently the volumes for fencing/boundary walls and vegetation removal have increased significantly.

Signalling
CP5 policy is to ensure signalling asset condition remains constant with targeted renewals based on asset condition. Signalling renewal or re-control is applied where operational savings can be made by using appropriate technology such as modular signalling principles and MCB – OD. The business benefits of synergy with train ERTMS fitment are considered to permit re-signalling with ERTMS.

For mothballed and out of use lines the maintenance policy will be to fix on failure. For all other routes maintenance will be cyclical using ROSE outputs. For performance purposes asset condition and deterioration will be monitored remotely.

Regimes for route criticality based maintenance will be developed during the control period to include fix on failure, reactive maintenance and predictive maintenance alongside the existing regime of planned cyclic preventative maintenance to permit implementation of maintenance appropriate to the criticality of the route.

Electrification and plant
Overhead Line Equipment (OLE)
Access for ground level foot patrols (E01) is difficult and predominantly available during the night. This limits the effectiveness of the inspections. It also relies on significant track walking and potentially red-zone working.

It is proposed to reduce the frequency of the ground level foot patrolling and introduce annual special high level visual inspections, routine helicopter patrols using high definition cameras and develop train-borne automated asset condition systems. The benefits this will provide are:
- Safety; less exposure to staff on the track.
- Engineering benefit with reduction in failures.
- Having clear asset understanding (when we should maintain and when we should refurbish to extend life to improve life cost).
- Reducing the track access requirement to carry out maintenance.
- Offsetting maintenance to reduce our Opex cost.
Whilst train-borne technology currently exists in pockets, it is proposed a solution is developed where all necessary OLE condition information is collected in one package, which can be collected by passenger trains to provide real-time information. With this enhanced asset information, maintenance can be focused on key risk areas as opposed to standard routine maintenance.

**Conductor rail**
The requirement for full provision of current-collection shoe-gear on the new Merseyrail EMU fleet introduced from 2017 instead of the rationalised arrangement currently found on the Class 507/508 fleet has been included in the draft Train-Infrastructure Interoperability Specification. It is proposed that the verified repeatable and accurate output from the Conductor Rail Measuring System (CRMS) fitted to the Electrification Measurement Vehicle is used annually on Merseyrail and Euston – Watford DC railways.

**Signalling Power Systems**
National Temporary Non-Compliance (TNC) 8785 allows BS7671, Wiring Regulations, testing to not be completed with certain conditions. It is proposed that full compliance to BS7671, Wiring Regulations, 5-yearly testing is re-introduced on the route. This will ensure an even safer and more reliable signalling power distribution system is maintained.

**Telecomms**
Maintenance efficiency is based on the following principles:
- Eliminate the need for an activity, e.g. criticality based maintenance regimes replacing time based.
- Simplify activities, e.g. standardisation of working practices and use of better asset information.
- Use intelligent infrastructure to reduce the labour aspect of activities where possible, e.g. remote monitoring.

**North West Electrification**
Electrification of the Liverpool to Manchester corridor, Lancashire triangle and Fylde coast will increase electrified route in the North by 131km and increase maintenance heads by 19. These will be phased over the control period and 60% resources will be introduced following completion of phase 1, 2a and 2b. The remaining resources will be introduced on completion of phase 3 and 4.

**Northern Hub**
The Northern Hub enhancement works will increase line speed and change track category. The full impact of the proposed enhancements are not fully understood as detailed design has not been completed. An estimate has been included for the known changes to line speed and tonnage across the route.

**Electrification schemes – south end of LNW**
Detailed designs are not available for the proposed schemes in the south end of the route. So the work undertaken to assess the maintenance impact of the North West Electrification has been used to assess the potential maintenance impact of the HLOS schemes.

**Red Zone prohibitions and dedicated LOWs teams**
It is standard policy to assume red zone working with flags will be prohibited in the following instances:
- night time;
- within 200m of a junction;
- line speed > 100mph; and
- moving worksites.

In these situations, lookout operated warning systems (LOWs) will be used. We have provided in Year 1 of our business plan for the purchase of sufficient LOWs systems to cover all red zone work at these locations. Assume each additional LOWs set costs £35,000 including training of operatives.

It is standard policy to assume that development of LOWs technology will continue through the control period. Existing lookout operated warning systems will be replaced by treadle operated warning systems, Wavetrain, GSM-R or such future developments. An additional £20,000 per LOWs set to be allocated in Year 3 of CP5 to upgrade all LOWs sets to the next generation of technology.

This will have a significant impact on maintenance activities and allowances have been included for purchase and modification of LOWs equipment. The route will also need to introduce 48 dedicated LOWs teams to provide protection to staff working on or about the controlled infrastructure. Each team will consist of 5 members of staff.

**650V cable testing (legal compliance)**
E5.5 – 5-yearly electrical installation testing is required on IT 650V signalling supply systems. This will require de-energising operational signalling equipment to perform testing. This testing will be disruptive and may also introduce operational risk.

44 additional heads have been included for the testing of 650V cables to the frequency specified in the current standard. These heads will be introduced in Year 1 of the control period.

**Annual high level OLE inspections on south**
A special high level tactile examination of the OLE in the south end of the route will be undertaken annually due to route criticality and the performance impact of OLE de-wirements.
OLE Helicopter/train-borne inspection
Six monthly OLE helicopter patrols of the OLE using high definition infra red cameras will be introduced in the control period. The technology has not yet been proved but as an alternative, cameras could be mounted on the NMT.

OTM volume increases
Maintenance volumes have increased in the control period for On Track Machines taking into consideration the current track geometry KPIs, the renewals work bank and the known enhancements and changes to tonnage and line speed. As a result plain line tamping and stone blowing will increase by 9.2% for the route, whilst S&C treatment (now including more durable S&C stone blowing) will decrease by 5.4%.

The route already undertakes tandem (and quad) tamping where possible and this makes up approximately 69.9% of all S&C tamping.

The use of OTMs in traffic is not feasible on LNW route due to the traffic density and type of signalling.

Route proposes to use the same amount of machines to deliver the increased volumes and will require the use of the multi purpose stone blowers. Route has assumed that the new machines will be available at the start of CP5 and have included and £700k efficiency rather than a headcount reduction.

Fencing and vegetation maintenance volume increases
Maintenance volumes have been increased in the control period to address the deteriorating asset condition which will introduce 30 additional off track heads. The vegetation volumes will be delivered by mechanised methods rather than manual methods.

Curve laser
South end of LNW is reliant on the use of the Emsat for maintenance of the absolute track geometry railway. Alternative methods like Curve laser or Vorsys system are now available which would save £200k per annum.

To realise the saving a capex purchase of the trolley would be required. Trolleys are circa £75k each and South would need 4 trolleys. Capex outlay of £300k with payback over 2 years.

FTN and GSM-R mast maintenance and inspection
ROTE will not change the frequency of mast inspections, i.e. yearly for West Coast South masts (approximately 175 in total), however a 2-yearly inspection is proposed for the GSM-R installed masts.

We also have no indication when the WCML legacy systems will be switched off so assumption is that maintenance will continue into CP5.

Increased workload will require two additional 2-man Rigger teams and two vehicles to maintain the 462 locations on the route which will be phased in the middle of Year 1 to the middle of Year 2.
Route Network
Availability Strategy
Network availability

Network Availability is about achieving the right balance between allowing access to customers to operate services and restricting access to allow the infrastructure to be maintained, renewed and enhanced in order to maximise net industry value.

London North Western - Route Network Availability Strategy (RNAS)
The RNAS process is designed to optimise the availability of the network flexibly enough to take into account the views and changing direction of the whole rail industry. This will enable the route to develop the network in order to meet future demand. Achieving an adaptable and robust RNAS that meets the business needs of the industry needs to be done through extensive consultation, conducting studies and cross route analysis.

A successful RNAS gives passenger and freight operators the confidence they need to plan and take strategic decisions on the future of their services. The diagram below illustrates the process for refinement of the RNAS.

The RNAS has clear and well defined objectives for the routes access strategy. Through consultation, we have agreed with the operators four basic principles for our RNAS:

- Drive through and deliver the best industry solution to deliver improvement in network availability on LNW to meet franchised passenger, freight and open access operator targets and aspirations.
- Make sure that network availability is at the heart of our planning and decision making.
- Maintaining, renewing and enhancing the railway so that it reduces disruption to our Customers (passenger and freight operators) and better meets their needs and aspirations.
- Develop on a balanced approach to operating trains and maintaining the network that is cost effective and financially 'sound'.

Once fully developed the RNAS will:
- drive efficiencies delivering infrastructure renewal, maintenance and enhancement activities through our delivery approach and specification;
- provide a template and framework for producing and delivering the remainder of CP4; this will be review and refreshed for CP5;
- provide the framework to enable improvements in network availability to benefit passenger operators and freight operators;
- demonstrate that route categorisation principles developed by the industry are in place and are being maintained in an accountable structure; and
- facilitate progress to meet CP5 targets with stakeholders.

Proposed Outcomes
Increased access to the network for TOCs and FOCs including:
- Meeting targets in relation to the Working Time Table (WTT), lower bus substitution miles/use and PDI measures where relevant.
- Shorter and appropriately timed possessions.
- Productivity and efficiency gains through changes to the technology and processes used to maintain, renew and enhance the network.
- More time within possessions for productive use through changes to operational processes.
- Delivery of route categorisation commitments.

Wider Measures of Success
- Improved customer and passenger satisfaction.
- Additional services operated where there is demand.
London North Western RNAS development

The refinement of the route’s RNAS in CP5 complements the Joint Network Availability Plan (JNAP) process and accompanying documentation. The successes of the JNAPs in CP4 are being used as the foundation to ‘launch’ development of the RNAS. The key ingredients and phasing to the development of the RNAS are:

- Identify key traffic flows for freight and passenger customers, building on the route categorisation approach adopted in CP4 and tailored to meet the business needs of the train operators using the Route.
- Planning availability of the network on the key routes will be specified so as to best meet the market need on that route. This may include, but should not be limited to the rules adopted by route categorisation:
  - unless no reasonable alternative exists flows will be kept on rail, on their primary route; and
  - where necessary reasonable diversionary options will be identified.
- Define further availability improvements: Where a business case exists, further commitments to reduce the duration of standard maintenance and renewals activities during CP5 will be made. This will enable train operators to exploit further market opportunities where the benefits of doing so exceed any costs necessary to facilitate the improvement.
- Define significant exceptions: The strategy will show those programmes of major work that will require significant disruptive access durations in CP5. Examples of works that may require such access are network enhancements, bridge reconstructions and complex switch and crossing renewals.

RNAS consultation

The RNAS is in the early stages of development. The route has already engaged with other routes and with passenger operators and we intend to hold similar discussions with freight operators to supplement the national dialogue that has taken place with the freight business. These discussions will continue for the remainder of CP4 to refine and finalise the RNAS documentation. The RNAS structure and method of engagement with Customers and key internal and external interfaces is illustrated below.
Key routes and flows

The priority for the RNAS is to protect customers’ primary flows and provide the necessary engineering access, so far as it is practical to do so. For the key passenger routes, this means limiting the increase in journey times when considering the available options, such as diversionary routes, if the normal booked route is blocked.

The consultation undertaken so far has resulted in a database that records:
- Passenger Train Operator Companies key flows (including those on non Cat A routes).
- Freight Operator Companies key flows (including those on non Cat A routes).
- Open Access and Tour Operator key flows (including those on non Cat A routes).
- Other customer priorities and expectations.

This database provides the primary foundation for developing and modifying access requirements; however, the key flows for the LNW Route are:
- Birmingham New Street to York.
- Cardiff to Nottingham.
- Birmingham to Manchester Piccadilly.
- Glasgow Central to London Euston.
- Birmingham New Street to London Euston (via Coventry and Weedon).
- Birmingham Moor Street to London Marylebone.
- Birmingham New Street to Bournemouth (via Coventry).
- Liverpool Lime Street to London Euston.
- Birmingham New Street to Plymouth.
- Norwich to Liverpool.
- Manchester Piccadilly to London Euston.
- Bournemouth/Bristol to Manchester Piccadilly.
- Carmarthen to Manchester Piccadilly.
- Leeds and Manchester, intermediate stations at Stalybridge.

RNAS proposed strategy and access

The Route Asset Management Plan Summary brings together the inspection, maintenance and renewal interventions for each asset discipline. The RAMP identifies the most appropriate approach to asset intervention to deliver the required outputs for the minimum whole-life, whole system cost. The volumes of work contained within the RAMP will inform the view for CP5 works, as will the planned enhancement works.

Access planning in CP4 for planned maintenance has mostly taken place in section 5 midweek night opportunities, on one out of every six weeks, with occasional weekend disruption. The strategy is aligned with adjacent routes, for example co-ordinating disruptions to overnight freight. The strategy is designed to protect routes and journey times for overnight passenger services, as well as routes for freight.

Plain line track renewals are delivered using high output equipment or conventional techniques typically based upon either 16 hour weekends or 8 hour midweek nights. On four-track lines, a two-track railway can normally be operated with reduced capacity running on adjacent lines.

Durations for conventional renewals normally range between 8 hours in ‘No Booked Service Periods’ to 29 hours with the appropriate duration being determined by location and complexity.

Longer access is required for S&C renewals usually between 16 to 72 hours, depending on location and complexity. The route’s strategy is to utilise tilting wagons and modular S&C whenever considered appropriate to minimise disruption. Access plans for significant enhancements or unusually complicated sites are developed and agreed with customers on a case-by-case basis to ensure that the best industry solution is adopted.
Network availability in CP4

The process of embedding network availability into rail operations involved the prioritisation of a number of key flows at the start of CP4 as part of a route categorisation initiative. For passenger routes, this was based on those flows carrying high numbers of passengers between important conurbations and for freight the focus was on strategic flows that had economic importance.

The principles guiding Network Availability for passenger services are that passengers travelling between the key intermediate stations on the passenger routes are not to be transferred onto buses, and where trains are diverted increases in planned journey times should not be increased by more than 30%. For freight, the aim is to provide a through route from origin to destination, making best use of alternative routes. For significant enhancements to the network, access plans are agreed with customers on a case-by-case basis to ensure that the best industry solution is adopted.

During Control Period 4, a programme of activities established network availability and its measurement within the route. Nationally, disruption caused by planned engineering works has significantly reduced, resulting in increased availability of the network for customers. The table below shows actual and planned performance at the end of each year as measured by possession disruption indices for passenger and freight traffic and the Route is currently on course to achieve the end of CP4 targets.

Disruption targets to-date

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<tr>
<th>Year</th>
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<th>Freight possession disruption index</th>
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<tr>
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<td>Actual pending</td>
</tr>
<tr>
<td>2012/13</td>
<td>0.68</td>
<td>0.62</td>
</tr>
<tr>
<td>2013/14</td>
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</tr>
</tbody>
</table>

Ongoing CP4 strategy

The route has delivered Network Availability improvements over the last three years of CP4 through collaborative planning; the modification of delivery processes; the introduction of new technologies and introducing innovative working practices. A major enabler of this success has been the partnerships that have been forged with operators whilst developing and making operational the 7 Day Railway concept. An example of this partnering has been the emergence of the Joint Network Access Plans (JNAPs) which have captured operators’ base access availability principles.

There is much to do in the remainder of CP4 and with predictions of greater access requests being made, a high-level access framework to support cyclic maintenance and renewal activities is needed. The next step, therefore, is to develop a coherent and consistent access strategy which coordinates the requirements outlined in the JNAPs with the route’s infrastructure activity requirements.

The route recognises that network availability is about achieving the right balance between when operators wish to operate services and when the infrastructure needs to be maintained, renewed and enhanced in order to maximise net industry value and revenue. It is also about ensuring engineering access is properly and professionally managed across interfaces with other routes.

Route Network Availability Strategy (RNAS)

The route has joined up with other routes to create a suite of Route Network Availability Strategies (RNAs) that when consolidated, form this coherent national strategy.

The RNAs and network planning process will be developed along the following principles; these will be embedded in the plan:

- aligning demand for train services and access strategies
- investing in technology
- delivering major enhancements
Network availability in CP5

The RNAS for the route will be built heavily around the underlining position of optimising use of the network in a manner that balances industry needs, maintaining and developing network capability versus access for train services to meet passenger and freight user demand.

Projects to improve availability in CP5
The route acknowledges that improvements in network access can be achieved through the injection of modest investment. The seven day railway (7DR) investment across the route to date has already delivered projects that facilitate engineering activity to be undertaken less disruptively.

Initial optioneering analysis has been undertaken using the work-banks developed to date and through direct consultation with key customers and stakeholders. Analysis suggests there are a number of unfunded proposals which would assist the Route in its ambition to reduce the need for passengers to change between rail and bus and deliver cost effective engineering access.

Maintenance activities
Where maintenance activity is currently suppressing TOC or FOC aspirations, we will explore schemes which could be recast or new technology or ways of working. This could, for example, look at access point provision, new ways of working and new and innovative methods of planning and implementing maintenance such as faster isolations. This would require bridging support funds for any transitions.

Enhancement during renewal
Where value for money can be demonstrated, the Route adopts a policy to incorporate enhancement elements into renewal projects; for example, modification of junction configurations to facilitate future maintenance activities in a less disruptive footprint and increase prevailing line speeds.

TOC or FOC delivered schemes
Sections of routes have been identified where franchise holders do not have a requirement for secondary route knowledge or where new diversionary routes could be delivered. A number of driver route knowledge training opportunities exist to enable a rail service to run throughout any period of disruption.

Other potential schemes
- Freight diversionary route provision and possible gauge enhancement works;
- Platform reinstatements and alterations to stations to allow better use in a 7DR context (e.g. Bushey and Watford DC lines);
- Signalling enhancements including trialling modular signalling applications;
- Signal box opening or operational support to enable 24/7 working.

Innovations and Technologies
There are many new technologies, processes and operations that are being implemented or considered for implementation during CP5. For example:
- Increased automation for new electrification schemes.
- Extensive/embedded use of SMART/LEAN process to deliver maintenance activity.
- Potential standardised approach to freight paths for engineering access.
Access strategy and key dependencies on other routes

Cross-border strategy (Anglo Scottish)

The Scottish, LNE and LNW Routes are in regular communication and planning within CP4 continues to work well – robust planning processes that have been developed and are in place. However, the work-banks predicted for CP5 bring challenges and possible conflicts that will continue to require effective management, dialogue and decision making.

When scheduling maintenance, renewal or enhancement activity on a cross-border route; the route will take cognisance of the Scottish HLOS specification to always make available a route between London and Scotland for the passage of timetabled sleeper, passenger and freight services.

The emerging access strategies to support the robust delivery of engineering activity, as defined in the LNW and LNE Route work-banks, presently use Bank Holidays periods to deliver significant engineering activity. Consequently, at this stage it has not been possible to define an access strategy that provides certainty that the Scottish HLOS requirement can be achieved. It should also be acknowledged that both Routes are charged with balancing delivery efficiencies with the wider requirements/impact of operators’ access strategies.

The requirement to keep an Anglo Scottish Route open will be addressed by:

- Producing a framework and methodology to enable the early planning of major works in a structured and co-ordinated way.
- Regular and effective customer consultation to exchange information for the most valid industry decision to be made (rather than favour one Route over another).
- Integration of the National Plan through utilising the Central Operations planning team where required;
- A ‘Heads of Terms’ framework document is to be drafted between the routes to enable ongoing and frequent dialogue to mitigate the challenges.
Risks to network availability

The RNAS strategy is to be aligned with the Route Asset Management Plans and work delivery methods. It is anticipated that any additional costs for work delivery arising from the RNAS will be included in Network Rail’s Strategic Business Plan, e.g. instances are occurring where there is a need for specific and identified investment. There are, however, some risks to the RNAS strategy as documented below:

**Specific risks**

- **TOC and FOC demand and aspirations vs. alignment of work banks** – As part of the consultation it is becoming increasingly apparent that a number of ‘conflicts’ exist which may result in interventions required to support demand and aspirations. These can appear as stand alone projects (CapEx or OpEx) and/or changes to rules.
- **Funding** – There is a shortfall in funding for Network Availability schemes identified in CP4 and there is no current allocation in CP5 to invest, enable or resolve Network Availability conflicts at the local, regional and route level. These range from minor infrastructure changes through to larger scale gauge clearance activities to maintain and support ‘one route open’ for the Anglo Scottish route.
- **Work Bank Size** – Initial modelling shows that there is an increased access requirement in CP5 above the peak of CP4. This has the potential to impact the ability to deliver the required operational performance. In addition, LNE and LNW intend to utilise bank Holidays for the delivery of major work activities on the East Coast Main Line (ECML) and WCML respectively. Compliance with the Scottish HLOS may prove challenging on occasions in CP5.
- **Cross route interface** – Establishing an agreed framework (and supporting Network Operations structure) to look at managing network access and especially the diversionary route/s for Anglo Scottish services following the ‘one route open’ principle.
- **Plant and Logistics** – There is a potential shortfall in critical plant, such as: S&C tilting wagons, the turnaround facility throughput, Medium Output Ballast Cleaners (MOBCs) and other Ballasting plant. This will require national investment funding. There is also a potential shortfall in ballast supply that may in turn affect access planning.
- **Track Renewals** – Proposed changes to ALO working methods may impact on track renewals efficiencies. There is also a proposal to change the access pattern to more mid-week nights that will require agreement with train operators.
- **Electrification and Plant** – the significant workload will require professional resource in supervisory, engineering and management roles that exceed the market availability that may in turn affect access planning.
- **Investment Projects Delivery** – Investment Projects have specified delivery efficiencies which are solely dependant on a modified network access strategy and undefined shift in work activities, e.g. weekends to mid-week (Track and S&C).
Deliverability, data and assumptions

This section summarises the key outputs, activities, risks and assumptions that supplement the London North Western Route Plan.
Delivering CP4 and CP5 plans

The final year of CP4 will be used to develop and refine techniques which will facilitate the robust delivery of the CP5 work-bank. This presents an opportunity to package work items and synergise engineering requirements, enhancement opportunities and customer aspirations. Successful delivery will generate greater efficiency once individual objectives are aligned.

Maintenance Delivery
By the end of CP4 the Route will see the introduction of new working practices and the deployment of new technology. These initiatives are expected to make it safer to maintain the network through reducing manual intervention. Supporting schemes include the rollout of Plain Line Pattern Recognition and Curve Laser/Vorsys Tamping Design Systems. This step change in how we undertake maintenance activities will set the foundation and principles for the CP5 Maintenance Strategy.

The proposed HLOS investment portfolio will significantly expand and enhance the network over CP5 (e.g. the Northern Hub and electrification), presenting an additional challenge for maintenance.

The route anticipates that there will be a need to modify the maintenance access regime during CP5 to accommodate construction work for the enhancements and the subsequent modifications to train service specifications to increase frequency and reduce journey time on these improved routes.

It is acknowledged that network access demands will increase during CP5 and the Route is therefore planning for collaborative industry working to accommodate all users’ needs. The Route will dedicate time to develop aligned strategies that are financially balanced whilst safely optimising the limited use of the network.

Asset Renewal
The asset renewal strategy for LNW Route has been compiled in a cost efficient way that maximises assets on a whole-life, wider system basis. In the small number of cases where we have deviated from national asset policy, the primary factor has been to minimise the impact on performance, reliability and long-term cost.

A pragmatic approach to applying asset policy during the planning of renewal activity has been adopted, primarily targeting renewals on highest criticality routes, e.g. WCML and focusing refurbishment on lower criticality routes.

Route Operating Strategy
By the end of CP4 the West Midlands Signalling Centre will control the Snow Hill Lines from Warwick to the Western Route boundary at Droitwich and include Coventry, Walsall and Bescot signalling areas. During CP5, Banbury to Warwick and Cross City Lines will be added along with the present Wolverhampton and New Street PSB areas.

The consolidation of control to existing control sites in the north will have been completed in CP4. Stalybridge, Ashburys and Guide Bridge Signal Boxes will be combined together within the Manchester South Signalling Centre. The supervision of a number of level crossings is also being consolidated at Preston PSB.

During CP5, Manchester ROC will take control of the Huyton area and much of the Chat Moss Line followed by the route from Weaver Junction to Liverpool Lime Street and the existing Warrington PSB area.

The Manchester ROC is under construction with completion expected in late CP4 (2013/14) and the ROC at Rugby will be fully constructed during CP5.

Enhancements
The proposed enhancements in CP5 are designed to deliver two specific outputs:

- Smaller projects will release modest network capacity to accommodate today’s level of traffic at current PPM levels.
- Major projects will deliver a significant expansion in network capability.

These projects are linked to the whole-life utilisation of cascaded electric rolling stock. A number of schemes have been developed with Infrastructure Projects, as delivery partner, to ensure a holistic delivery strategy that maximises engineering efficiency and value for money.
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<tr>
<td>DC (km)</td>
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<td>Station Category</td>
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</tr>
<tr>
<td>A – National hubs</td>
<td>4</td>
</tr>
<tr>
<td>B – Regional hubs</td>
<td>12</td>
</tr>
<tr>
<td>C – Important feeders</td>
<td>30</td>
</tr>
<tr>
<td>D – Medium-sized staffed</td>
<td>44</td>
</tr>
<tr>
<td>E – Small staffed</td>
<td>234</td>
</tr>
<tr>
<td>F – Small unstaffed</td>
<td>243</td>
</tr>
<tr>
<td>Franchised Stations</td>
<td>567</td>
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<td>Managed Stations</td>
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<td>Traction Maintenance Depots</td>
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<tr>
<td>Operational Depots</td>
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<tr>
<td>Maintenance Buildings</td>
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</table>

Network Rail
Expenditure plan

The reliability of the infrastructure, whether it is track or a line-side building, is a fundamental foundation upon which the business can successfully perform and operate.

During the latter parts of CP3 and throughout CP4, the engineering philosophy has been primarily built around compliance with Network Rail’s suite of asset principles (Policies) and Standards. The move towards ‘Devolution’ has brought with it a new era for asset management planning in devolving financial accountability to the Routes and promoting local engineering decision-making to meet local needs.

Renewals
The level of intrusive work is closely aligned to route criticality banding. The Route believes that this will help it generate greater engineering efficiency and balance the appropriate level of asset management intervention against forecast expenditure.

Renewals and refurbishment volumes, including expenditure profiles, have been devised using combination of top-down modelling and bottom-up work bank development. The bottom-up work-banks have been forged from a combination of detailed asset knowledge, application of locally based engineering expertise and application of Network Rail asset policies.

The expenditure profile has been phased to match national supply chain outputs and the achievable rates of delivery negotiated between the Route and its delivery agents.

The renewals expenditure plan comprises a mixture of nationally blended unit rates with a Route-specific overlay applied for some functions. Applying a specific Route overlay is designed to reflect the complex delivery challenges unique to LNW.

Operations
The cost to operate the Route during CP5 reduces substantially including the application of the long-term operating strategy. By the end of CP5 the Rail Operating Centres (ROCs) will be populated and a substantial number of signal boxes will have been closed and control of the signalling infrastructure migrated to the ROCs.

<table>
<thead>
<tr>
<th>Maintenance Organisation</th>
<th>Controllable Costs (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signaller</td>
<td>319.1</td>
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<tr>
<td>Non-Signaller</td>
<td>162.2</td>
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</table>

Maintenance
The maintenance organisation has developed a resource based plan comprised from determined renewals volumes for CP5. The level of expenditure in CP5 has been calculated from this analysis. The resource plan reflects the increased maintenance requirements following completion of the enhancement projects, levels of asset refurbishment and minor renewals activity.

The route maintenance organisation is presently reviewing and exploring efficiency opportunities arising from technological advancements such as Plain Line Pattern Recognition, S&C video inspection and Phase 3 Remote Condition Monitoring (RCM). Whilst we anticipate that these initiatives will generate benefits during the remainder of CP4, we expect to realise the greater portion of efficiency in CP5. Some of the efficiencies anticipated are offset by the increased refurbishment volumes and consequential additions in asset quantity resulting from scheduled enhancements.

<table>
<thead>
<tr>
<th>Efficiencies</th>
<th>FY15</th>
<th>FY16</th>
<th>FY17</th>
<th>FY18</th>
<th>FY19</th>
<th>CP5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track</td>
<td>0%</td>
<td>3%</td>
<td>7%</td>
<td>9%</td>
<td>12%</td>
<td>6%</td>
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<tr>
<td>Signalling</td>
<td>3%</td>
<td>8%</td>
<td>14%</td>
<td>19%</td>
<td>21%</td>
<td>12%</td>
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<tr>
<td>Civils</td>
<td>3%</td>
<td>6%</td>
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<td>11%</td>
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<td>16%</td>
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<td></td>
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<tr>
<td>Electrification</td>
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<td>9%</td>
<td>4%</td>
<td>7%</td>
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<tr>
<td>Telecoms</td>
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<td>6%</td>
<td>9%</td>
<td>12%</td>
<td>15%</td>
<td>9%</td>
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<tr>
<td>Plant</td>
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<td>13%</td>
<td>14%</td>
<td>15%</td>
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### Renewals

<table>
<thead>
<tr>
<th>HLOS post-efficient</th>
<th>FY15</th>
<th>FY16</th>
<th>FY17</th>
<th>FY18</th>
<th>FY19</th>
<th>CP5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total: 12/13 price</strong></td>
<td>531.0</td>
<td>512.6</td>
<td>517.6</td>
<td>434.9</td>
<td>406.7</td>
<td>2,402.9</td>
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</table>

### Track

<table>
<thead>
<tr>
<th>HLOS post-efficient</th>
<th>FY15</th>
<th>FY16</th>
<th>FY17</th>
<th>FY18</th>
<th>FY19</th>
<th>CP5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total: 12/13 price</strong></td>
<td>531.0</td>
<td>512.6</td>
<td>517.6</td>
<td>434.9</td>
<td>406.7</td>
<td>2,402.9</td>
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<tr>
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<td>S&amp;C</td>
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### Signalling

<table>
<thead>
<tr>
<th>HLOS post-efficient</th>
<th>FY15</th>
<th>FY16</th>
<th>FY17</th>
<th>FY18</th>
<th>FY19</th>
<th>CP5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total: 12/13 price</strong></td>
<td>531.0</td>
<td>512.6</td>
<td>517.6</td>
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<td>FY16</td>
<td>FY17</td>
<td>FY18</td>
<td>FY19</td>
<td>CP5</td>
</tr>
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</tbody>
</table>
Key outputs

Safety
The Route plans for CP5 do not include specific safety targets, but we have programmes of work designed to reduce risk and improve safety metrics in a continuous and sustainable way.

We will focus on the following areas:
- Route Crime, theft and vandalism
- Safety leadership and culture
- Improved asset management of our structure assets
- Platform-Train interface safety improvement
- Track worker safety
- Level crossing risk reduction
- Irregular working

Performance
The Route strategy will be to consolidate the improvements made in CP4 and continue to seek further improvements in CP5. There are a number of challenges to overcome if the Route is to achieve its contributable output towards the CP5 HLOS performance target. Two of the key challenges will be mitigating, so far as possible, the considerable risks presented by the volume of construction/renewal works planned during CP5 and the predicted levels of traffic growth in CP5 and beyond. The predicted increase in traffic levels have been factored into the Route’s strategies, the anticipated increase is shown below:

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Passenger</td>
<td>116,727,982</td>
<td>117,573,969</td>
<td>118,047,193</td>
<td>119,863,662</td>
<td>121,737,738</td>
<td>123,009,609</td>
<td>125,494,944</td>
<td>127,617,054</td>
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<tr>
<td>Freight</td>
<td>15,066,550</td>
<td>15,209,743</td>
<td>15,648,145</td>
<td>16,222,381</td>
<td>16,813,112</td>
<td>17,517,315</td>
<td>18,253,821</td>
<td>19,072,337</td>
</tr>
<tr>
<td>Total</td>
<td>131,742,840</td>
<td>132,731,616</td>
<td>133,642,098</td>
<td>136,030,860</td>
<td>138,493,746</td>
<td>140,467,449</td>
<td>143,686,870</td>
<td>146,625,068</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LNW Year on Year percentage growth compared to 2011/12</th>
<th>2011/12</th>
<th>2012/13</th>
<th>2013/14</th>
<th>2014/15</th>
<th>2015/16</th>
<th>2016/17</th>
<th>2017/18</th>
<th>2018/19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger</td>
<td>0.72%</td>
<td>0.40%</td>
<td>1.54%</td>
<td>1.56%</td>
<td>1.04%</td>
<td>2.02%</td>
<td>1.69%</td>
<td>8.99%</td>
</tr>
<tr>
<td>Freight</td>
<td>0.95%</td>
<td>2.88%</td>
<td>3.67%</td>
<td>3.64%</td>
<td>4.19%</td>
<td>4.20%</td>
<td>4.48%</td>
<td>24.02%</td>
</tr>
<tr>
<td>Total</td>
<td>0.75%</td>
<td>0.69%</td>
<td>1.79%</td>
<td>1.81%</td>
<td>1.43%</td>
<td>2.29%</td>
<td>2.04%</td>
<td>10.80%</td>
</tr>
</tbody>
</table>
Asset reliability
Against the backdrop of predicted traffic increases, on top of the high train service intensity and current asset condition, maintaining overall asset reliability throughout CP5 is a challenge the Route will meet head on. Despite the proportion of the life-expired assets being scheduled for renewal in CP5, a significant percentage remain nearing life-expiry.

Asset policies specify a stepped increase in refurbishment volume in order to maximise whole-life cost. The decision to balance renewal against refurbishment may have a negative impact on the overall performance of the asset. In response, the Route proposes to modify maintenance intervention cycles and step up its deployment in RCM in order to predict and prevent asset failures.

The Route Performance Team and Maintenance Improvement Team are now closely aligned to monitor and mitigate failures in order to enhance outputs in asset reliability. The teams have engaged in a process mapping exercise which is invaluable in achieving a common understanding and linking asset reliability and performance.

The Route will continue to closely monitor the reliability of the asset through the established KPI tools – Asset Stewardship Indicators.

Capacity and capability
Key capacity and capability schemes in the control period include:
- Proposed expansion of the network electrification programme, e.g. North Trans-Pennine Electrification, Walsall to Rugeley Line and Electric Spine.
- Additional phases to the Northern Hub project.
- Bromsgrove and Redditch service improvements.
- Platform extensions to support longer services.
Assumptions

The Route Plan has been constructed around various high-level assumptions that are both inside and outside the route’s control. These assumptions enable us to identify and mitigate risks that may negatively influence our desired outputs.

There is significant amount of industry change anticipated in CP5 with continued passenger and freight growth, re-franchising, build phases of major engineering schemes and Network Operating Strategy – all of which generate a high level of uncertainty and risk to the operation of the business.

The route recognises that predicting external events is difficult and so, during the development of this Route Plan, the Route has made some well-considered assumptions that have provided a logical foundation upon which the individual strategies, cost bases and expenditure profiles have been developed.

The route will focus on five core areas; safety, performance, environmental impacts, people and business expenditure.

Safety
- The Route Safety culture will be briefed and embedded in readiness for CP5.
- Fatalities on the network at the exit of CP4 will remain the same during CP5.

Performance
- **Sectional Appendix** – The Route Plan has been based on the network system (capability, operations and asset ownership) as published in the edition dated August 2012 Sectional Appendix.
- Franchise changes will introduce significant new requirements of the asset (e.g. additional services) or materially impact performance targets.
- To maintain the CP4 performance exit rate for PPM and CaSL, the previously funded performance initiatives, e.g. Smart Water, are funded and included within the Route’s structural base for CP5.

Environment
- The effects of climate change/occurrence in extreme weather will remain the same during CP5.
- The impact of cable theft at the exit of CP4 will remain the same during CP5.
- **High Speed 2** – No provisions are made for initial impacts from High Speed 2 (HS2) on the classic network in CP5. We assume that any associated costs incurred, including development and feasibility, are fully attributed to the project.
- **Road Traffic Management** – The Government has recently signalled that it is to reconsider road pricing as a tool in tackling road congestion. This may generate a modal shift to rail, giving rise to overcrowding on some services. The potential impact of the adoption of road pricing has not been taken into account in this plan.

People
- The current relationship with local focus groups, Council groups, LEPs, the ITAs will continue and develop further.
- **Terms and Conditions** – The delivery of some efficiencies are reliant on modifications to T&Cs, it is assumed that changes will be coordinated nationally.
- **Delivery Resources** – Some of the unit rate cost estimates are based on today’s ability to resource sufficient technical expertise internally and externally to operate, maintain and renew the railway. This includes the Route’s delivery agents. Whilst the Route is committed to retaining professional expertise, it should be noted that increased costs due to demand leverages placed on technical resource as a result of the major enhancements have not been factored into the unit rates in this Route Plan, e.g. Electrification engineers.

Business expenditure
- **Redundancy** – All redundancy compensation costs are calculated on former British Rail ‘Red Book’ terms.
- **Control Period 4 Exit Rate** – The Route Plan assumes that: the Regulatory Route targets specified in PR08 will be achieved at the exit of CP4 unless specified.
- **Boundary Changes** – There are several high-level discussions regarding Route boundary changes. We have assumed no change to the existing boundary with the exception of the incremental changes proposed by the following schemes:
  - Chiltern’s Bicester to Oxford scheme
  - East – West Rail link.
- The assumed boundary between this Route and the Western Route is east of Wolvercot Tunnel (outskirts of Oxford).
# Route activity volumes

## Track

<table>
<thead>
<tr>
<th>Track</th>
<th>FY15</th>
<th>FY16</th>
<th>FY17</th>
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## Signalling

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Network Rail
### Buildings

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### Electrification

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### Telecoms

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