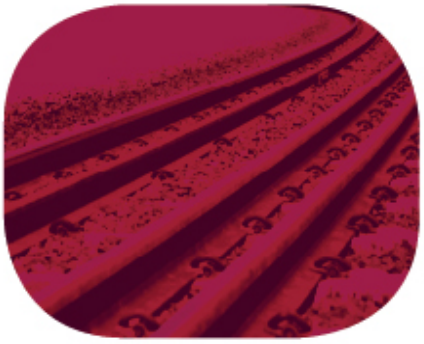

QR Network's Access Undertaking (2009)

Western System (SEQ Cluster) Maintenance Costs

November 2008

QRNetwork

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1 Background

As part of the development of the next QR Network Undertaking (UT3) QR Network has proposed an increase to the reference tariff for coal carrying train services utilising the Western System (SEQ Cluster).

In developing its proposed tariff QR Network has sought to establish a building block approach to calculate a ceiling price that reflects the Maximum Allowable Revenue for the provision of access west (to Macalister) of Rosewood. Due to issues that are evident in the Western System, QR Network does not propose to set the reference tariff equal to this ceiling price and as such has proposed a reference tariff of $22.07 per 000's GTK ($July 2008).

Due to the complexities of establishing a ceiling price for coal services through the Brisbane Metropolitan system, and the likelihood that any ceiling price in this area would be higher that for access west of Rosewood QR Network is proposing that the reference tariff of $22.07 ($July 2008) tariff apply to the full length of coal carrying services, including for access from Rosewood to Fishermans Island.

1.1 Purpose

The purpose of this paper is to provide a detailed commentary on the maintenance cost allocation as presented as part of the Western System (SEQ Cluster) Coal Tariff model, which is used to calculate the ceiling price for coal services west of Rosewood. This paper will also outline the location of maintenance activities and the general scope of activities to be undertaken in the UT3 period.

All references to the Western System in this paper are with regard to the following track sections that support current coal movements.

- Rosewood to Toowoomba – inclusive of the Toowoomba Range crossing;
- Toowoomba to Jondaryan – the load point for the New Acland mine;
- Jondaryan to Dalby; and
- Dalby to Macalister – the load point for the Wilkie Creek mine.

1.2 Context and Objectives

For understanding and clarity this paper is to be read in conjunction with the following submissions made by QR Network;

- Volume 2 of QR Network's Access Undertaking 2009 Submission
- Attachment G to Volume 2, Report by QR Network on Maintenance Costs in the CQCR
- QR Network's Western System Coal Tariff Development Paper.
- QR Network's UT3 Supplementary Information submission in response to the QCA's S.185 Notice

The objective of this paper to provide an understanding of the planned maintenance activities in the Western System (SEQ Cluster) and the impact of coal traffics on the planned maintenance schedule.

As QR Network has not developed a detailed ceiling price model for the operation of coal services through the Metropolitan System, this paper does not provide detail on planned maintenance activities in the Metropolitan System.

This paper is support material to QR Network's proposed UT3 Western System (SEQ Cluster) Coal tariff.

1.3 Maintenance Cost Review Process

The planned maintenance costs presented in this paper are a subset of the Western and South Western Network Management Plan (NMP) and the Network Asset Management Plan (NAMP)
Information in this paper has been sourced from the following;

- The Regional Manager Assets (West), QR Network and support staff
- The Network Asset Management Plan
- The Network Maintenance Plan

1.4 Structure of this Report

This paper is structured to detail the planned maintenance activities in the Western System under current and planned coal traffic and is presented in following format:

- Key drivers of the UT3 forecasts
- Scope of the maintenance program
- Forecast cost of the maintenance program
- Per line section planned maintenance
- The allocation of maintenance costs to non-coal traffics
- Discussion on the operator margin applied to maintenance costs

Attachment G to Volume 2 of QR Networks Access Undertaking 2009 submission provides an overview of QR Network's maintenance regime. This includes:

- QR Network's maintenance philosophy (Chapter 2)
  - Maintenance and supply chain efficiency
  - Tradeoffs in the maintenance strategy
  - Vision for the maintenance program
- QR Network's maintenance regime (Chapter 3).
  - Commercial arrangements
  - Planning, implementing and managing the maintenance program
  - Driving efficiency and innovation in maintenance
  - Performance monitoring

As such this paper will not seek to replicate these sections.

2 Western System Characteristics

The Western System was constructed in stages commencing with the section between Ipswich and Grandchester opened to traffic in 1865, with subsequent extensions reaching Toowoomba in 1867 and Roma in 1880. Historically the line catered for passenger, livestock, freight and primary products (e.g. grain, cotton) traffics. Coal carrying services commenced in 1982 initially from mines located just west of Ipswich. Rail export commenced via rail from Jondaryan in 1984 and from Macalister in 1994.

The track standard and alignment are lower than that which would be constructed for a new stand alone heavy haul railway built specifically for coal carrying services. This track standard has been reflected, via the DORC valuation carried out by QR Network in the asset valuation of the track section, both in the context of the

replacement cost of the asset (where QR Network has valued the asset based on its current track standard and alignment rather than reflecting a higher standard track) and in the degree of depreciation of the asset. In this context, the existing track is heavily depreciated due to its age – it would be unreasonable to contemplate a high standard heavy haul railway of a similar age to the existing asset. The resulting modelled opening asset base is considerably lower that the cost of a purpose built heavy haul railway.

As a consequence of the system age and track standard, the track section between Rosewood and Macalister requires a higher cost maintenance regime in order to safely and reliably deliver the forecast and future tonnages. To sustain the track in a fit for purpose state, maintenance activities such as:

- resleepering, track reconditioning, rail and turnout grinding, fire and vegetation control and rail stress adjustment; and
- track and structures inspections and bridge repairs;

will be high.

The Network Maintenance Plan (NMP) identifies the major periodic maintenance activities as;

- Mechanised resleepering – undertaken every five years. Each resleepering programme replaces 1 in 4 sleepers on a like for like basis, that is timber for timber and if required steel for part worn cascaded steel as they are either approaching their end of economic life or identified as defective
- Track Resurfacing and grinding – the combination of localised black soils and the high axle loads relative to track structure on non upgraded track sections results in the requirement for more frequent rail resurfacing and rail grinding
- Rail restressing – loaded and empty trains traversing the Toowoomba range put great forces on the track through tight radius curves and as a result a more frequent rail stress adjustment programme is required.

3 Maintenance and CAPEX Interrelationship

The track upgrades contained within capital expenditure programme on the Western System has an interrelationship with maintenance. The majority of CAPEX in the Western System is triggered by tonnage increases being taken up by existing mines or for new mines. The activities completed during track capital upgrade works include;

- Replacing timber and steel sleepers with concrete
- Timber bridge replacement
- Formation strengthening and ballast replacement
- Re-railing for heavier axle load capacity
- Upgrade of points and turnouts.

These upgrades in time will lessen the requirement for the current levels mechanised resleepering, track resurfacing and rail grinding as the upgraded track structure is of better quality and more resilient to the effects of traffic. However it must be noted that the extra tonnes delivered through these track upgrade works will require extra maintenance on the non upgraded sections, for example rail re-stressing on the range would be increased as would rail maintenance due to the increased traffic movements.

It could be argued that the whole system should undergo track strengthening however this would result in a very high CAPEX charge and require QR Network to increase its proposed $22.07 per 000GTK ($July 2008) tariff in order to recover these costs from system users.

4 Key Drivers of the UT3 Forecasts

4.1 Western System Coal Infrastructure Expansion

The Western System services a variety of traffics including coal services from the coal mines operating in the Surat and Clarence-Moreton Basins for export via Fishermans Island and domestic power station use in the Brisbane area.

In the 2007-08 financial year 5.4mt of coal was carried on the Western System. This haulage task is forecast to increase in 2010/11 up to 7.7mtpa. The current longest coal haul on the Western System is Macalister to Fishermans Island which is a total of 286km for a loaded train service.

Full detail of Western System coal volume forecast can be found at Section 6.2 of QR Network's Western System (SEQ Cluster) Coal Tariff Development Paper.

The forecast tonnage profile for Western System Coal is detailed in the following table.

	Tonnes expressed as mtpa[1]			
Western System Coal	**2009/10**	**2010/11**	**2011/12**	**2012/13**
Export Contracted	5.23	5.231	5.231	5.23
Export New	-	1.94	1.94	1.94
Domestic Contracted	0.51	0.51	0.51	0.51
Domestic New	-	-	-	-
Total Tonnes	**5.73**	**7.67**	**7.67**	**7.67**

In order to encourage growth in this key market and keep up with industry demand, the Western System (SEQ Cluster) will require additional infrastructure investment. To this end, QR Network is planning to implement a series of incremental capacity enhancements which correspond with the forecast tonnage demands of its customers. These improvements will be complemented by industry investment.

The targeted throughput levels cannot be provided by the provision of rail infrastructure only, but will need all participants of the Western System Coal supply chain to contribute. The following table summarises the key inputs expected from members for the track section Macalister to Fishermans Island.

Target Capacity Level	Mine Load-out	Rail Infrastructure	Rail Operator(s)	Export Terminals
Up to 7.7mtpa	Planned improvements in load rate (tph) and recharge rates	Increased availability of paths in Metro system. Upgrade of existing infrastructure to facilitate increased tonnages (timber bridge replacement etc)	Additional consists and better utilisation of current consists	Re-alignment of current stockpile arrangements to facilitate expansion within current port facility footprint

[1] Mtpa = million tonnes per annum

A further supporting paper has been developed to provide information and scope of below rail Capital Expenditure.

2.2 Continuation of Cost Pressures

Another key driver of the UT3 maintenance forecasts is the continued pressure on the costs of inputs used in the maintenance program. An overview of the key cost pressures for UT3 that will affect all of QR Network's costs was provided in Volume 2 (Chapter 2) of QR Network's submission. Many of these cost pressures have been impacting all participants in the Western System coal supply chain.

QR Network's submission to the QCA in May 2007 regarding its revised UT2 CQCR maintenance cost forecasts identified the main sources of pressure on input costs, being labour, consumables, fuel and accommodation. This submission was accompanied by a study completed by Booz & Co (then Booz Allen Hamilton), who devised a weighted cost index of QR Network's key input costs. This index increased by 6% per annum between 2003-04 and 2005-06 compared with a CPI increase of around 2.5% per annum.

This increase was considered relatively conservative. For example, between June 2003 and March 2008, the Rawlinson's building index (Brisbane), increased by 66% compared to a total increase of 16.8% in the Brisbane CPI

These pressures are not set to abate in UT3. The overarching implications of the tight demand for labour were outlined in Volume 2. Many of the skills employed in maintaining network infrastructure are also utilised in the mining industry (such as diesel fitters and electrical tradespeople), which will mean that the labour market for these skills will be particularly tight.

Pressures on the cost of materials and consumables are also expected to continue. For example, the Australian Industry Group's May 2008 Construction Outlook survey revealed that:

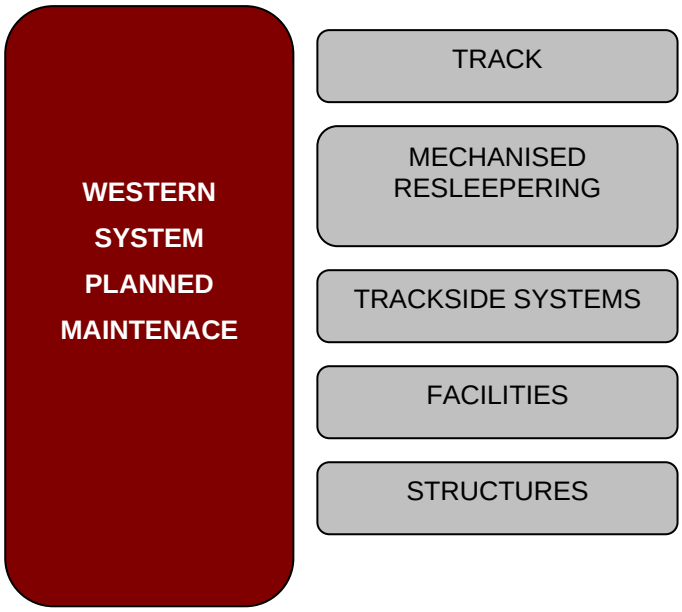
> *Pressures on construction material costs have also increased. Respondent firms mainly linked these pressures to higher prices for steel, iron, rubber and fuel. In total, 89.7% of firms reported major or moderate increases in*

materials used in construction over the six months to March 2008, up from 72.4% in the previous six months.[2]

QR Network has a limited ability to control these costs. The specific impacts of input costs on forecasts for key activities have been examined in Chapter 6 of Attachment G to Volume 2 of Networks Access Undertaking 2009 Submission

5 Planned Maintenance Products

The maintenance products that are undertaken to maintain the Western System can be described using the five discipline bases: Track, Mechanised Resleepering, Trackside Systems (TSS), Facilities and Structures.



Each of these five disciplines has a list of maintenance products identified that describe the maintenance tasks undertaken. All maintenance costs are allocated under these five categories. The budget for each of these products (represented by separate product codes) is shown individually in the Network Maintenance Plan. Work undertaken in these product codes is then recorded and monitored at the monthly Regional Management Team meetings.

[2] Australian Industry Group (2008). Construction Outlook May 2008, http://www.aigroup.asn.au/scripts/cgiip.exe/WService=aigroup/ccms.r?PageId=914.

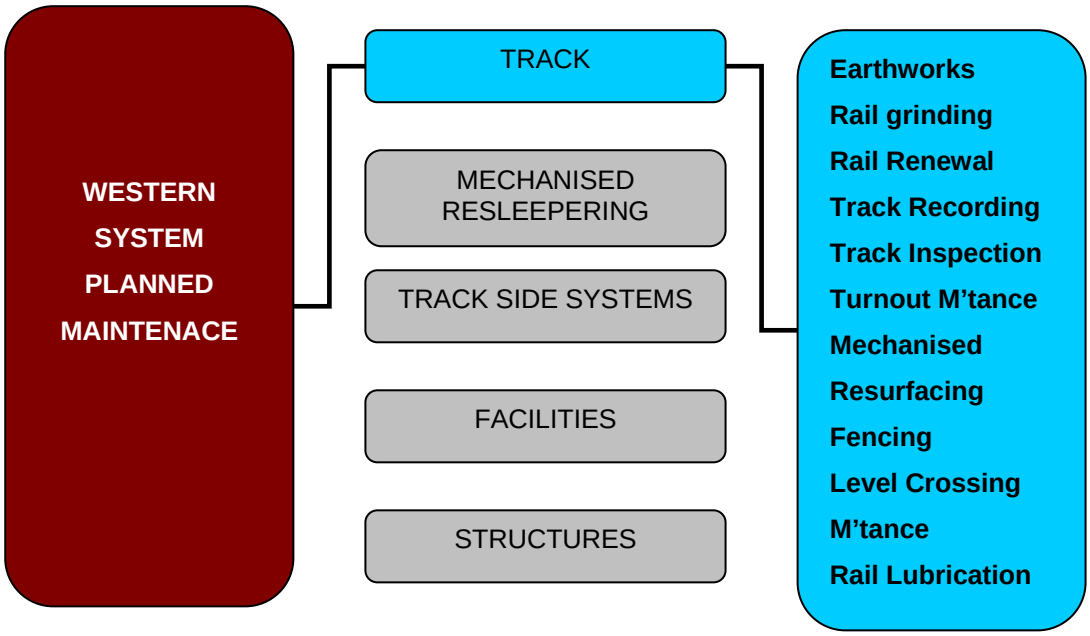
Overall product codes have been developed for Inventory Management and Asset Management. Inventory Management involves the management of all inventories, stock takes and clean up, retrieval of material, audits, inventory admin duties, minor asset stock takes and audits. Asset Management involves the day to day management of assets including procurement handling and storage of assets

The following sections provide descriptions of each of the maintenance products in each of the five disciplines shown above.

5.1 Track Maintenance Products

The activities associated with track maintenance, with the exception of mechanised resleepering, makes up the majority of maintenance planned and undertaken in the Western System, both in activity and cost.

The diagram below lists some but not all of the activities that can are classed as track maintenance products.



Products included under Track Structure Management are those that relate to the overall performance of the track structure. These products ensure that the geometry and stability of the track is maintained to a safe and appropriate operating level. A list of the products and their purpose are shown in the following table and are described in more detail in the following sections.

Activity Name	Purpose
Maintenance Ballast Formation Repairs Earthworks	Restores ballast drainage properties, reduces speed restrictions, restores track geometry, and reduces risk of track buckle. Ensures formation earthworks are fit for purpose
Mechanised Resurfacing Mechanised Resurfacing- Turnouts Stone Blowing Top & Line Spot Resurfacing Rail Grinding	Restores Track geometry, prolong ballast life, prevents premature component failure and therefore reduces track related speed restriction
Sleeper Management Rail Repair Joint Maintenance Rail Stress Management Rail Lubrication	Replace defective sleepers and rail on a as needs basis. Monitors joints and rail for stress Lubricates rail to reduce rail generated noise
Track Inspections Track Geometric Recording	Proactive management of track geometry. Identify & prioritise corrective work
Ultrasonic Testing	Identify work to be planned & carried out
Turnout Maintenance Minor Yard Maintenance	Routine maintenance and replacement of components
Track Reconditioning & Removal	Major Refurbishment to restore condition.
Fencing renewal / repair Monument / Signage Erection Fire & Vegetation Control	Works on fences to ensure corridor security and safety distance signage and general sign maintenance to reduce fire risk and maintain unimpaired vision
Crossing Maintenance OLC & OCC	Maintenance of all level and occupational crossings and crossing approaches

Of the products involved in Track Structure Management, the activity of mechanised resurfacing is the largest expense items in the maintenance budget. Consequently, this activity has a detailed descriptions provided below.

For detailed explanations of the other maintenance activities listed in the above table please refer to section 5.1 of Attachment G to Volume 2, Report by QR Network on Maintenance Costs in the CQCR.

5.2 Mechanised Resurfacing – Mainline & Turnouts

Track infrastructure experiences multiple loads with the main sources of stress coming from the forces transmitted under traffic through the wheels of Rollingstock. The forces increase when the vehicle is in motion creating dynamic loads in addition to the static load of the vehicle when stationary. The higher the train speed and axle load combination, the higher the forces transmitted to the track. Surface irregularities in the running surface (created by the plane between the two running rails) also have an influence on the dynamic load and resulting vibrations. Therefore, poor track quality accelerates track deterioration if not properly maintained.

Mechanised resurfacing restores the geometry of the track by lifting the track to the appropriate level and compacts the ballast underneath the sleeper. If track geometry is not corrected to a standard that is fit for the traffic task, track components deteriorate leading to a marked increase in the need to perform other maintenance on the track. For example, rails can develop surface irregularities and defects, fastenings may work loose or break, sleepers may skew or even break, ballast and formation deteriorates and poor track geometry can lead to speed restrictions being imposed. Speed restrictions limit the available capacity of the network and increase the transit time of trains.

Under normal conditions, ballasted track displaces slightly out of its original position under traffic, however, these changes of the horizontal and vertical positions initially occur at low rates. Over time with the passage of more traffic, the development of track geometry irregularities accelerate the rate of geometry deterioration, which requires corrective work in order to restore the track geometry and assure safe running.

Mechanised resurfacing is a standard railway maintenance function applied to keep track within the design geometry parameters. It assures correct levelling and lining, which keeps vertical and lateral forces and accelerations within acceptable limits. By the tamping/ lining/ levelling action the rails are lifted and shifted to the correct position and the tamping tools pack the ballast underneath the sleepers.

Mechanised resurfacing is performed as part of the initial construction of the track and subsequently at intervals depending on the speed, tonnage and deterioration rate of the track. The task is completed using self-propelled on-track machines that are able to lift and line the track to a pre-determined level, and compact the ballast under the rail seat to support the new track position.

In QR, resurfacing maintenance operations are broken into three distinct products:

- Mechanised Resurfacing – Mainline
- Mechanised Resurfacing – Turnouts
- Stoneblowing

It is worth noting that no stoneblowing is planned on the Western System for the UT3 period.

The planning of track maintenance works, particularly to maintain track geometry, requires considerable skill and experience to achieve cost-effective outcomes. Mechanised resurfacing is one of a few different maintenance products that may be used to treat a particular area depending on the required response time to the defect, the underlying cause of the defect and the inherent track component condition. The following table gives an example of the geometry defect, cause and potential remedial treatment:

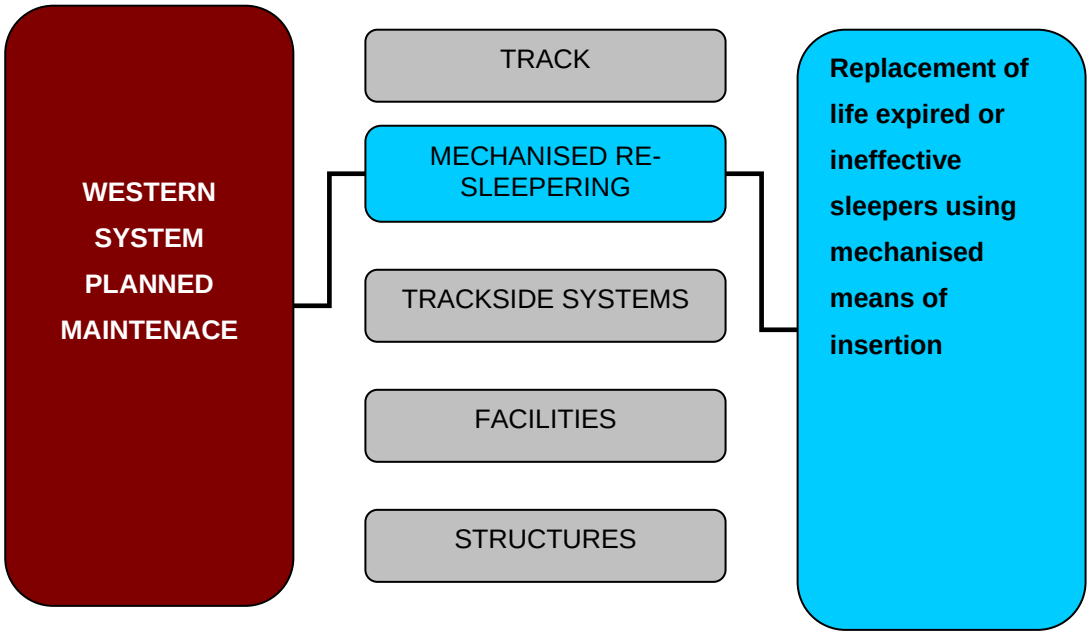
Geometry Exception	Typical Causes	Typical Routine Maintenance Treatments
Top/Twist Defects	• Settlement of ballast • Change in track stiffness (e.g. bridge ends)	• Lift track and packing or tamping ballast under sleepers by mechanised or manual means
Line Defects	• Ineffective ballast around sleepers	• Realign track laterally to design alignment and pack ballast around sleepers by mechanised or manual means

Other track defects may cause geometry exceptions, for example, areas of poor drainage or failed formation. These defects cannot be treated by resurfacing as the cause of the defect is still present and the defect will continue to occur.

Factors which are difficult to predict include rain and heat events, and impact on short-term resource utilisation to ensure speed restrictions are kept within acceptable levels. Tamping is an important maintenance strategy to ensure that track related restrictions are kept to a minimal level so that cycle times required by supply chain participants are met.

5.3 Mechanised Re-Sleepering

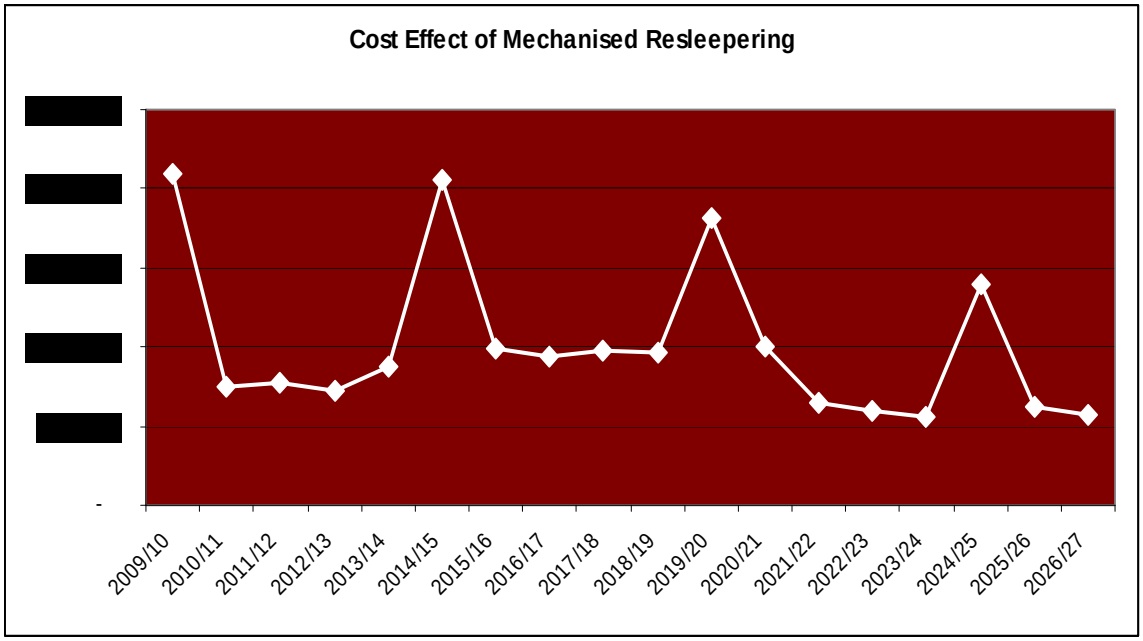
QR Network has adopted a cyclic approach to sleeper renewals. Mechanised Resleepering is the programmed replacement of a large proportion of sleepers by mechanised means to restore the overall condition of the sleeper population to a desired level. The quantity of sleepers renewed is a function of the rate of degradation of the sleepers in a certain location, and the desired cycle length. The diagram below lists the activities related to mechanised resleepering.



Currently mechanised resleepering occurs throughout the greater Western System every 4 to 5 years. The resleepering gang commence at Quilpie in the west and re-sleeper at selected locations through to Rosewood.

Mechanised resleepering is historically and forecast the largest cost maintenance activity undertaken in the Western System. The graph below illustrates the forecast

effect of resleepering on maintenance cost related to the resleepering activity on the coal related track sections of the Western System.



The effective life of timber sleepers in the Western System is 20 years, this resleepering programme allows for the replacement of 1 in 4 sleepers every five years, as such track sections have a mix of ages of sleepers ranging from 5 to 20 years. Currently timber sleepers are replaced with timber and steel if required, with part worn steel. This like for like replacement as a maintenance activity is due to the height of timber and steel sleepers differing to that of concrete, the mixing of timber /steel with concrete is therefore not practical as the ballast depth to the formation would differ between the two and load would not be spread evenly over the formation, this could then in turn result in track alignment issues.

The primary purpose of sleepers is to provide vertical support to the rail, maintain gauge between the rails and provide longitudinal restraint to the rails. Where a sleeper can no longer meet these requirements, it is deemed defective. The life of a timber sleeper in service is dependant on the traffic task (e.g. speed, axle load, gross tonnage), and environment (e.g. pest damage, exposure to the varying weather conditions). The allowable limits for the % of defective sleepers and clusters are managed in accordance with the minimum safety standards as prescribed in Std 77 Civil Engineering Track Standards. Clusters of defective sleepers are where three or more defective sleepers are located adjacent to each other. Allowing the amount of defective sleepers to increase above minimum safety standards leads to the

enforcement of speed restrictions and axle load restrictions. In extreme instances or if the issue is not maintained the result may be total closure of the track until the issue is rectified.

To achieve an efficient method of renewing timber sleepers, the approach QR Network takes is to allow the timber sleeper population to degrade in between resleepering cycles until such time that the standard dictates that maintenance intervention is required to ensure safe operation of the railway. The method of resleepering is to partially resleeper the track on a cyclic basis and not face resleeper sections of the track. This is due to the fact that sleepers in a section of track are a mixture of sleepers of various ages, distributed so that the safety of the track is maintained if a portion of the sleepers fail from age related problems. The identified defective or failed sleepers are replaced only when a mechanised resleepering gang works in a face through a section on a cyclic program, currently every 5 years. As a region only sees this gang every 5 years, approximately one quarter of the sleepers in that region are usually replaced when the mechanised gang comes through.

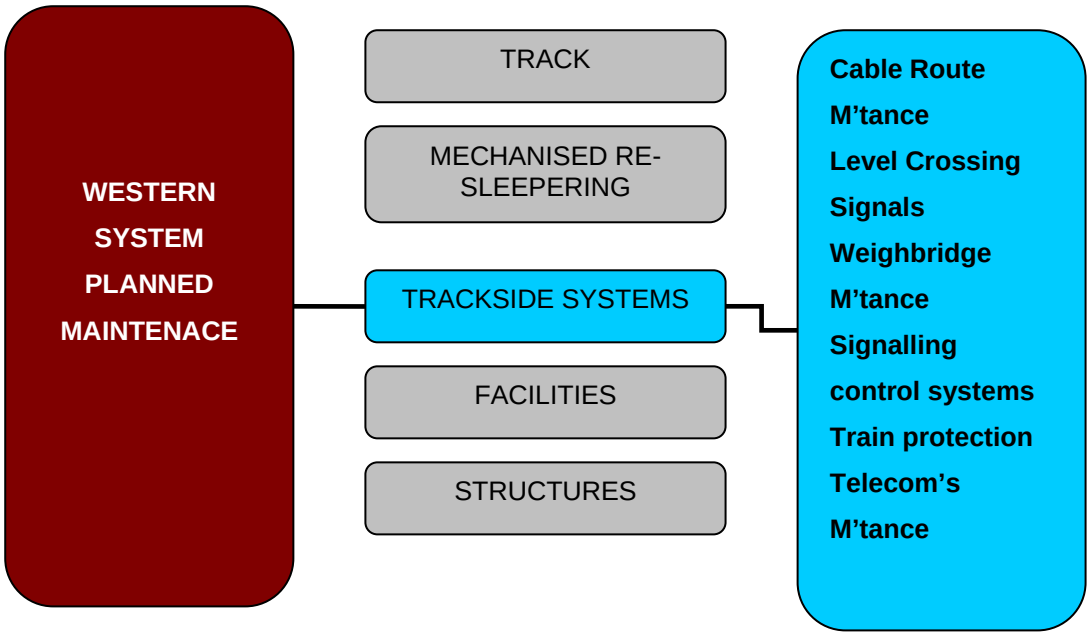
Mechanised resleepering is deemed a maintenance activity as the resulting works re-establish the standard of the track to the same level and not an improved level. The replacement of timber and steel sleepers with concrete is a capital improvement as the standard of track is improved.

As previously mentioned, capital track upgrades include face resleepering sections of track with concrete sleepers. If required the formation is re-engineered and lowered to ensure the minimal ballast depth is maintained between sleeper base and formation. As capital track upgrades are completed the requirement for mechanised resleepering of those track sections is removed. Over time as more track upgrades are completed the level of mechanised resleepering will lessen.

5.4 Trackside Systems Products

Trackside systems include the maintenance of electronic and communication systems required for the safe operation of the railway. These include telecommunications equipment and signalling maintenance.

The diagram below lists some but not all of the activities that can be classed as track side systems maintenance products.



Maintenance for Signals and Telecommunications involve three main activities:

- Preventative maintenance;
- Corrective maintenance;
- Technical assistance with civil infrastructure works.

Preventive Maintenance

Preventative maintenance is maintenance that is undertaken on equipment at regular programmed intervals to maximise its availability and reliability.

Corrective Maintenance

Corrective maintenance means action performed as a result of failure, to restore an item or asset to its predetermined condition, as far as possible. Corrective maintenance is also known as repair or unplanned maintenance. The factors that cause assets to fail are many.

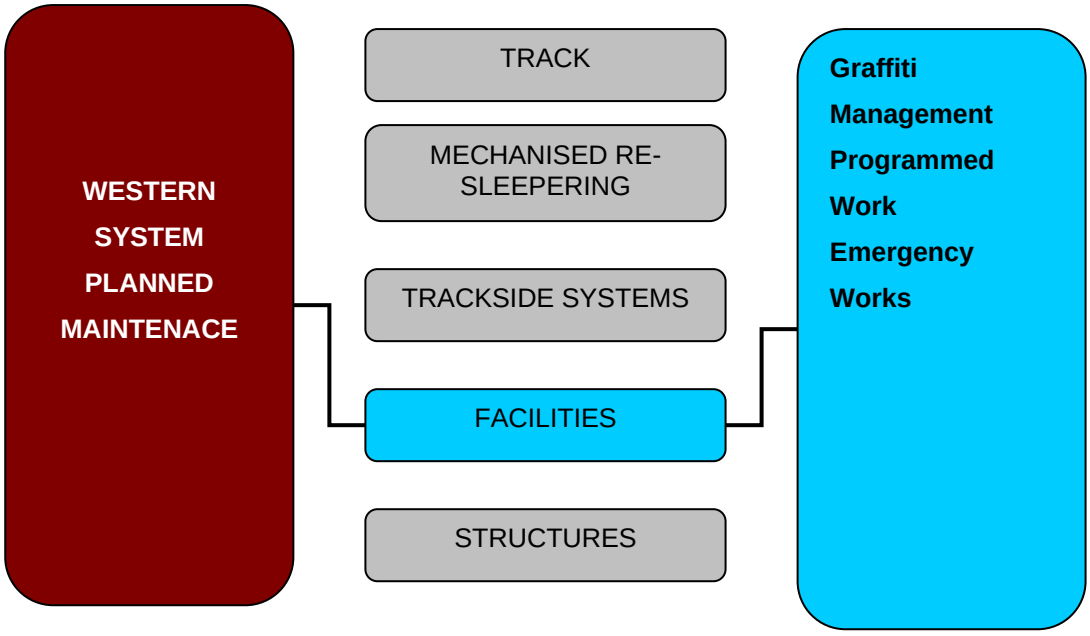
The following table details the TSS maintenance activities on the Western System forecast fro the UT3 period

Name	Purpose
Preventative Signalling Maintenance Preventative Telecommunications Maintenance Corrective Signalling Maintenance Corrective Telecommunication Maintenance Level Crossing Protection Signalling Control Systems Cable Route Management Train Protection Systems Maintenance Wayside Monitoring Systems Maintenance	Provide a safe and operating signalling and telecommunications system

For detailed explanations of the other maintenance activities listed in the above table please refer to section 5.1 of Attachment G to Volume 2, Report by QR Network on Maintenance Costs in the CQCR.

5.5 Facilities Maintenance

Facilities maintenance includes all activities related to the maintenance of QR Network facilities associated with the Western System. The diagram below lists some but not all of the activities that can be classed as facilities maintenance products.

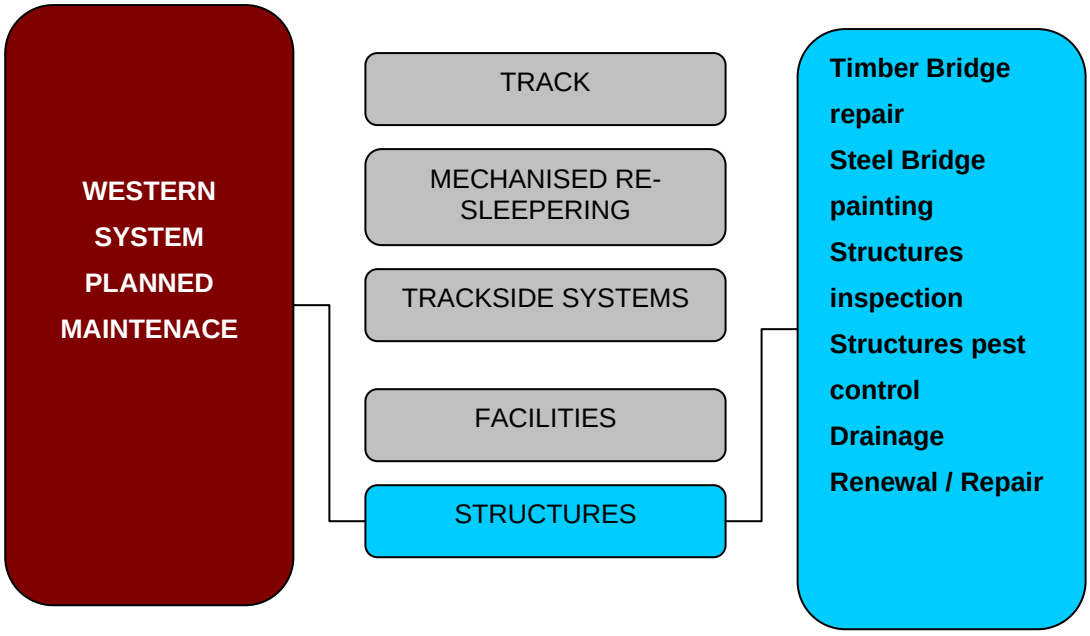


Facilities maintenance is a minor activity in the Western System. Further detail is provided in section 4 of this paper.

5.6 Structures Maintenance

Activities included under Structures Management are those that relate to maintenance that affects structures that support rail over road crossings, road over rail crossings and those structures that provide drainage under the track.

The diagram below lists some but not all of the activities that can be classed as structures maintenance products.



A list of the key activities and their purpose is shown below.

Product Name	Purpose
Structures Inspections Drainage Construction/Repairs Repairs Concrete Bridges Repairs Steel Bridges Repairs Timber Bridges Retaining Wall Construction/Repairs Structures Pest Control	Provide safe and effective structures throughout the rail corridor.

For detailed explanations of the maintenance activities listed in the above table please refer to section 5.1.4 of Attachment G to Volume 2, Report by QR Network on Maintenance Costs in the CQCR.

6 UT3 Forecast Maintenance by Task

The total maintenance budget for the Western System has been built up by forecasting the costs associated with each of the major maintenance cost elements including:

- Track maintenance
- Mechanised Resleepering
- Track Side Services maintenance
- Facilities maintenance
- Structures maintenance

For each of these costs the cost of maintenance has been built up on the basis of a direct cost estimate plus a margin.

6.1 Track Maintenance

The forecast of track maintenance per activity is summarised in the following table for each year in the UT3 period

Track Maintenance	2009/10	2010/11	2011/12	2012/13
Crossings OLC & OCC	[redacted]			
Major Formation Repairs				
Major Earthworks				
Major Fencing Renewal/Construction				
Major Rail Joint Elimination/Repair				
Turnout Component Replacement				
Track Re conditioning - Timber				
Mech Resurface - main line				
Mech Resurface - turnouts				
Rail Grinding - main line				

Rail Grinding - turnouts	[redacted]			
Minor Yard Maintenance				
Track Geometry Recording				
Ultrasonic Testing on track machine				
Maintenance Ballast				
Sleeper Cluster Management				
Fire & Vegetation Control				
Local Testing				
Rail Stress Adjustment				
Track Inspections				
Per Way Corridor Maintenance				
Asset Management				
Inventory Management				
Total	**6,643,258**	**6,287,243**	**6,475,919**	**6,034,427**

6.1.1 Discussion of planned costs

The expenditure for rail grinding of turnouts is higher in the first year as this activity is cyclical. New turnouts are ground on installation and then once every 5 years. As the rail grinder comes through the Western System those turnouts either recently constructed or on this five year cycle are ground. A high number of turnouts were installed or replaced in the Western System in 2004/05 as part of the Surat Basis Track Upgrade Stage 2 project, these will be around five years old in 2009/10 and such are planned to be ground resulting in a higher related maintenance expenditure for this activity in 2009/10.

Mechanised resleepering is planned to occur in the Western System in 2009/10, related to this is an increase in planned maintenance ballast expenditure. During the resleepering activity some ballast can be lost or deemed defective and is required to be replaced to ensure sleepers maintain correct alignment. 12,240m3 of maintenance ballast will be required in 2009/10 apposed to 9,000m3 per year for the remainder of UT3

Sleeper Cluster Management refers to the small scale replacement of defective sleepers (not via mechanised resleepering). This is lower in 2009/10 as a larger than normal amount of defective sleepers are replaced via the planned mechanised resleepering activity. Approximately 700 sleepers per year are replaced in non mechanised resleepering years opposed to 500 in 2009/10.

Fire and vegetation control activities involve the control of vegetation by chemical and mechanical means; burn offs to eliminate vegetation interference with train running and track maintenance. This includes the following processes: vegetation control around bridges, slashing, brush cutting, hi rail and manual herbicide treatment, tree surgery, fire and vegetation management, fire breaks, burning off, tree planting, fire fighting, pest management plans. This activity does not usually require track closures. This is an ongoing maintenance activity and is required throughout the entire length of the Western system (approx 365km per year for the coal carrying sections)

In the CQCR the major maintenance activity with regards to cost is ballast undercutting and stone blowing. There is no planned ballast undercutting or stone blowing due to occur in the Western System as current and short term forecast tonnages do not warrant their use as a maintenance activity. The benefits of these activities are detailed in section 5.1.1 of Attachment G to Volume 2 of Networks Access Undertaking 2009 Submission. In summary these benefits are;

- Restoration of ballast drainage
- Restores track geometry
- Reduces the risk of track buckle

Mechanised resurfacing achieves these results to the required level under current and forecast coal tonnages in the Western System. As coal has only been running on the Western System for a relative short time there has not been the prolonged exposure to the issues with ballast fouling as experienced in the CQCR so the effects of fouled ballast are less in the Western System and can be maintained through the maintenance ballast activity if required. Mechanised resurfacing occurs in the Western System year round. The following table details the planned mechanised resurfacing programme for the UT3 period.

UT3 Mechanised Resurfacing Programme (kilometres)	2009/10	2010/11	2011/12	2012/13
Rosewood - Toowoomba	110	95	95	95
Toowoomba - Jondaryan	72	59	59	59
Jondaryan - Dalby	39	32	32	32
Dalby - Macalister	33	33	33	33
Total	**254**	**219**	**219**	**219**

6.2 Mechanised Resleepering

The forecast of mechanised resleepering activity is summarised in the following table for each year in the UT3 period

	2009/10	2010/11	2011/12	2012/13
Mechanised Resleepering ($)	10,739,815	-	-	-

The $10.7 million of mechanised resleepering can be further allocated to track sections as follows

- Rosewood – Toowoomba [redacted]
- Toowoomba – Jondaryan [redacted]
- Jondaryan – Dalby [redacted]
- Dalby – Macalister [redacted]

6.2.1 Discussion of planned costs

As mentioned mechanised resleepering is the bulk replacement of life expired as tracked through asset management or defective sleepers as identified in track inspections. The 2009/10 planned resleepering programme will replace approximately 95,000 sleepers on the track section between Rosewood and Macalister, the planned sleeper replacement per track section is detailed in the following table:

Mechanised Resleepering by track Section (number of sleepers)	2009/10
Rosewood - Toowoomba	38000
Toowoomba - Jondaryan	23096
Jondaryan - Dalby	16870
Dalby - Macalister	16870
Total	**94836**

6.3 Track Side Systems Maintenance

The forecast of Track Side Systems activity is summarised in the following table for each year in the UT3 period

Track Side Systems Maintenance ($)	2009/10	2010/11	2011/12	2012/13
TSS Products	1,466,758	1,476,991	1,473,760	1,468,200

6.3.1 Discussion of planned costs

As mentioned in the section 3.3 TSS maintenance is in the main rectification of TSS faults. As such forecasting specific allocations for future years is difficult hence the relatively flat line forecast.

The majority of public level crossings in the Western System have passive protection only, approach signs and cattle grids. Any changes to the safety legislation that resulted in all public level crossing to have active protection, flashing lights as a minimum would result in an increase in TSS maintenance costs.

6.4 Facilities Maintenance

There is no planned maintenance for facilities in the Western System for the UT3 period. All cost with relation for the operation of facilities required to operate the

railways have been captured in the regional and system wide costs parameter of the Western System tariff model

6.5 Structures Maintenance

The forecast of Structures per activity is summarised in the following table for each year in the UT3 period:

Structures Maintenance ($)	2009/10	2010/11	2011/12	2012/13
Concrete Pier/Abutment Renewal	[redacted]			
Drainage Construction & Renewal				
Bridge Repairs				
Major Tunnel Repairs				
Retaining Wall Construction				
Steel Bridge Painting				
Structures and Civil Inspections				
Asset Management				
Inventory Management				
Structures Corridor Mtnce				
Total	**2,419,128**	**1,170,052**	**1,848,155**	**1,154,566**

6.5.1 Discussion of planned costs

Steel bridges require painting to reduce corrosion every 15 to 20 years hence the one off expenditure in the UT3 period. The 119 metre Lockyer River Bridge will be painted in 2009/10.

All bridge piles are inspected on a cyclical basis every 4 years, this is due to be undertaken in 2011/12 and is reflected in the increase in this activity for that year.

In 2011/12 two timber bridges are being eliminated and replaced with concrete culverts at the 66k kilometre point; this is reflected in an increase in drainage construction and renewal.

All expenditure on maintenance to tunnels is on the Toowoomba Range. These tunnels are the original construction and design.

7 Allocation of Maintenance to the UT3 Tariff

The UT3 Western System Coal tariff model has been developed for the optimised stand alone coal line section between Rosewood and Macalister. This has been done as the contracted tonnages from Macalister are the most westerly point on the greater Western System which coal traffics currently originate.

To ensure that the maintenance costs presented in the UT3 Western System Coal tariff model are reflective of the optimised stand alone network on which the ceiling price was derived, the actual fully planned maintenance costs are required to be allocated on the consistent basis.

7.1 Allocation to Non-Coal Traffics

The Western System is shared by a number of different traffics, including long distance passenger services, general freight, livestock and seasonal grain traffic. Further; traffic from the South Western System joins the Western System at Toowoomba and shares the track section between Toowoomba and Rosewood. As such it is required to allocate a portion of the planed maintenance costs to these non coal traffics. This has been done to reflect the level of maintenance that would still be required if coal traffic did not exist.

The following table details the forecast weekly loaded train paths and annual gross tonnes by traffic type over the Toowoomba Range[3]. The Toowoomba Range crossing has been selected as all traffic types utilise this section of the network as well as the traffics from the South Western System that join at Toowoomba.

[3] Forecast 2008/09

Traffic Type	% total weekly loaded Paths	Annual GTK's ('000)	% of Annual GTK's
Coal	72.2%	2,510,307	92.52%
Passenger	2.5%	127	0.01%
Freight	8.9%	61,834	2.47%
Grain	10.1%	94,060	3.75%
Livestock	6.3%	31,475	1.26%

The above table identifies that on the Toowoomba Range crossing, coal is the predominant traffic, and this is the circumstance for the entire track section Rosewood to Macalister.

To best allocate maintenance costs to non coal traffics that is representative of the system usage, planned maintenance cost was allocated to coal vs. non-coal on a forecast annual Gross Tonne Kilometre (GTK) basis. This allocation is represented in the following table.

('000) GTK's	2009/10	2010/11	2011/12	2012/13
Westerns System Coal	2,319,141	2,451,528	2,451,528	2,451,528
Non-Coal Traffics	187,495	189,634	187,514	189,672
Total System GTK's	2,506,636	2,641,163	2,639,042	2,641,200
% allocation to Coal	92.52%	92.82%	92.89%	92.82%
% allocation to Non-Coal	7.48%	7.18%	7.11%	7.18%

This resulted in an average 92.76% allocated to coal and 7.24% of maintenance costs allocated to non coal traffics for planned maintenance costs on the line section between Macalister to Rosewood for the UT3 period.

8 Maintenance on the Toowoomba Range

The 470m climb of the Toowoomba Range at 25 kilometres in length is the longest and highest rail range crossing in Queensland[4] with the alignment dating back to

[4] For coal carrying services

1867. This rail section from Murphy's Creek to Toowoomba includes three passing loops, nine tunnels, continuous tight radius curves (many less than 120m radius) and a ruling grade of 1 in 50. Because of its nature the Toowoomba Range crossing demands a high level of continuous maintenance to ensure track condition is maintained. This track section also requires additional infrastructure such as wayside lubricators to reduce wheel squeal noise and sacrificial rail on tight radius curves.

The requirement for sacrificial rail on tight radius curves is unique to the Toowoomba Range. This sacrificial rail serves two purposes, firstly to lessen the force on the two main line rails and secondly to reduce the risk of flange climb derailment. Sacrificial rail can only be fixed to timber sleepers as there is no concrete sleeper designed to facilitate the fitting of sacrificial rail.

The level of maintenance has a direct relationship with track possession therefore this high level of maintenance impacts the capacity of the system.

To negate or minimise this, maintenance activities on the range are timed in conjunction with the curfews placed on coal services through the Brisbane Metropolitan System and in line with planned construction shut downs. The range crossing is made available to ensure that trains can traverse the range at times to meet the available slots through Brisbane whilst maintenance activities are conducted when trains are either west of Toowoomba or east of Murphy Creek. If required during major maintenance shut downs or system recovery from incidents, trains can be staged in the Willowburn holding yard.

[redacted]

A high level of maintenance also translates to a higher maintenance cost. The table below details the proportion of maintenance cost allocated to line section by track kilometres. From this table it is evident that the line section Rosewood to Toowoomba, inclusive of the Toowoomba Range crossing is the most maintenance intensive, with 38.25% of total system maintenance.

Maintenance Per Track Section (Track Km's)	Rosewood - TWB	TWB - Jondaryan	Jondaryan - Dalby	Dalby - Macalister
Track	9,508,583	5,464,414	5,167,191	5,300,661
Mechanised Resleepering	4,438,000	2,862,000		3,439,815
Trackside Systems	2,200,735	1,264,723	1,195,932	1,226,823
Facilities	-	-	-	-
Structures	2,405,577	1,382,443	1,307,248	1,341,015
% of Total System Maintenace	**38.25%**	**22.62%**	**15.81%**	**23.31%**

9 Operator Margin

An operator margin has been included to capture the return that a maintenance provider would be expecting above costs if it were to bid for the coal contract. A margin of 15% has been chosen based on an analysis of similar rail maintenance companies by KPMG.

The margin is applied to all direct costs. It is applied to asset charges because they are calculated using an interest only calculation (based on the depreciated value of the asset) rather than a WACC. The interest used in this calculation is equivalent to the cost of debt used in the WACC calculations and is significantly lower than the interest rate which would be payable if the maintenance provider was not operating under an alliance agreement with QR.

Section 5 of QR Network's UT3 Supplementary Information submission in response to the QCA's S.185 Notice provides a detailed discussion on the derivation of the ISG Margin and the margin measured against external infrastructure maintainers..

10 UT3 Maintenance Summary

The table below summarises the forecast maintenance costs by activity for the period of UT3. Over the period of the undertaking total expenditure is forecast to be $55.9 million, with the greatest expenditure in year 1 (2009/10).

Western System Coal Maintenance ($)	2009/10	2010/11	2011/12	2012/13
Track (excl Mechanised Resleepering)	6,643,258	6,287,243	6,475,919	7,301,146
Mechanised Resleepering	10,739,815	-	-	-
Trackside Systems	1,466,758	1,476,991	1,473,760	1,468,200
Facilities	-	-	-	-
Structures	2,419,128	1,170,052	1,848,155	1,154,566
SUB TOTAL	21,268,958	8,934,286	9,797,834	9,923,913
Margin for ISG's Overhead and ROA (15%)	3,190,344	1,340,143	1,469,675	1,488,587
TOTAL	**24,459,302**	**10,274,429**	**11,267,510**	**11,412,500**

On a line section basis the majority of maintenance expenditure will occur on the Rosewood to Toowoomba section inclusive of the Toowoomba Range crossing.

The most cost intensive maintenance activity is mechanised re-sleepering due to occur in the 2009/10 year.