

**AU1 West Moreton
Reference Tariff Reset
Capital Submission
(Public Release)**

 QueenslandRail



Table of Contents

INTRODUCTION	3
PRE AU1 CAPEX (2007/08 TO 2012/13)	3
PRE AU1 PROJECT LIST & SUMMARY (EXCL. CAPITALISED INTEREST)	4
PRE AU1 CAPACITY EXPANSION PROJECTS	5
1. JONDARYAN TRACK UPGRADE	5
2. CUMBOOLA TO FISHERMAN ISLANDS PROJECT	7
PRE AU1 ASSET RENEWAL PROJECTS	9
3. WESTERN SYSTEM ASSET REPLACEMENT	9
AU1 PROPOSED CAPEX (2013/14 TO 2016/17)	10
AU1 PROJECT LIST & ESTIMATE SUMMARY (EXCL. CAPITALISED INTEREST)	12
AU1 CIVIL PROJECTS	14
1. SLOPE STABILISATION ON TOOWOOMBA RANGE	14
2. FORMATION REPAIRS	16
3. TIMBER BRIDGE STRENGTHENING AND ELIMINATION	18
4. REPLACE TIMBER & STEEL BRIDGES WITH REINFORCED CONCRETE BOX CULVERTS ON THE COAL CORRIDOR	20
5. DRAIN RENEWALS	22
AU1 TRACK IMPROVEMENT PROJECTS	23
6. CHECK RAIL CURVES, TOOWOOMBA & LITTLE LIVERPOOL RANGES	23
AU1 SIGNALLING PROJECTS	28
10. LEVEL CROSSING COMPLIANCE PROGRAM	28
11. SIEMENS AZ S 600 AXLE COUNTER REPLACEMENT	30
12. ATP ENCODER REPLACEMENT	32
AU1 WAYSIDE EQUIPMENT PROJECTS	34
13. CORRIDOR & ASSET PROTECTION STRATEGY	34
AU1 TELECOMMUNICATIONS PROJECTS	36
14. RADIOCOMMUNICATIONS STRATEGY	36
15. BACKBONE STRATEGY	38

Introduction

The current access undertaking, titled 'QR Network's Access Undertaking (2008) June 2010' (Temporary Undertaking), was assigned to Queensland Rail via a Transfer Notice on 1 July 2010 as part of the separation of QR Limited into Aurizon (formerly QR National) and Queensland Rail.

Queensland Rail has drafted its own access undertaking, titled 'Queensland Rail's Access Undertaking 1' (AU1), which is under consideration by the Queensland Competition Authority (QCA). As part of the development of AU1, Queensland Rail has undertaken to develop a reference tariff for the West Moreton System based on a building blocks approach. The reference tariff developed will "reset" the existing reference tariff that has applied under the Temporary Undertaking and is proposed to apply from 1 July 2013 to 30 June 2017.

The "opening asset value" building block utilises a Depreciated Optimised Replacement Cost (DORC) valuation with a datum date of 1 August 2007 and as such asset expenditure post this date will be treated as capital expenditure (capex) for building block purposes. This submission supports the "AU1 West Moreton Reference Tariff Reset Overall Submission" document and provides insight into capex undertaken and proposed to be undertaken on the West Moreton System (the rail corridor bounded by Rosewood to the east and Miles to the West).

This document separates capex into:

- Pre AU1 capex, carried out between 2007/2008 to 2012/2013; and
- AU1 capex, proposed to be carried out between 2013/2014 to 2016/2017 and corresponding to the term of the reference tariff reset.

For each project a distinction has been made for works performed between:

- Rosewood - Macalister and
- Macalister - Columboola

As well as whether the project solely facilitates coal traffic or provides benefits to all users of the West Moreton System.

Due to the difficulties of establishing building blocks for the Brisbane Metropolitan Area, Queensland Rail has proposed to apply the reference tariff derived from West Moreton building blocks to all coal carrying services originating in the West Moreton System through to the Port of Brisbane. Consequently no capital expenditure undertaken or proposed to be undertaken in the Brisbane Metropolitan Area is presented in this document.

Pre AU1 Capex (2007/08 to 2012/13)

The following tables and project summaries outline capex undertaken prior to the reference tariff reset period (August 2007 to June 2013). At the time of this submission the Jondaryan Track Upgrade and Columboola to Fisherman Islands projects have been completed, however the Western System Asset Replacement project is ongoing, with the 2012/13 amount representing forecasted expenditure, an amount that will be revised following the QCA's Draft Decision (post 2012/13 year-end).

Project expenditure is presented on both a cashflow and commissioned basis. Capitalised interest has been calculated at the regulatory weighted average cost of capital (WACC) applicable under the Temporary Undertaking (9.96%) and added to commissioned cashflow to derive the amounts to be added to respective Regulatory Asset Bases (RABs).

Pre AU1 Project List and Summary (excl. Capitalised Interest)

	Project Name	07/08 (\$'000)	08/09 (\$'000)	09/10 (\$'000)	10/11 (\$'000)	11/12 (\$'000)	12/13 (\$'000)	Total (\$'000)
1	Jondaryan Track Upgrade	9	1,685	11,397	198	0	0	13,289
2	Columboola to Fisherman Islands Project	90	2	15,698	16,274	4,434	990	37,488
3	Western System Asset Replacement	3,593	51	0	3,577	6,724	9,636	23,581
	Total Cost	3,692	1,738	27,095	20,049	11,158	10,626	74,358

Pre AU 1 Project List and Summary (incl. Capitalised Interest)

	Project Name	RAB: Rosewood – Macalister							RAB: Macalister – Columboola						
		07/08 (\$'000)	08/09 (\$'000)	09/10 (\$'000)	10/11 (\$'000)	11/12 (\$'000)	12/13 (\$'000)	Total (\$'000)	07/08 (\$'000)	08/09 (\$'000)	09/10 (\$'000)	10/11 (\$'000)	11/12 (\$'000)	12/13 (\$'000)	Total (\$'000)
1	Jondaryan Track Upgrade	9	1,769	11,965	208	0	0	13,951	0	0	0	0	0	0	0
2	Columboola to Fisherman Islands Project	0	0	0	18,540	2,448	547	21,535	0	0	0	16,719	2,207	492	19,418
3	Western System Asset Replacement	3,772	54	0	3,755	7,059	10,116	24,756	0	0	0	0	0	0	0
	Claimed	3,781	1,822	11,965	22,503	9,507	10,663	60,241	0	0	0	16,719	2,207	492	19,418

Pre AU1 Capacity Expansion Projects

1. Jondaryan Track Upgrade

Project Cost (\$'000): \$13,289 (excl. Capitalised Interest)

Timelines:

Construction: 2007/2008 to 2010/2011

Corridor	2007/08 (\$'000)	2008/09 (\$'000)	2009/10 (\$'000)	2010/11 (\$'000)	Total (\$'000)
Rosewood - Macalister	9	1,685	11,397	198	13,289

RAB	2007/08 (\$'000)	2008/09 (\$'000)	2009/10 (\$'000)	2010/11 (\$'000)	Total (\$'000)
Rosewood - Macalister	9	1,685	11,397	198	13,289
Capitalised Interest	0	84	568	10	662
Claimed	9	1,769	11,965	208	13,951

Description of Project and Benefits:

Project Scope:

Works completed as part of this project include:

Resleepering

- Gatton - Helidon with Low Profile Concrete Sleepers (98.360km - 114.118km)
- Air Force Straight with Standard Concrete Sleepers (115.925km - 117.492km)
- Western Line with Standard Concrete Sleepers (0.780km - 3.380km)

Welding Joints

- Gatton - Helidon
- Toowoomba - Jondaryan

Track Reconditioning (with 50kg Head Hardened Rail & Concrete Sleepers)

- Western Line 310m (4.265km - 4.575km)
- Curves <1000m radius on the Western Line between Gowrie to Kingsthorpe (2,000m in total at various locations between 9.500km - 10.930km and 12.484km - 19.140km)

Formation Stabilisation/Repairs

- Toowoomba to Jondaryan 2,850m (various between 0.830km - 1.960km and 14.600km - 27.900km)

Timber Rail Bridge Elimination (Replacement with Concrete Rail Bridge)

- Doctor's Creek at 41.740km (38m Length / 4 Spans)

Timber Rail Bridge Elimination (Replacement with Concrete Pipe Culverts)

- Air Force Straight at 117.230km (12m Length / 1500mm Diameter / 1 Barrel)
- Western Line at 20.840km (8m Length / 900mm Diameter / 1 Barrel)
- Western Line at 26.890km (8m Length / 900mm Diameter / 1 Barrel)
- Western Line at 28.410km (8m Length / 900mm Diameter / 1 Barrel)

- Western Line at 39.590km (8m Length / 900mm Diameter / 1 Barrel)

Project Benefits:

- The upgrade of existing assets to allow additional traffic to be hauled safely and efficiently
- New Hope Corporation is able to export additional tonnage from its New Acland mine
- Revenue growth in the coal business for Aurizon
- Demonstrates Queensland Rail's commitment to responding to customer needs

All Traffics / Coal Specific:

Works undertaken as part of this project were solely to facilitate the transport of an additional [REDACTED] tonnes per annum of coal from the New Acland mine to the Port of Brisbane.

Delivery Provider:

Works included in this project were completed internally by Queensland Rail except for the construction of the Doctors Creek Bridge which was outsourced to Neumann Contractors at a cost of \$1.255m.

Contact Officer:

Not Applicable.

2. Columboola to Fisherman Islands Project

Project Cost (\$'000): \$37,488 (excl. Capitalised Interest)*

*Capital expenditure claimed represents only the Rosewood to Columboola component of the entire project that was delivered at a total cost of \$53,093,000 – i.e. the balance represents expenditure incurred in the Brisbane Metropolitan Area.

Timelines:

Construction: 2007/2008 to 2012/2013

Corridor	2007/08 (\$'000)	2008/09 (\$'000)	2009/10 (\$'000)	2010/11 (\$'000)	2011/12 (\$'000)	2012/13 (\$'000)	Total (\$'000)
Rosewood - Macalister	47	1	8,255	8,557	2,332	521	19,713
Macalister - Columboola	43	1	7,443	7,717	2,102	469	17,775
Total Cost	90	2	15,698	16,274	4,434	990	37,488

RAB	2007/08 (\$'000)	2008/09 (\$'000)	2009/10 (\$'000)	2010/11 (\$'000)	2011/12 (\$'000)	2012/13 (\$'000)	Total (\$'000)
Rosewood - Macalister	0	0	0	16,860	2,332	521	19,713
Capitalised Interest	0	0	0	1,680	116	26	1,822
Claimed	0	0	0	18,540	2,448	547	21,535

RAB	2007/08 (\$'000)	2008/09 (\$'000)	2009/10 (\$'000)	2010/11 (\$'000)	2011/12 (\$'000)	2012/13 (\$'000)	Total (\$'000)
Macalister - Columboola	0	0	0	15,204	2,102	469	17,775
Capitalised Interest	0	0	0	1,515	105	23	1,643
Claimed	0	0	0	16,719	2,207	492	19,418

Description of Project and Benefits:

Project Scope:

This project involved the construction of the Columboola spur and balloon loop and mainline infrastructure works, enabling coal to be railed from the Cameby Downs mine (located near the township of Miles) to the Port of Brisbane. The scope of works carried out by Queensland Rail includes:

- Construction of a new spur and balloon loop at Columboola with civil works contracted out by Yancoal (formerly Syntech Resources)
- Design and installation of a weighbridge at Columboola including a concrete track slab
- Dragging equipment detectors at the balloon loop and at the mid-sections between Columboola and Rywung and between west of Gowrie and east of Macalister
- Relocation and upgrade of pedestrian crossing at Chinchilla
- 3km of formation stabilisation between Columboola and Macalister
- Passing loop extensions and upgrades at Rywung, Chinchilla and Warra
- Removal of grain passing loop at Columboola
- Track reconditioning
- Turnout replacement and upgrading

- Resleeping 25,000 concrete sleepers between Jondaryan and Toowoomba
- Resleeping every second sleeper for 21km between Rosewood and Helidon
- Welding rail joints between Jondaryan and the 137km point on the Western Line into 220m lengths
- Design, procurement, installation and commissioning of Train Loading Applications
- Telecommunications and signalling

Project Benefits

- The creation of new assets and the upgrade of existing assets to allow additional traffic to be hauled safely and efficiently
- Yancoal was able to develop its Cameby Downs mine
- Revenue growth in the coal business for Aurizon
- Demonstrates Queensland Rail's commitment to responding to customer needs

All Traffics / Coal Specific:

Works undertaken as part of this project were solely to facilitate the transport of ■■■ mtpa of coal from the Cameby Downs mine to the Port of Brisbane.

Delivery Provider:

All works were carried out internally by Queensland Rail with the exception of:

- Civil works for the Columboola spur and balloon loop - contracted out by Yancoal and handed over to Queensland Rail in November 2010 for track construction (approximately \$3m)
- Installation of the communications equipment room at Oakey – works carried out by ICS Industries (approximately \$70,000)
- Installation of detection equipment – works carried out by Signal & System Technik (approximately \$300,000)

Contact Officer:

Project Manager.

Pre AU1 Asset Renewal Projects

3. Western System Asset Replacement

Project Cost (\$'000): \$23,581 (excl. Capitalised Interest)

This project commenced in 2006/07 and will continue until 2015/16. The total project cost is estimated to be \$40,976,000 – note that \$1,832,000 of this amount was spent in 2006/07 and will not be claimed in this submission as it is already included in the opening asset value.

Timelines:

Construction: 2006/07 to 2015/16

Corridor	2007/08 (\$'000)	2008/09 (\$'000)	2009/10 (\$'000)	2010/11 (\$'000)	2011/12 (\$'000)	2012/13 (\$'000)	Total (\$'000)
Track Reconditioning	3.635km		0km	3.419km	5.589km	7.607km	20.250km
Turnout Replacements	6		0	1	6	2	15
Rosewood - Macalister	3,593	51	0	3,577	6,724	9,636	23,581

RAB	2007/08 (\$'000)	2008/09 (\$'000)	2009/10 (\$'000)	2010/11 (\$'000)	2011/12 (\$'000)	2012/13 (\$'000)	Total (\$'000)
Rosewood - Macalister	3,593	51	0	3,577	6,724	9,636	23,581
Capitalised Interest	179	3	0	178	335	480	1,175
Claimed	3,772	54	0	3,755	7,059	10,116	24,756

Description of Project and Benefits:

Project Scope:

The objective of this project was to improve reliability and increase the longevity of the West Moreton System. This involved the upgrade of 23.925km of track to 50kg rail on concrete sleepers (includes 2006/07 works) and the replacement of 15 turnouts, upgrading them to 60kg steel on concrete sleepers.

Project Benefits:

- Improve the reliability of track through a reduction in track under speed restriction and below rail delays
- Reduces the likelihood of broken rail derailments, thereby improving safety
- Reduces exposure to service defects which require shutdowns to remove defective rail and expensive welding in and match grinding of the inserted closure rails
- Reduces maintenance requirements in inspections, resurfacing and grinding

All Traffics / Coal Specific:

The works that comprised this project were undertaken specifically to benefit coal carrying customers on the West Moreton System.

Delivery Provider:

All works undertaken have been delivered by internal Queensland Rail resources.

Contact Officer:

Project Manager.

AU1 Proposed Capex (2013/14 to 2016/17)

Outlined below are the project scopes and estimates that make up the capital program for the West Moreton System for the period July 2013 to June 2017. The scope has been developed collaboratively by the West Moreton Asset Manager as well as local and regional strategic engineering personnel. It is supported by the Transportation Technology Center of the Association of American Railways November 2010 West Moreton Coal Corridor Evaluation and the June 2012 Regional Engineering West Moreton Rail Strategy report. It aims to improve the system by reducing risks of infrastructure failures and extensive maintenance interventions.

The West Moreton System was constructed in the 1870's and sits on a black soil plain, a substrate that is notoriously porous. This has a significant impact on the capital works required to maintain optimal track condition as high soil porosity results in the creation of voids beneath the track which causes formation to fail and fall through. These failures are required to be rebuilt to enable good track geometry as well as avoiding excessive resurfacing and ballast undercutting exercises which serve to decrease the availability of the system. In addition the flooding of early 2011 created instability around cuttings and access roads throughout the Toowoomba range, increasing the ongoing capital requirements.

The following is proposed with respect to track:

- The replacement of failing 41kg rail in the more heavily used corridors
- The removal of rail joints which are major points of deterioration on substandard formation throughout the system
- The rehabilitation of contaminated ballast
- The gradual removal of timber sleepers from the system

To achieve this it is proposed to relay 7.16km of check rail curves on the Toowoomba and Little Liverpool Ranges and 4km of track between Oakey and Jondaryan. Worn and defect prone 41kg rail is to be replaced with 50kg rail between Rosewood and Helidon (2.5km) and Toowoomba and Oakey (1.5km).

The scope includes the elimination and strengthening of the 13 most problematic timber bridges and flood openings. An attempt must be made to progressively upgrade the remaining bridges to reduce risk exposure to extensive maintenance interventions, increasing labour cost and loss of timber expertise.

Assumptions used in determining the asset replacement strategy for the West Moreton System over the four year period include:

- 15 million gross tonnes maximum per year for the 4 years;
- 1 x 48hr closure per month;
- 2 x 12hr closures per month (Sunday & Monday), Jondaryan - Rosewood possessions;
- 1 x 12hr closure per month (Sunday), Jondaryan - Rosewood possessions;
- 15.75 tonne axle load;
- Speed of 60km/hr down road (loaded train to Fisherman Islands) and speed of 80km/hr up road (unloaded train to mine).
- A reference train comprised of 2 x 90 tonne locomotives plus 41 coal wagons; and
- Staffing levels constant until the capital program delivers less maintenance intensive infrastructure.

The capex projects forecast to be undertaken during the AU1 period that are presented in this document have been subject to an internal peer review process. In addition to this consultant WorleyParsons has been engaged by Queensland Rail to undertake a review of the capital program to ensure that it is prudent, robust and appropriate for the traffic task.

Similar to pre AU1 projects, expenditure is presented on both a cashflow and commissioned basis. Capitalised interest has been calculated at an estimated regulatory WACC of 6.93% although Queensland Rail will revise this component of its capital expenditure claim when the Authority sets the regulatory WACC for the AU1 period.

AU1 Project List and Estimate Summary (excl. Capitalised Interest)

	Project Name	13/14 (\$'000)	14/15 (\$'000)	15/16 (\$'000)	16/17 (\$'000)	Total (\$'000)
1	Slope Stabilisation on Toowoomba Range	1,040	2,163	2,250	2,340	7,793
2	Formation Repairs	3,120	3,245	3,375	3,510	13,250
3	Timber Bridge Strengthen and Elimination	4,011	3,648	1,125	1,720	10,504
4	Replace Timber and Steel Bridges with Reinforced Concrete Box Culverts	597	632	1,073	220	2,522
5	Drain Renewals	515	0	0	0	515
6	Check Rails Curves (6.105km Toowoomba Range & 1.055km Little Liverpool Range)	2,878	2,993	3,112	3,237	12,220
7	Relay Program (4km Oakey - Jondaryan)	0	0	1,147	3,580	4,727
8	Rerailing Program (2.5km Rosewood - Helidon & 1.5km Toowoomba - Oakey)	0	0	0	1,872	1,872
9	Western System Asset Replacement	7,818	3,461	4,284	0	15,563
10	Level Crossing Compliance Program	0	0	675	1,755	2,430
11	Siemens AZ S 600 Axle Counter Replacement	198	617	641	667	2,123
12	ATP Encoder Replacement	0	503	523	544	1,570
13	Corridor and Asset Protection Strategy	312	757	0	0	1,069
14	Radiocommunications Strategy	260	595	1,237	397	2,489
15	Backbone Strategy	291	0	0	0	291
	Total Cost	21,040	18,614	19,442	19,842	78,938

AU1 Project List and Estimate Summary (incl. Capitalised Interest)

	Project Name	RAB: Rosewood – Macalister					RAB: Macalister – Columboola				
		13/14 (\$'000)	14/15 (\$'000)	15/16 (\$'000)	16/17 (\$'000)	Total (\$'000)	13/14 (\$'000)	14/15 (\$'000)	15/16 (\$'000)	16/17 (\$'000)	Total (\$'000)
1	Slope Stabilisation on Toowoomba Range	1,076	2,238	2,328	2,421	8,063	0	0	0	0	0
2	Formation Repairs	2,798	2,909	3,026	3,147	11,881	430	448	466	484	1,828
3	Timber Bridge Strengthening and Elimination	4,150	3,774	1,164	0	9,088	0	0	0	1,780	1,780
4	Replace Timber and Steel Bridges with Reinforced Concrete Box Culverts	618	654	1,110	0	2,382	0	0	0	228	228
5	Drain Renewals	533	0	0	0	533	0	0	0	0	0
6	Check Rails Curves (6.105km Toowoomba Range & 1.055km Little Liverpool Range)	2,978	3,097	3,220	3,349	12,643	0	0	0	0	0
7	Relay Program (4km Oakey - Jondaryan)	0	0	1,187	3,704	4,891	0	0	0	0	0
8	Rerailing Program (2.5km Rosewood - Helidon & 1.5km Toowoomba - Oakey)	0	0	0	1,937	1,937	0	0	0	0	0
9	Western System Asset Replacement	8,089	3,581	4,432	0	16,102	0	0	0	0	0
10	Level Crossing Compliance Program	0	0	0	1,816	1,816	0	0	698	0	698
11	Siemens AZ S 600 Axle Counter Replacement	205	638	663	690	2,197	0	0	0	0	0
12	ATP Encoder Replacement	0	520	541	563	1,624	0	0	0	0	0
13	Corridor and Asset Protection Strategy	323	783	0	0	1,106	0	0	0	0	0
14	Radiocommunications Strategy	192	441	917	295	1,845	77	175	363	116	730
15	Backbone Strategy	216	0	0	0	216	85	0	0	0	85
	Claimed	21,177	18,636	18,589	17,922	76,324	592	623	1,527	2,607	5,349

AU1 Civil Projects

1. Slope Stabilisation on Toowoomba Range

Project Cost (\$'000): \$7,793 (excl. Capitalised Interest)

Timelines:

Planning: 2012/13
Construction: 2013/14 to 2018/19

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Toowoomba	1,040	2,163	2,250	2,340	7,793

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	1,040	2,163	2,250	2,340	7,793
Capitalised Interest	36	75	78	81	270
Claimed	1,076	2,238	2,328	2,421	8,063

Description of Project and Benefits:

Project Scope:

This project involves monitoring and repairing locations along the length of the Toowoomba Range particularly locations where access roads are showing signs of movement through longitudinal tension cracking. Works will include the stabilisation of high and steep slopes directly adjacent to the access road and rail corridor through the installation of rock walls, widening of vehicular access road, and removal of mud holes¹ beneath the track structure. Site inspections were conducted with Golders Associates, whose continued advice forms the basis of this project scope. This work program is expected to continue past 2016/17.

Project Benefits:

Reduced risk of major landslips during inclement weather with the benefits of avoiding such landslips including (but not limited to):

- Reduced risk of derailments, and associated injuries
- Reduced risk of service delays and/or lost revenue
- Reduced risk of access road failure, and associated potential injuries, vehicle damage, and productivity losses due to lack of site access
- Implementing slope stabilisation as a preventative measure will result in better long term outcomes for users of the West Moreton System

¹ There are two main types of mud holes as defined in the ARTC, ETH-10-01 Mud hole Management Guideline, 2011:

- Fouled ballast mud holes: In severely fouled ballast, the sleeper will be surrounded by mud that retains a pool of water (or sloppy mud) around the individual sleepers. This puddle can be "perched" around the sleeper with dryer ballast beneath. Alternatively the mud can extend down to a solid formation (this often occurs when there is inadequate ballast depth above a rock formation). In both cases the problem is fouled ballast. The resulting geometry faults are often short sharp faults.

- Soft formation: On soft formation, the track overall becomes wavy with repeat faults. There may however be a single fault and it is generally longer and gentler than for the fouled ballast mud hole. The single soft formation fault is often referred to as a ballast pocket. The formation outside the toe of the ballast may be soft and muddy to walk on. In severe cases the shoulders of the formation may "heave" outside the toe of the ballast, as the track sinks.

All Traffics / Coal Specific:

The works that comprise this project will be undertaken to benefit all users of the West Moreton System.

Delivery Provider:

Work for this project will be undertaken by an external contractor managed by Queensland Rail.

Contact Officer:

Manager Engineering and Regional Services West.

Image 1: Fouled ballast type mud hole



Source: (ARTC, ETH-10-01 Mud hole Management Guideline, 2011)

2. Formation Repairs

Project Cost (\$'000): \$13,250 (excl. Capitalised Interest)

Timelines:

Planning: 2013
Construction: 2013 to 2023

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	2,704	2,812	2,925	3,042	11,483
Macalister - Columboola	416	433	450	468	1,767
Total Cost	3,120	3,245	3,375	3,510	13,250

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	2,704	2,812	2,925	3,042	11,483
Capitalised Interest	94	97	101	105	398
Claimed	2,798	2,909	3,026	3,147	11,881

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Macalister - Columboola	416	433	450	468	1,767
Capitalised Interest	14	15	16	16	61
Claimed	430	448	466	484	1,828

Description of Project and Benefits:

Project Scope:

Repairing formation failure², mud holes and ballast pockets³ throughout the West Moreton System. A provision of 5km per year has been allowed at an estimated cost of \$600,000/km (\$2012/13). Currently within Queensland Rail's RIMS database there is approximately 13.8km of formation requiring attention with priorities ranging between three months to three years. It is forecasted that 5km per year will ensure defect growth is less than repair works. This work program is expected to continue past 2016/17.

Corridor	2013/14 Metres	2014/15 Metres	2015/16 Metres	2016/17 Metres	Total Metres
Rosewood - Toowoomba	2,400	2,400	2,400	2,400	9,600
Toowoomba - Jondaryan	500	500	500	500	2,000
Jondaryan - Dalby	1,500	1,500	1,500	1,500	6,000

² Formation failure: A situation where the geometry of the track is poor or below the minimum engineering standard.

³ Ballast pocket: Occurs when the formation is full of compacted ballast which restricts water from draining out, holding moisture which leads to the creation of clay holes (formation failure) or mud holes.

Corridor	2013/14 Metres	2014/15 Metres	2015/16 Metres	2016/17 Metres	Total Metres
Dalby - Macalister	200	200	200	200	800
Macalister - Columboola	400	400	400	400	1,600
Total Metres	5,000	5,000	5,000	5,000	20,000
Total Cost (\$'000)	3,120	3,245	3,375	3,510	13,250

Project Benefits:

Reduces ballast contamination as well as top and line deterioration⁴ which causes speed restrictions and ultimately derailments.

All Traffics / Coal Specific:

The works that comprise this project will be undertaken specifically to benefit coal carrying customers on the West Moreton System.

Delivery Provider:

Queensland Rail will remove and replace rail assets as well as manage formwork rehabilitation undertaken by an external contractor.

Contact Officer:

Manager Engineering and Regional Services West.

Image 2: Poor formation on the West Moreton System



⁴ Top and line: Vertical and horizontal positioning of the track structure (used interchangeably with geometry).

3. Timber Bridge Strengthening and Elimination

Project Cost (\$'000): \$10,504 (excl. Capitalised Interest)

Timelines:

Planning: 2013 to 2017
Construction: 2013 to 2017

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	4,011	3,648	1,125	0	8,784
Macalister - Columboola	0	0	0	1,720	1,720
Total Cost	4,011	3,648	1,125	1,720	10,504

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	4,011	3,648	1,125	0	8,784
Capitalised Interest	139	126	39	0	304
Claimed	4,150	3,774	1,164	0	9,088

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Macalister - Columboola	0	0	0	1,720	1,720
Capitalised Interest	0	0	0	60	60
Claimed	0	0	0	1,780	1,780

Description of Project and Benefits:

Project Scope:

Upgrade or elimination of six timber bridges on the coal corridor between Rosewood and Columboola by either bridge strengthening or concrete culverts. Reinstatement of associated trackwork is included and to minimize this requirement, bridges are to be designed on current alignment where practicable.

Timing	Location	Name	Cost (\$'000)	Comment
2013/14	84.000km ML Both Bridges	-	4,011	Leaning piers, trains pushing piers over, temporary support. Replace with culverts.
2014/15	83.190km ML Both Bridges	-	3,648	Leaning piers, trains pushing piers over. Replace with culverts.
2015/16	30.680km WL	Oakey Creek	1,125	Has two girder work and non-standard piers. Strengthen bridge with extra girder and double headstocks.
2016/17	164.350km WL	Charley's Creek	1,720	Has two girder works. Strengthen bridge with extra girder and double headstocks.
	Total Cost		10,504	

Project Benefits:

- Reduces maintenance costs associated with component degradation/replacement and detailed inspections
- Reduces exposure to old technology and labour intensive practices
- Reduces exposure to defect and work related speed restrictions on bridges and their approaches

All Traffics / Coal Specific:

The works that comprise this project will be undertaken specifically to benefit coal carrying customers on the West Moreton System. The project would otherwise not be required to be delivered within the four year AU1 period.

Delivery Provider:

An external contractor under the management of Queensland Rail will be engaged to complete this project except for the track work which will be undertaken by Queensland Rail.

Contact Officer:

Manager Engineering and Regional Services West.

Image 3: Bridge to be replaced at the 84km mark



4. Replace Timber and Steel Bridges with Reinforced Concrete Box Culverts on the Coal Corridor

Project Cost (\$'000): \$2,522 (excl. Capitalised Interest)

Timelines:

Planning: 2013
Construction: 2013 to 2017

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	597	632	1,073	0	2,302
Macalister - Columboola	0	0	0	220	220
Total Cost	597	632	1,073	220	2,522

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	597	632	1,073	0	2,302
Capitalised Interest	21	22	37	0	80
Claimed	618	654	1,110	0	2,382

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Macalister - Columboola	0	0	0	220	220
Capitalised Interest	0	0	0	8	8
Claimed	0	0	0	228	228

Description of Project and Benefits:

Project Scope:

This project involves the replacement of seven timber/steel bridges and flood openings with reinforced concrete box culverts between Rosewood and Columboola. Priorities are based on the condition and residual structural capacity of the existing structures. The works include replacement of former bank end material, installation of new cover material with compacted selected geosynthetic reinforced soil and reinstatement of open track work.

Structures to be replaced are as follows:

Timing	Location	Km	Existing Structure	Description of Work	Cost (\$'000)
2013/14	Rosewood to Helidon Up Road	83.930km	Steel - Flood Opening	Replace with RCBC	298
2013/14	Rosewood to Helidon Down Road	83.930km	Steel - Flood Opening	Replace with RCBC	298
2014/15	Jondaryan to Dalby	63.040km	Timber Bridge	Replace with RCBC	632
2015/16	Jondaryan to Dalby	46.900km	Timber Bridge	Replace with RCBC	657

Timing	Location	Km	Existing Structure	Description of Work	Cost (\$'000)
2015/16	Jondaryan to Dalby	47.410km	Timber Bridge	Replace with RCBC	416
2016/17	Macalister to Columboola	111.380km	Steel - Flood Opening	Replace with RCBC	110
2016/17	Macalister to Columboola	113.190km	Steel - Flood Opening	Replace with RCBC	110
	Total Cost				2,522

Project Benefits:

- Reduces the risks associated with working on bridges and of damage during major flooding events and bush fires
- Reduces costs associated with inspections and maintenance and eliminates labour intensive work practices
- Reduces exposure to defect and work related speed restrictions

All Traffics / Coal Specific:

The works that comprise this project will be undertaken specifically to benefit coal carrying customers on the West Moreton System. The project would otherwise not be required to be delivered within the four year AU1 period.

Delivery Provider:

An external contractor under the management of Queensland Rail will be engaged to complete this project except for the track work which will be undertaken by Queensland Rail.

Contact Officer:

Manager Engineering and Regional Services West.

5. Drain Renewals

Project Cost (\$'000): \$515 (excl. Capitalised Interest)

Timelines:

Planning: 2013
Construction: 2013/14

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	515	0	0	0	515

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	515	0	0	0	515
Capitalised Interest	18	0	0	0	18
Claimed	533	0	0	0	533

Description of Project and Benefits:

Project Scope:

Replacing drains affected by calcium chloride reaction in priority order. Three drains require replacement on the following corridors:

- 2 x drain Rosewood to Grandchester (\$330,000) at Up and Down Main Line 60.140km
- 1 x drain Oakey to Dalby (\$165,000) at Western Line 63.910km

Project Benefits:

Replacing drains affected by calcium chloride reaction will reduce the risk of culvert failure which would result in transit time delays and/or derailments. There will also be a corresponding reduction in costs associated with the inspection and maintenance of this asset.

All Traffics / Coal Specific:

The works that comprise this project will be undertaken to benefit all users of the West Moreton System.

Delivery Provider:

An external contractor under the management of Queensland Rail will be engaged to complete this project except for the track work which will be undertaken by Queensland Rail.

Contact Officer:

Manager Engineering and Regional Services West.

AU1 Track Improvement Projects

6. Check Rail Curves, Toowoomba and Little Liverpool Ranges

Project Cost (\$'000): \$12,220 (excl. Capitalised Interest)

Timelines:

Planning: 2012/13 to 2014/15
Construction: 2013/14 to 2017/18

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Toowoomba	2,878	2,993	3,112	3,237	12,220

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	2,878	2,993	3,112	3,237	12,220
Capitalised Interest	100	104	108	112	423
Claimed	2,978	3,097	3,220	3,349	12,643

Description of Project and Benefits:

Project Scope:

8.949kms of timber sleepered check rail curves on the Toowoomba (7.895km) and Little Liverpool (1.055km) Ranges are planned to be relayed. The relay will provide new 50kg head hardened rail and 33C1 check rail on an inclined boltless check rail baseplate on concrete sleepers and fresh ballast. The track is to be installed on a designed and monumented alignment at a stress free neutral temperature of 38 degrees celcius. The first four years will involve the replacement of 7.160km (1.79km per year) of checkrail curves with the remainder programmed for replacement in 2017/18.

Formation is to be repaired as a part of the relay where and as required. High cesses⁵ are to be graded throughout to ensure formation drainage unless concentration to a single point of protected flow is required.

Project Benefits:

- Improves reliability of this heavily used section, hence reducing derailment likelihood
- Improves track geometry and reduces speed restrictions to safeguard running times
- Improves track stability and reduces significant creep to limit pull aparts and buckles
- Reduces the occurrence of rail defects, exposure to traffic delays and broken rail derailments
- Significantly reduces the maintenance required to replace broken check rail bolts and to realign track moving under down hill breaking coal traffic
- Reduces future maintenance requirements and interventions such as inspections, formation repair, resurfacing and rail repairs, not only saving labour but improving trackside safety

⁵ Cesses: The area along either side of a railroad track which is kept at a lower level than the sleeper bottom, in order to provide drainage.

All Traffics / Coal Specific:

The works that comprise this project will be undertaken specifically to benefit coal carrying customers on the West Moreton System.

Delivery Provider:

Queensland Rail will perform the majority of the work associated with this project with some use of external contractors for earthworks and crane hire.

Contact Officer:

Manager Engineering and Regional Services West.

7. Relay Program (Oakey - Jondaryan)

Project Cost (\$'000): \$4,727 (excl. Capitalised Interest)

Timelines:

Planning: 2013
Construction: 2015/16 to 2016/17

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Toowoomba - Jondaryan	0	0	1,147	3,580	4,727

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	0	0	1,147	3,580	4,727
Capitalised Interest	0	0	40	124	164
Claimed	0	0	1,187	3,704	4,891

Description of Project and Benefits:

Project Scope:

Selected portions of the Oakey to Jondaryan section are to be re-laid with 50kg rail on full depth concrete sleepers and 200mm of fresh ballast. It will include track being installed to a designed and monumented alignment at a stress free neutral temperature of 38 degrees celcius. This targeted 4km relay will address areas where high maintenance is being experienced, including multiple resurfacing events, rail defect propergating and high wear. A provision has been made to reconstruct 2km of failed formation as part of the relay operation. High shoulders and cesses⁶ are to be graded throughout to ensure formation drainage. This work program is expected to continue beyond 2016/17.

Project Benefits:

- Improves reliability of this heavily used section, hence reducing derailment likelihood
- Improves track geometry, track stability and reduces significant creep to limit pull aparts and buckles
- Reduces the occurrence of rail defects and exposure to traffic interruptions and broken rail derailments
- Reduces future maintenance requirements and interventions such as inspections, formation repair, resurfacing and rail repairs, not only saving labour but improving trackside safety

All Traffics / Coal Specific:

The works that comprise this project will be undertaken specifically to benefit coal carrying customers on the West Moreton System.

Delivery Provider:

Queensland Rail will perform the majority of the work associated with this project with limited use of external contractors for earthworks and crane hire.

Contact Officer:

Manager Engineering and Regional Services West.

⁶ Cesses: The area along either side of a railroad track which is kept at a lower level than the sleeper bottom, in order to provide drainage.

8. Rerailing Program

Project Cost (\$'000): \$1,872 (excl. Capitalised Interest)

Timelines:

Planning: 2013
Construction: 2015/16 to 2018/19

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Toowoomba	0	0	0	1,170	1,170
Toowoomba - Jondaryan	0	0	0	702	702
Total Cost	0	0	0	1,872	1,872

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	0	0	0	1,872	1,872
Capitalised Interest	0	0	0	65	65
Claimed	0	0	0	1,937	1,937

Description of Project and Benefits:

Project Scope:

Replacement in the higher tonnage corridors of 41kg rail which is showing increased susceptibility as rail wears, fatigue cycles accumulate and the defect discovery rate increases. In conjunction with the rerailing operation, track is to be installed on a monumented designed alignment with rail at a stress free neutral temperature of 38 degrees. The project scope is to replace 41kg rail with 50kg rail on 2.5km of existing low profile concrete sleepers between Rosewood and Helidon and 1.5km of concrete sleepers between Toowoomba and Oakey.

Project Benefits

- Reduces the likelihood of broken rail derailments
- Reduces exposure to service defects which require shutdowns to remove defective rail and expensive welding in and match grinding of the inserted closure rails
- Reduces maintenance requirements including inspections, resurfacing and grinding
- Improves the safety and reliability of the track

All Traffics / Coal Specific:

The works that comprise this project will be undertaken specifically to benefit coal carrying customers on the West Moreton System.

Delivery Provider:

Queensland Rail will perform the majority of the work associated with this project with limited use of external contractors for earthworks and crane hire.

Contact Officer:

Manager Engineering and Regional Services West, Asset Planning Coordinator.

9. Western System Asset Replacement

Project Cost (\$'000): \$15,563 (excl. Capitalised Interest)

This project commenced in 2006/07 and will continue until 2015/16. The total project cost is estimated to be \$40,976,000 – note that \$1,832,000 of this amount was spent in 2006/07 and will not be claimed in this submission as it is already included in the opening asset value.

Timelines:

Planning: 2013
Construction: 2006/07 to 2015/16

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	7,818	3,461	4,284	0	15,563

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	7,818	3,461	4,284	0	15,563
Capitalised Interest	271	120	148	0	539
Claimed	8,089	3,581	4,432	0	16,102

Description of Project and Benefits:

Project Scope:

This project involves the upgrade of 13.597km of track and 16 turnouts. Track will be upgraded to 50kg rail on concrete sleepers with 200mm of ballast and turnouts will be upgraded to 60kg turnouts on concrete bearers with angles ranging from 1:8.25 to 1:12.

Project Benefits:

- Improve the reliability of the track
- Reduces the likelihood of broken rail derailments
- Reduces exposure to service defects which require shutdowns to remove defective rail and expensive welding in and match grinding of the inserted closure rails
- Improves safety
- Reduces maintenance requirements in inspections, resurfacing and grinding

All Traffics / Coal Specific:

The works that comprise this project will be undertaken specifically to benefit coal carrying customers on the West Moreton System.

Delivery Provider:

Queensland Rail will perform the majority of the work associated with this project with some use of external contractors for earthworks and crane hire.

Contact Officer:

Project Manager.

AU1 Signalling Projects

10. Level Crossing Compliance Program

Project Cost (\$'000): \$2,430 (excl. Capitalised Interest)

Timelines:

Planning: 2013
Construction: 2015/16 to 2016/17

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Toowoomba - Macalister	0	0	0	1,755	1,755
Macalister - Columboola	0	0	675	0	675
Total Cost	0	0	675	1,755	2,430

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	0	0	0	1,755	1,755
Capitalised Interest	0	0	0	61	61
Claimed	0	0	0	1,816	1,816

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Macalister - Columboola	0	0	675	0	675
Capitalised Interest	0	0	23	0	23
Claimed	0	0	698	0	698

Description of Project and Benefits:

Project Scope:

All public level crossings were reviewed using the Australian Level Crossing Assessment Model (ALCAM) and for compliance with AS 1742 Part 7. There are three crossings that do not comply with both the ALCAM assessment reports and AS 1742 Part 7. These crossings require upgrading from passive protection to flashing lights and boom gates.

Timing	ID & Location	Km	Current Controls	Proposed Controls	Cost (\$'000)
2015/16	ID1789 Taylor St Warra Western Line	127.740km	Passive	Flashing Lights & Boom Gates	675
2016/17	ID2315 Malu Quarry Access Rd Malu Western Line	48.760km	Passive	Flashing Lights & Boom Gates	1,053
2016/17	ID2438 Macalister / Bell Road Macalister Western Line	107.700km	Passive	Flashing Lights & Boom Gates	702
	Total Cost				2,430

Project Benefits:

- To bring the remaining level crossings into compliance with the ALCAM assessment reports and AS 1742 Part 7
- Improve the safety and reliability of the rail network with flow on safety benefits for road users
- Reduced near miss occurrences and accidents and to improve trackside safety

All Traffics / Coal Specific:

The works that comprise this project will be undertaken to benefit all users of the West Moreton System.

Delivery Provider:

Work for this project will be undertaken by an external contractor managed by Queensland Rail.

Contact Officer:

Project Manager.

11. Siemens AZ S 600 Axle Counter Replacement

Project Cost (\$'000): \$2,123 (excl. Capitalised Interest)

Timelines:

Planning: 2013
Construction: 2013/14 to 2016/17

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Toowoomba	198	617	641	667	2,123

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	198	617	641	667	2,123
Capitalised Interest	7	21	22	23	74
Claimed	205	638	663	690	2,197

Description of Project and Benefits:

Project Scope:

The West Moreton System (Rosewood to Toowoomba) operates under the safeworking system of Remote Controlled Signalling (RCS). The axle counters are part of the RCS and provide the train detection function. The axle counters count the number of axles in and out of a block section to ensure that the train departing the section did not leave any wagons within the section. The axle counters also provide the vital signalling controls and indications between the ends of each section with the interlocking of the next section's starting signal.

The axle counters used are Siemens AZ S 600's which were installed during the late 1980s and early 1990s. These axle counters are no longer manufactured or repaired by Siemens. Queensland Rail has purchased a limited number of spares for the Siemens AZ S 600 but these will run out in the next few years. It is proposed to replace axle counters with the latest Siemens model. The scope will include the design, purchase, installation, testing and commissioning of Siemens 350U axle counters to replace Siemens AZ S 600 axle counters and block solar fed track circuits.

Timing	Location	Road	Cost (\$'000)
2013/14	Spring Bluff - Rangeview	Single	198
2014/15	Holmes - Spring Bluff	Single	206
2014/15	Murphy's Creek - Holmes	Single	206
2014/15	Lockyer - Murphy's Creek	Single	206
2015/16	Grantham - Helidon	Up & Down	427
2015/16 & 2016/17	Gatton - Grantham	Up & Down	436
2016/17	Forest Hill - Gatton	Up & Down	445

Timing	Location	Road	Cost (\$'000)
	Total Cost		2,123

Project Benefits:

- Improved reliability of the signalling system in the West Moreton System.

All Traffics / Coal Specific:

The works that comprise this project will be undertaken to benefit all users of the West Moreton System.

Delivery Provider:

Work for this project will be undertaken by an external contractor managed by Queensland Rail.

Contact Officer:

Senior Signal Systems Engineer.

12. ATP Encoder Replacement

Project Cost (\$'000): \$1,570 (excl. Capitalised Interest)

Timelines:

Planning: 2013
Construction: 2014/15 to 2016/17

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Toowoomba	0	503	523	544	1,570

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	0	503	523	544	1,570
Capitalised Interest	0	17	18	19	54
Claimed	0	520	541	563	1,624

Description of Project and Benefits:

Project Scope:

Automatic Train Protection (ATP) is designed to improve train safety by ensuring the trains can only move when they have authority to do so. ATP is quite complex with multiple interfaces with operational and safety systems. This project is concerned with the trackside equipment of ATP. The ATP system interfaces to the trackside interlocking system and gathers information about the authorised direction of travel and route and sends this information to the onboard loco equipment via a radio transmitter.

The ATP interface to the interlocking system is called a Westect encoder. There is one encoder per interlocking and 2 radios per encoder. The Westect encoders were installed on the Western system from 1994 onwards. This equipment has a 15 year life and reached the end of its life expectancy in 2009. Additionally the Westect VLM encoder is no longer supported by the manufacturer. The VLM cards require computers to be running a DOS operating system to reliably program the data EPROM's. This legacy means that it is increasingly difficult to make updates to the ATP system to support track and speed changes. The Westect encoders need to be replaced.

The Westect encoders send information to radio equipment to transmit movement authorities to onboard loco equipment. Similar to the encoders, this radio equipment (supplied by Tait and Motorola) has a 15 to 20 year life and reached the end of its life expectancy in 2009. The radio equipment also needs to be replaced.

The objective of this project is to replace life expired trackside ATP equipment with the current equivalent Westinghouse model at the following 15 sites:

Timing	Interlocking	Km	Cost (\$'000)
2014/15	Rosewood	56.000km	101
2014/15	Grandchester	69.000km	101

Timing	Interlocking	Km	Cost (\$'000)
2014/15	Yarongmulu	76.400km	101
2014/15	Laidley	85.500km	101
2014/15	Forrest Hill	87.900km	101
2015/16	Gatton	96.250km	105
2015/16	Grantham	106.000km	105
2015/16	Helidon	114.600km	105
2015/16	Lockyer	122.000km	105
2015/16	Murphys Creek	131.600km	105
2016/17	Holmes	139.500km	109
2016/17	Spring Bluff	146.300km	109
2016/17	Rangeview	155.700km	109
2016/17	Toowoomba	161.000km	109
2016/17	Willowburn	3.600km	109
	Total Cost		1,570

Project Benefits:

- Improved reliability of ATP resulting in reduced maintenance costs
- Reduced false triggering of ATP
- Improved on time running and subsequent train safety

All Traffics / Coal Specific:

The works that comprise this project will be undertaken to benefit all users of the West Moreton System.

Delivery Provider:

Work for this project will be undertaken by an external contractor managed by Queensland Rail.

Contact Officer:

Senior Signal Systems Engineer.

AU1 Wayside Equipment Projects

13. Corridor and Asset Protection Strategy

Project Cost (\$'000): \$1,069 (excl. Capitalised Interest)

Timelines:

Planning: 2013/14
Construction: 2013/14 to 2016/17

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Toowoomba - Macalister	312	757	0	0	1,069

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	312	757	0	0	1,069
Capitalised Interest	11	26	0	0	37
Claimed	323	783	0	0	1,106

Description of Project and Benefits:

Project Scope:

Install corridor asset protection systems to improve asset reliability.

This project includes two major deliverables:

- Deliverable 1: Field equipment/systems
- Deliverable 2: IAMPS, field equipment/systems integration into control

Wayside devices to include:

- Dragging Equipment Detector (DED)
- Hot Bearing Detectors (HBD) and Hot Wheel Detector (HWD)
- Cold Wheel Detectors (CWD)
- Wheel Impact Load Detectors (WILD)
- Overload & Imbalanced Load Detectors (OILD)
- Automatic Equipment Identification (AEI)
- Acoustic Bearing Detectors (ABD)

Wayside detection asset protection systems are used to identify mechanical defects and operational errors early and provide timely warnings to above and below operators of mechanical defects or operational errors on rolling stock that can adversely affect the rail infrastructure and subsequent operational effectiveness and safe running of services.

Early identification and intervention of operational and mechanical errors will reduce the risk of damage to the rail network and rolling stock. Examples of mechanical defects are dragging equipment, flat wheel defects, wheel bearing and brake failure. Examples of operational errors are the running of overloaded trains, imbalanced loads on wagons and over length trains on the network.

Implementation of strategically located wayside detection systems will allow network controllers and above and below rail operators to take a proactive approach to preventing

asset damage and ensuring rail safety. Additional benefits include the improvement in the reliability of existing infrastructure, a reduction in breakdown maintenance and improved on time running of trains through greater availability of the system.

It is proposed to upgrade the following 15 sites:

Site	Type	Proposed Location	Stopping Zones (approximate)		Closest Siding	
			UP	DOWN	UP	DOWN
PRIMARY INSTALLATIONS						
1	HBD HWD DED AEI	23.7km (Western)	23.7km to 26.7km	20.7km to 23.7km	6.4km, 701m length	3.7km, 687m length
2	HBD HWD DED AEI	~71km (Western)	71km to 74km	67.8km to 71km	3.3km, Blaxland 706m length	6.5km, Koomi 708m length
3	HBD HWD DED AEI	50km (Main)	52km to 53km	46.2km to 47km	19km (Grandchester)	8km (Wulkuraka)
4	HBD HWD DED ABD WILD AEI	~160.3km (Western)	161.6km to 163.2km	157.1km to 159.9km	3.2km, SWB siding 605m length	30.3km, Bidstrups Rd 645m length
SECONDARY INSTALLATIONS						
5	HBD HWD DED AEI	110.5km (Main)	110.5km to 113km	107.5km To 110.5km	11km, Lockyer 669m length	42km, Grandchester 708m length
6	HBD HWD AEI	52.5km (Western)	52.5km to 55.5km	49.8km to 52.5km	4km, Bowenville 678m length	3.3km, Malu 700m length
7	HBD HWD AEI	124.3km (Western)	124.3km to 127km	121km to 124.3km	22.4km, Warra 758m length	16.6km, Macalister 700m length

Project Benefits:

- Optimise and maximise corridor asset protection for rail operations
- Optimise the equipment systems used to maximise its effects to our long term business objectives
- Rationalise the systems and site locations wherever possible to maximise the benefits of centralisation
- Improved trackside safety due to reduced breakdown maintenance
- Improved reliability of rail operations resulting in improved on time running

All Traffics / Coal Specific:

The works that comprise this project will be undertaken specifically to benefit coal carrying customers on the West Moreton System.

Delivery Provider:

Work for this project will be undertaken by an external contractor managed by Queensland Rail.

Contact Officer:

Technology Manager.

AU1 Telecommunications Projects

14. Radiocommunications Strategy

Project Cost (\$'000): \$2,489 (excl. Capitalised Interest)

Timelines:

Planning: 2013/14
Construction: 2014/15 to 2016/17

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	186	426	886	285	1,783
Macalister - Columboola	74	169	351	112	706
Total Cost	260	595	1,237	397	2,489

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	186	426	886	285	1,783
Capitalised Interest	6	15	31	10	62
Claimed	192	441	917	295	1,845

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Macalister - Columboola	74	169	351	112	706
Capitalised Interest	3	6	12	4	24
Claimed	77	175	363	116	730

Description of Project and Benefits:

Project Scope:

The current Train Control Radiocommunications (TCR) and Maintenance Supervisory Radiocommunications (MSR) systems consist of a network of radio base stations and links throughout the Queensland Rail network. The base station, link and rolling stock equipment operate on 25 kHz wideband channels in the 400 MHz band. The systems are based on analogue technology and are end of life and need replacement. The same systems are installed across all of Queensland Rail's South East Queensland and regional rail networks as well as Aurizon's Central Queensland Coal Network.

Recently the Australian Communications and Media Authority (ACMA) have announced the following changes to the 400 MHz band:

- Mandatory migration to 12.5 kHz narrowband operation by 31 December 2012 in high density areas (high density areas are defined by the ACMA and essentially encompass the South East Queensland region)
- Migration to the nationally harmonised Rail Industry Only (RIO) band by 31 December 2015 in high density areas and adjacent low density areas within 100 kilometres

- Migration to the nationally harmonised Rail Industry Only (RIO) band by 31 December 2018 in low density areas which encompass all regional areas in Queensland

There are several concerns around these changes:

- Migration to narrowband requires replacement of all base station and rolling stock radio equipment as the current equipment is not capable of narrowband operation
- Migration to the RIO band requires staged introduction of the new channel plan and may require parallel operation of base station equipment
- Replacement of equipment is a significant undertaking and cannot be carried out in this short timeframe. Through the Australasian Rail Association (ARA), Queensland Rail together with other jurisdictions are in discussions with the ACMA and Queensland Government to seek an extension to this tight deadline
- The RIO allocation of 32 channels is likely to be insufficient to support all rail industries' (Queensland Rail, Aurizon and Pacific National) current and future needs

This project will replace end of life and non-compliant safety critical operational rail radiocommunications infrastructure including base equipment at radio sites and associated UHF links. If existing radiocommunications systems are not replaced then Queensland Rail is likely to lose functionality and coverage of its existing systems. Gradual degradation of mobile communications systems are likely to be caused by interference and in the worst of cases licences to operate the radio systems could be withdrawn making continued use illegal under applicable Federal ACTs – the Radiocommunications Act 1992 and the Telecommunications Act 1997.

This project includes three major deliverables:

- Deliverable 1: TCR
- Deliverable 2: MSR
- Deliverable 3: Link radio replacement to support TCR, MSR and Enterprise Asset Management System (EAMS) field equipment/systems integration into Network Control Centres

Project Benefits:

- Maintain availability of existing TCR, MSR and asset monitoring capability
- Ensure compliance with ACMA regulations
- Provide backhaul links for centralised monitoring of proposed Corridor & Asset Protection Strategy field equipment
- Minimise potential impact on rail network capacity, efficiency and safety
- Contribute to improved reliability of rail operations resulting in improved on time running

All Traffic / Coal Specific:

The works that comprise this project will be undertaken to benefit all users of the West Moreton System.

Delivery Provider:

Work for this project will be undertaken by an external contractor managed by Queensland Rail.

Contact Officer:

Technology Manager.

15. Backbone Strategy

Project Cost (\$'000): \$291 (excl. Capitalised Interest)

Timelines:

Planning: 2013/14
Construction: 2013/14

Corridor	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Toowoomba - Macalister	209	0	0	0	209
Macalister - Columboola	82	0	0	0	82
Total Cost	291	0	0	0	291

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Rosewood - Macalister	209	0	0	0	209
Capitalised Interest	7	0	0	0	7
Claimed	216	0	0	0	216

RAB	2013/14 (\$'000)	2014/15 (\$'000)	2015/16 (\$'000)	2016/17 (\$'000)	Total (\$'000)
Macalister - Columboola	82	0	0	0	82
Capitalised Interest	3	0	0	0	3
Claimed	85	0	0	0	85

Description of Project and Benefits:

Project Scope:

LEDR subrate link radios provide linking communications for such services as TCR, signalling telemetry and asset monitoring and protection systems.

This project will replace radio links at various locations throughout this rail network to maintain asset availability and improve asset reliability. These radio links provide point to point connectivity to support operational communications to remote sites where a copper or fibre cable connection and carrier derived services are not cost effective or available.

This project includes two major deliverables:

- Deliverable 1: Replace Toowoomba Range life expired link radios
- Deliverable 2: Replace Toowoomba to Miles life expired link radios

Implementation of this strategy will ensure network controllers have continued access to TCR for the West Moreton System, signalling telemetry on the Toowoomba Range, a level crossing monitoring system, a flood height monitoring system as well as facilitating communications for the field equipment to be installed as part of the proposed Corridor & Asset Protection Strategy to aid efficient and safe rail operations.

Project Benefits:

- Maintain availability of existing backhaul links for operational communications
- Provide backhaul links for centralised monitoring of proposed Corridor and Asset Protection Strategy field equipment
- Improved rail operations safety and efficiency due to continued availability of TCR
- Improved reliability of rail operations resulting in improved on time running

All Traffics / Coal Specific:

The works that comprise this project will be undertaken to benefit all users of the West Moreton System.

Delivery Provider:

Work for this project will be undertaken by an external contractor managed by Queensland Rail.

Contact Officer:

Technology Manager.