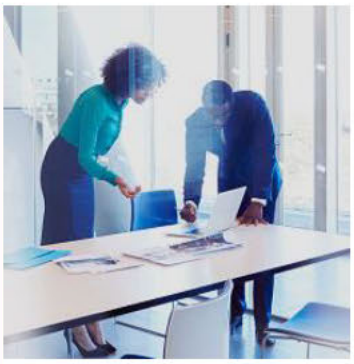
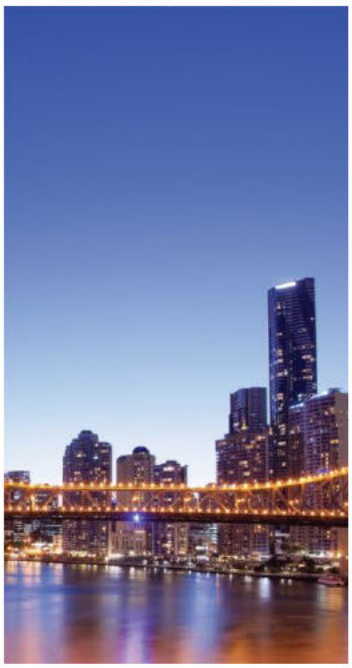
Attachment 4: GHD Peer Review of West Moreton System DAU2 Capital Expenditure 2020-21 to 2024-25

GHD Advisory





Peer review of Queensland Rail's proposed capital expenditure for DAU2

Queensland Rail

13 July 2018

GHD

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Executive summary

Queensland Rail has engaged GHD (we/us) to assess the prudency and efficiency of proposed capital works for the West Moreton system from 2020-21 (FY2021) to FY2025, captured in Queensland Rail's Draft Access Undertaking 2 (DAU2) proposal to the Queensland Competition Authority (QCA). The DAU2 proposal requires forecast of capital costs for the following scenarios:

- [redacted] (mtpa) scenario, where only Yancoal's mine at Cameby Downs (Columboola) operates
- [redacted] scenario, where Yancoal's mine and New Hope's expansion at the New Acland mine (Jondaryan) comes online.

Queensland Rail's proposal for these two scenarios involves 25 capital projects. In agreement with Queensland Rail, we adopted a sampling approach for our assessment. The principles that we adopted for selecting the sample capital projects are as follows:

- At least 60% of total capital-expenditure costs are covered.
- All projects that increase in value because of the throughput increase from [redacted] to [redacted] are included in the sample.
- The project sample should, where practicable, attempt to cover the four broad categories of: civil projects; track improvement projects; signalling projects; and telecommunications projects.
- Some of the selected capital projects should have a relationship with Queensland Rail's proposed maintenance-expenditure plans (e.g. if a timber bridge upgrade program is completed during DAU2, then we would expect a reduction in maintenance costs of 'repairs timber bridges' (B06)).

Based on these principles, and in agreement with Queensland Rail, we selected the following six capital projects, which represent at least 62% of proposed capital costs over the DAU2 period and a 50/50 mix of throughput-driven and throughput-independent projects:

- Formation Repairs
- Track Reconditioning
- Re-railing
- Timber Bridge Upgrades
- Re-sleepering
- West Moreton Minor Signalling Renewals.

Scope

We have reviewed Queensland Rail's notifications register and 2016-17 asset management plan (AMP), which are Queensland Rail's key documents for shaping its planned capital works for DAU2. We also undertook a site visit (5-6 June 2018) of the West Moreton system to familiarise ourselves with the main issues affecting Queensland Rail's track infrastructure. Based on the documentation and our site visit, we consider the scopes that Queensland Rail has proposed for the five civil-related projects to be prudent.

We consider that there may be justification for more work to be undertaken during the DAU2 period that Queensland Rail proposes to bring the network up to a satisfactory condition[1]; this is particularly the case in relation to work for Track Reconditioning, Formation Repairs and Re-sleepering. Our position has been informed in a substantive way by our site visit, where we observed, among other things, deteriorated formation in certain locations, excessive track vertical movement, mud holes and vegetation in track beds. The section of infrastructure requiring most attention in relation to these issues is the eastern part of the Toowoomba Range (within Rosewood to Jondaryan).

Considering the above, we have not recommended amending the scope of works proposed for the six capital projects. In our view, there is unlikely to be a case to reduce the work scopes.

Unit rate

We have reviewed the unit rates proposed for five of the six sampled capital projects[2]. The assessment of the composition and quantum of the unit rates underlying the five projects is central to our analysis of the efficiency of Queensland Rail's capital expenditure proposal. Our underlying assumption has been that the unit rates that Queensland Rail has achieved over the last three years (where available) result in efficient costs. We consider this an appropriate assumption because our analysis revealed that the costs of consumables (e.g. rail, sleepers and ballast) reflect very competitive prices, based on our internal and external benchmarking, and that labour costs are in keeping with Queensland Rail's relevant wage-related agreements with staff members.

In each of the sections where we review the first five capital projects, we evaluate the proposed unit job cost largely against the historical unit rate achieved by Queensland Rail in West Moreton network. Then we evaluate the price of the key components of each historical project category against the industry normal practice and our in-house rates. We consider the unit rates proposed for all the five sampled capital projects to be efficient. (We also consider the proposed total expenditure for West Moreton Minor Signal Renewals as efficient.)

Other key observation

We note that Queensland Rail has demonstrated that it has strong buying power in relation to the purchase of rail, sleepers and ballast. When we undertook our benchmarking of unit rates achieved for these three items, we observed that Queensland Rail would often achieve unit rates that were at least [redacted] lower than indicated by our in-house database and our experience with industry. In this context, we consider it appropriate to acknowledge that Queensland Rail has used its dominant position of a provider of below-rail services in Queensland to seek economies of scale in its purchasing decisions of materials.

[1] A network that meets the service standards (e.g. average sectional running times) that have been agreed to with access holders via the signed access agreements.

[2] We could not review the unit rates for the West Moreton Minor Signalling Renewals project because the cost of works is not based on a product of scope and unit rate, but rather than overall cost figure for several minor projects.

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This report, which is a peer review of Queensland Rail's proposed costs for the DAU2 period, has been prepared in the context that Queensland Rail's submission is being provided as a response to an economic-regulation process.

1. Introduction

Queensland Rail has engaged GHD (we/us) to undertake a peer review of its proposed capital expenditure for the DAU2 period, covering FY2020-21 (FY2021) to FY2025. This peer review includes:

- Identifying efficient costs for the forecast capital tasks, noting the throughput scenarios to be considered are for [redacted] (mtpa) and [redacted]
- Undertaking a comparative analysis, where relevant, of the proposed cost forecast with a suitable rail system and/or corridor to demonstrate that costs are appropriate

Our peer review acknowledges that Queensland Rail's proposed capital expenditure for the DAU2 period will be subject to review and adjustment by the Queensland Competition Authority (QCA) and its consultants in the QCA's draft decision on the DAU2. Hence, our assessment has been undertaken in the context of an economic-regulation expenditure review.

1. 1 Queensland Rail's proposal

Queensland Rail has proposed to undertake 25 capital projects over DAU2 (see Table 1).

The projects are categorised as: (a) civil projects; (b) track improvement projects; (c) signalling projects; and (d) telecommunication projects. Of the 25 projects, only three of the projects are dependent on the throughput scenario selection. These are Formation Repairs, Track Reconditioning, and Re-railing.

Table 1: Queensland Rail's proposed capital projects for DAU2

Section in Queensland Rail's submission	Project Name	Dependent on forecast throughput?	Qld Rail Regulatory Driver
4.1	Timber Bridge Upgrades	No	Asset Renewal
4.2	Formation Repairs	Yes	Asset Renewal
4.3	Culvert Replacement	No	Asset Renewal
5.1	Track Reconditioning	Yes	Asset Renewal
5.2	Re-sleepering	No	Asset Renewal
5.3	Re-railing	Yes	Asset Renewal
5.4	Level Crossing Reconditioning	No	Asset Renewal
5.5	Concrete Sleepers With Gauge Issues On Tight Radius Curves	No	Asset Renewal
5.6	Level Crossing Transitions	No	Asset Renewal
5.7	Greasers Replacement / Upgrades	No	Asset Renewal
6.1	Trailable Facing Points Detection (Monitoring)	No	Service Improvement
6.2	West Moreton Minor Signalling Renewals	No	Asset Renewal / Compliance
6.3	Signalling Pole Route Yarongmulu - Laidley	No	Asset Renewal

Section in Queensland Rail's submission	Project Name	Dependent on forecast throughput?	Qld Rail Regulatory Driver
6.4	Level Crossing Signalling Upgrade	No	Asset Renewal / Compliance
6.5	Location Case Renewal	No	Asset Renewal / Compliance
6.6	Rangeview SER/PER Upgrade	No	Asset Renewal
6.7	Signalling LED Upgrade	No	Asset Renewal
6.8	Gatton Interlocking Renewal	No	Asset Renewal
6.9	Relay Interlocking Refurbishments - WM	No	Asset Renewal
7.1	Replacement of Weather Stations	No	Asset Renewal
7.2	RMS Rollout - West Moreton	No	Asset Renewal / Compliance
7.3	Telecoms Rectifiers Regional	No	Asset Renewal / Compliance
7.4	Digital Telemetry Rollout - West Moreton	No	Asset Renewal / Compliance
7.5	Rangeview Cable Route Upgrade Copper to Fibre	No	Asset Renewal
7.6	Nera Microwave Refresh	No	Asset Renewal

A summary of Queensland Rail's proposed capital expenditure, for each throughput scenario, is presented in Table 2.

Table 2: Queensland Rail's proposed capital expenditure ($M, $FY2018) over DAU2

Scenarios	FY2021	FY2022	FY2023	FY2024	FY2025	Total
[redacted]	33.7	28.6	25.2	24.3	23.4	**135.2**
[redacted]	35.5	30.8	29.1	26.7	27.1	**149.2**

Under the [redacted] scenario, total proposed expenditure is $135.2 million ($FY2018) over DAU2. In comparison, proposed expenditure is $149.2 million under the [redacted] scenario.

1. 2 Structure of our report

We have investigated Queensland Rail proposed capital expenditure for DAU2 for the sample of expenditure items to assess whether it is prudent and efficient. Our report is structured as follows:

- Approach for assessing prudency and efficiency (Chapter 2)
- Sampling approach (Chapter 3)
- Analysis for each sampled project (Chapters 4 to 9)

2. Approach for assessing prudency and efficiency

Our overarching approach for assessing prudency and efficiency recognises that Queensland Rail's expenditure proposal covers:

- A scenario in which only the Yancoal's Cameby Downs mine (at Columboola) operates
- A scenario in which the Yancoal mine and New Hope's New Acland Expansion (at Jondaryan) proceeds.

Therefore, our analysis considers Queensland Rail's proposed expenditure by dividing the capital activities according to the following sections:

- Rosewood to Jondaryan (R2J)
- Jondaryan to Columboola (J2C).

2. 1 Prudency

Prudency relates to whether a capital project is *needed*. What needs to be established is whether a project is required for Queensland Rail to deliver the below-rail declared service and what regulatory driver or drivers support that expenditure. Regulatory drivers include, for example:

- Meeting growth (typically driving capex in infrastructure expansion)
- Service improvement (usually requiring explicit or tacit customer approval and willingness to pay for such improvement, through an access agreement or system operating parameters that the entity has published)
- Renewal, replacement and refurbishment of assets to maintain foreseeably required capacity and conformance with performance standards in customers' access agreements
- Compliance with applicable legislation (e.g. for rail, Transport (Rail Safety) Act 2010 (Qld) (TRSA Act) and Transport (Rail Safety) Regulation 2010 (Qld) (TRSA Regulation), the Professional Engineers Act 2002 (Qld) and mandatory standards and operating licences)

Our assessment considers whether Queensland Rail's DAU2 proposal provides a clear link between the nominated capital project, the provision of the below-rail service and the relevant regulatory driver (also see Table 1).

2. 2 Efficiency

An efficient expenditure is one that is the most cost effective for delivering the required standard of service. This could relate to the option selected to meet the service requirement, the unit costs being used, the amount of materials and/or labour forecast to be used.

To assess whether a proposed capital expenditure is efficient, we would seek to consider whether the costs are:

- in keeping with the appropriate scope for the required task
- the least costs (taking into account asset lifecycle cost)
- in keeping with market rates

- comparable with industry benchmarks (taking into account locational and operating factors that may impact on costs)
- in keeping with those costs that an operator would have incurred, if it were subject to competitive pressures to retain market share. We note that this is a subjective assessment that requires engineering and commercial judgement.

Table 3 summarises what our prudency and efficiency tests cover, to the extent that the relevant data were available and could be reviewed in the required timeframes for the engagement with Queensland Rail.

Table 3: Summary of prudency and efficiency tests

Prudency		Efficiency	
Is the capital project needed?	Is the scope of works (e.g. distance of Re-railing) appropriate?	Do the cost rates for machines, equipment, labour and consumables reflect competitive outcomes?	Are machines, equipment and labour being used in an efficient manner?

2. 3 Capex-classification rules

In classifying its activities as capital expenditure or maintenance expenditure, Queensland Rail has regard to its *Capitalisation of expenditure* specification. An overview of the classification rules for property, plant and equipment expenditure is set out in Figure 1:

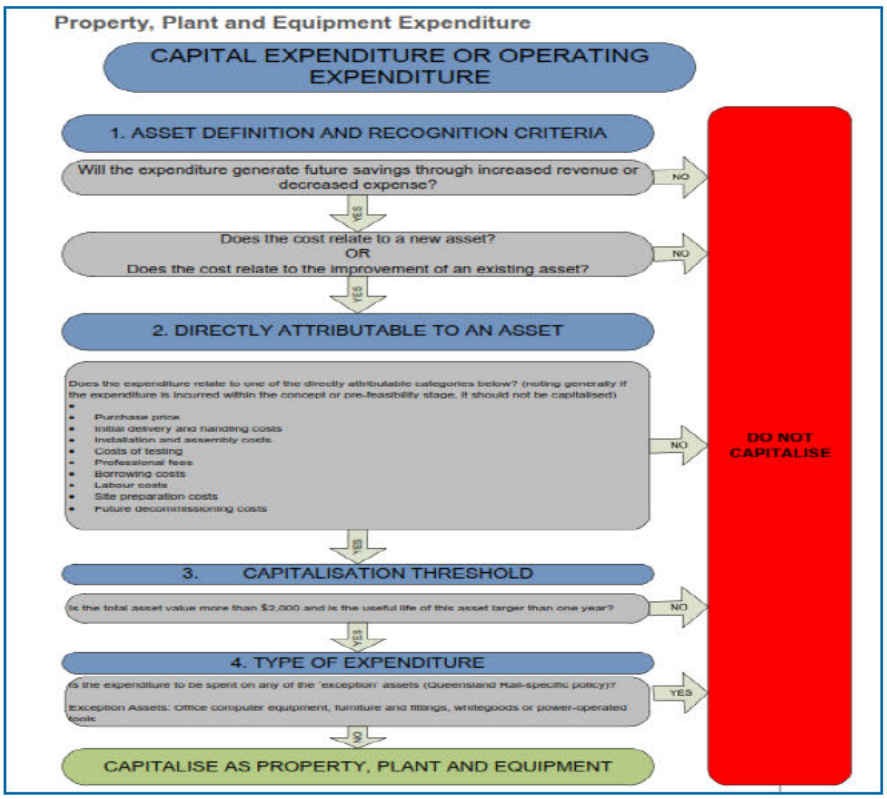

Figure 1: Queensland Rail's approach for classifying property, plant and equipment as capex/opex

Capital expenditure and operating expenditure (which includes maintenance expenditure) generate increased revenue for Queensland Rail under the DAU2 framework for the West Moreton tariff pricing. It is necessary therefore to test whether the expenditure relates to a new asset or to improving an existing asset.

Section 2.2.3.6 of the *Capitalisation of expenditure* specification outlines what Queensland Rail considers the term 'improve' to cover:

> *…expenditure on assets must be capitalised (i.e. added to the carrying amount of the asset) when it improves the condition of the asset beyond its originally assessed standard of performance or capacity. This can occur through:*
>
> - *An increase in the service potential provided by the asset; or*
> - *Increasing the useful life of the asset.*[3]

Hence, Queensland Rail's distinction between capital and operating expenditure in terms of expenditure in existing assets is predicated on whether the expenditure results in an increase in service standards and/or an increase in useful life.

Track rules

Section 2.2.3.3 of the specification sets out railway-track-specific rules for Queensland Rail:[4]

> *Where a section of track is replaced, the following rules apply:*
>
> - *Where an entire section of track is replaced, including all its components, the old track is disposed of and the replacement costs, including demolition costs, are to be capitalised.*
> - *Where only the dual rail lines are replaced, the replacement costs, including demolition costs are to be capitalised where the track is at least 110 metres in length. Any replacement costs of track shorter than 110 metres must be expensed as incurred and the existing track is not disposed of.*
> - *Where only a single rail line is replaced due to wear and tear, the entire costs of replacement are expensed as incurred. Where only the sleepers are upgraded resulting in increased track capacity, the sleepers are to be capitalised where the expenditure is part of a larger capital replacement program.*
> - *The existing sleepers must be disposed of and the demolition costs are to be capitalised. Upgrade includes replacing timber with steel or concrete, or replacing steel with concrete. There are no minimum track length requirements under these circumstances.*
> - *Where only the ballast is replaced or replenished, these costs are to be expensed as incurred.*

These rules were accounted for during our peer review.

3. Sampling approach

We have adopted a sampling approach to undertake a targeted and detailed review of some capital projects, rather than a preliminary review of all capital projects. The premise for undertaking this approach is to provide Queensland Rail firm and substantiated, rather than indicative, findings for the peer-review process.

[3] Page 20 of Queensland Rail's *Classification of expenditure* specification.

[4] Pages 16-17 of Queensland Rail's *Classification of expenditure* specification.

3. 1 Principles for selecting sample

The principles adopted for selecting the sample capital projects are as follows:

- At least 60% of total capital-expenditure costs are covered
- All capital projects that increase in value because of the throughput increase from [redacted] to [redacted] are included in the sample
- The capital project sample should, where practicable, attempt to cover the four broad categories of: civil projects; track improvement projects; signalling projects; and telecommunications projects
- Some of the selected capital projects should have a relationship with Queensland Rail's proposed maintenance-expenditure plans (e.g. if a timber bridge upgrade program is completed during DAU2, then we would expect a reduction in maintenance costs of 'repairs timber bridges' (B06)).

3. 2 Sample selected

Based on the principles above, and in agreement with Queensland Rail, we have selected six capital projects to review in this task (see Table 4). The sample covers at least 62% of DAU2 capital expenditure and reflects a 50/50 mix of throughput-driven and throughput-independent projects.

Table 4: GHD's capital-project sample

Section in Queensland Rail's submission	Project Name	Costs change when throughput increases from [redacted] to [redacted]
4.2	Formation Repairs	Yes
5.1	Track Reconditioning	Yes
5.3	Re-railing	Yes
4.1	Timber Bridge Upgrades	No
5.2	Re-sleepering	No
6.2	West Moreton Minor Signalling Renewals	No

Our detailed assessment of each of the six projects is provided in the following sections. For each of the projects, we set out the following:

- Recommendation, so that the reader is aware of our summary findings
- Project description, including setting out why the project is needed for the safe and reliable operation of the West Moreton below-rail infrastructure to meet contracted positions
- Queensland Rail's proposal, in terms of total costs and proposed scopes of work (e.g. km per annum of Formation Repairs)
- Prudency, in terms of whether the scopes reflect prudent expenditure
- Efficiency, in terms of whether the unit rates and total costs reflect efficient expenditure
- Key references for our analysis.

4. Formation Repairs

4. 1 Recommendation

We consider the proposed scopes for Queensland Rail's Formation Repairs program (5.1 km per annum for the [redacted] scenario, and 5.9 km per annum for the [redacted] scenario) over DAU2 to be prudent.

We consider that the unit rates adopted for the Formation Repairs program ([redacted] for the Rosewood to Jondaryan section, [redacted] for the Jondaryan to Columboola section) are efficient, and we have confidence in Queensland Rail's derivation of these rates. Our review was based on Queensland Rail's actual cost data over FY2016 to FY2018.

4. 2 Project description

Formation Repairs address failures in the track structure due to poor and/or below the minimum engineering standards (e.g. the Queensland Rail Civil Engineering Track Standards[5]). Poor formation condition, such as shown in Figure 2, causes uneven movement of the train which leads to increased deterioration of track and locomotive components over time, culminating in an increased probability of derailment. Formation repair scope of works includes the repair of formation deterioration and failure, mud holes and ballast pockets. Queensland Rail assesses and tracks network formation condition via a formation notification register (preventative). The repairs are then targeted towards segments of track which present as a high priority notification.

The repair scope of works typically involves preparation works of the track panel for removal, extraction of the track panel or long weld section to expose the ballast and formation, followed by excavation of the formation through to 600 – 700 mm below the ballast, reaching the subgrade level. The subgrade is prepared and engineered fill layers are placed, followed by placement and compaction of a capping layer and then ballasting. The track panel is then reinstated and connected by welding or jointing, and stressed accordingly. The track is then tamped and aligned.

[5] Queensland Rail Civil Engineering Track Standard MD-10-575, version 3.2, dated 11 November 1994

Figure 2: Areas in the West Moreton system needing Formation Repairs

During our site visit we observed that there are locations along the network where formation needs to be repaired or strengthened as per the example shown in Figure 2.

4. 3 Queensland Rail's proposal

Queensland Rail's expenditure proposal for the Formation Repairs program is articulated in Table 5.

Table 5: Queensland Rail's proposed expenditure for Formation Repairs ($000s, $FY2018)

Scenarios	FY2021	FY2022	FY2023	FY2024	FY2025	Total
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
R2J	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
J2C	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
R2J	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
J2C	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Under the [redacted] scenario, proposed expenditure is [redacted]. If throughput increases to [redacted] proposed annual expenditure lifts by [redacted] We note that Queensland Rail's expenditure proposal is based on the following unit rates:

- [redacted] (rounded) for the R2J section
- [redacted] (rounded) for the J2C section.

We used the proposed unit rate to derive the proposed distance of work by section, as set out in Table 6. The majority of works will be performed in the J2C section, while the scope of work in the R2J section is dependent on the tonnage being transported.

Table 6: Queensland Rail's proposed distances for Formation Repairs (km)

Scenarios	FY2021	FY2022	FY2023	FY2024	FY2025	Total
[redacted]	**5.1**	**5.1**	**5.1**	**5.1**	**5.1**	**25.5**
R2J	0.8	0.8	0.8	0.8	0.8	4.0
J2C	4.3	4.3	4.3	4.3	4.3	21.5
[redacted]	**5.9**	**5.9**	**5.9**	**5.9**	**5.9**	**29.5**
R2J	1.6	1.6	1.6	1.6	1.6	8.0
J2C	4.3	4.3	4.3	4.3	4.3	21.5

In the next subsection, we assess whether Queensland Rail's proposed scopes of work for the [redacted] scenario (5.1 km per year) and [redacted] scenario (5.9 km per year) reflect prudent decision making.

4. 4 Prudency

Our prudency review is based on information from notifications (or defects) data and on the condition of the formation observed during our site visit. Our review also accounted for factors such as the presence of expansive soils and the standard of construction of the railway (particularly with regards to compaction of material).

We investigated the notifications data for formation repairs as of February 2018. Out of the 87 line items, only one of these was prioritised as high (having a score of 3), four are moderate (having a score of 4), twenty three were classed as low (having a score of 5) and 56 are classified as very low (having a score of 6). This indicates that the formation repair work on the West Moreton network is suitably monitored and the formation is adequately maintained.

We understand that Queensland Rail's approach for scoping the works over the DAU2 period is similar to that for the AU1 period. Since the notifications data indicate that historical scopes of work demonstrate that the West Moreton network's formation is being suitably monitored, and the formation that has had work completed is being adequately maintained, we consider that Queensland Rail's proposed scopes for the DAU2 period, for both scenarios, are likely to yield similar outcomes.

4. 5 Efficiency

Queensland Rail has proposed the following unit rates for Formation Repairs work in the Rosewood-to-Jondaryan section and the Jondaryan-to-Columboola section separately:

- [redacted] (rounded) for the R2J section
- [redacted] (rounded) for the J2C section.

Our top-down review of costs, based on historical job costs reported for FY2016-FY2018 provided by Queensland Rail's contact officer[6], has resulted in the following average unit rates (real $FY2018 terms):

- [redacted] for the Rosewood-to-Jondaryan section
- [redacted] for the Jondaryan-to-Columboola section.

This provides us evidence of how the unit rates for the proposed costs are calculated. We therefore recommend using the unit rates that Queensland Rail has proposed for Formation Repairs work over DAU2 period.

To supplement our top-down analysis, we reviewed the cost components that contribute to the build-up of yearly annual costs (analysis undertaken in nominal terms):

- Out of 36 cost components in the formation-repairs capital project, the four components that contributed most to total costs over the FY2016 to FY2018 period are: hire charges for plant and machinery [redacted]; internal labour [redacted]; ballast [redacted] and miscellaneous permanent-way components (9%).
- We did not review the hire charges for plant and machinery (e.g. excavators, sucker trucks, impact wrenchers, and lighting towers) or permanent-way components (e.g. insulated pads, geogrids, fishbolts and screw dogs) because of the diverse nature of elements within these cost components. Analysing such data would not yield meaningful unit-rate results that we could reliably use for this peer review.
- We reviewed the unit rates for internal labour and ballast from FY2016 to FY2018:
    - Hourly labour rates were between [redacted] (Formation-repairs infrastructure worker) to [redacted] (Track maintenance supervisor).[7] We consider these rates reasonable based on our in house data for labour rates.
    - The current contract prices indicate the unit rate for ballast is between [redacted] This is consistent with the actuals data after converting the unit from per cubic metre to per tonne. We consider these rates to be reasonable.

Overall, the data on the cost components have not triggered the need for us to revisit our top-down analysis for formation repairs. In summary, we recommend the use of:

- [redacted] (rounded) for the R2J section
- [redacted] (rounded) for the J2C section.

We understand that Queensland Rail has elected to use [redacted] for the R2J section and [redacted] for the J2C section, which are lower rates than our recommended numbers.

4. 6 References

In undertaking our peer review of the costs of Formation Repairs project over DAU2, we reviewed the following documents:

[6] *2018 05 29 B.04613 Formation* spreadsheet, sent on 4 June 2018.

[7] The data show a maximum labour rate of $150/hr once for one hour of work. We consider this immaterial and have excluded it from the range.

- AU2 West Moreton Tariff Reset Capital Submission – July 2018
- Queensland Rail's Network Asset Management Plan – 2017/18
- Queensland Rail's Capitalisation of expenditure – June 2017
- AU1 West Moreton Reference Tariff Submission Review – September 2013
- West Moreton Reference Tariff 2015 DAU Appendix 3 – May 2015
- West Moreton System Information Pack – October 2016
- Queensland Rail's Western System Coal Tariffs – June 2014
- Queensland Rail documentation and tables – Assorted dates
- B&H Review of Queensland Rail West Moreton System for QCA – May 2014

5. Track Reconditioning

5. 1 Recommendation

We do not recommend any changes to Queensland Rail's proposed scope of works or costs for Track Reconditioning. We consider the scope being budgeted in the DAU2 proposal to be prudent. In addition, we consider the proposed unit rate of [redacted] ($FY2018), based on our analysis of Queensland Rail's historical data, to reflect efficient costs.

5. 2 Project description

Track reconditioning work in the West Moreton network involves reconstructing the formation and track. The scope of works involves:

- track deconstruction,
- formation reconstruction from the subgrade,
- replacement of fastenings, rail (41 kg/m to 50 kg/m) and sleepers,
- welding and stressing,
- tamping and resurfacing,
- quality components (NDT of welds, formation compactness etc.), and
- follow-up inspections as needed.

If Track Reconditioning is not undertaken when required, the risks of failure increase. Figure 3 shows an area scheduled for Track Reconditioning work in the near future. There are historical issues with track buckling on tight curves sections in hot summer months. These issues need to be addressed to reduce the risk of derailments, through increasing track structure strength.

Figure 3: Poor track conditions in parts of the West Moreton system

The subsection below outlines Queensland Rail's cost proposal for Track Reconditioning over the DAU2 period.

5. 3 Queensland Rail's proposal

Queensland Rail's cost proposal is set out in Table 7.

Table 7: Queensland Rail's proposed expenditure for Track Reconditioning ($000s, $FY2018)

Scenarios	FY2021	FY2022	FY2023	FY2024	FY2025	Total
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
R2J	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
J2C	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
R2J	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
J2C	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Under the [redacted] scenario, DAU2 expenditure is [redacted]. If throughput increases to [redacted] expenditure lifts [redacted] We note that Queensland Rail's cost proposal is based on a unit rate of [redacted] of track-reconditioning works. The scopes (kilometres of Track Reconditioning) to which Queensland Rail's cost proposal relates are set out in Table 8.

Table 8: Queensland Rail's proposed distances for Track Reconditioning (km)

Scenarios	FY2021	FY2022	FY2023	FY2024	FY2025	Total
[redacted]	**2.45**	**2.23**	**1.04**	**1.96**	**1.00**	**8.68**
R2J	2.45	0.00	0.00	0.00	0.00	2.45
J2C	0.00	2.23	1.04	1.96	1.00	6.23
[redacted]	**2.92**	**2.99**	**3.18**	**2.90**	**2.96**	**14.95**
R2J	2.92	0.76	2.14	2.90	0.00	8.72
J2C	0.00	2.23	1.04	0.00	2.96	6.23

5. 4 Prudency

Areas of Track Reconditioning are selected, in part, by defect notices that are reported in Queensland Rail's Enterprise Asset Management System (EAMS). The information in the defect notices is entered and complemented by engineering inspections, where Queensland Rail's staff review and confirm that rail, sleepers and ballast are in need of renewal. Locations for Track Reconditioning are then prioritised based on the condition and level of throughput over the rail (e.g. the main line is likely to get higher priority than a passing loop). Hence, a combination of defect information and engineering judgement informs Queensland Rail's plans for Track Reconditioning.

From our review of the EAMS data and observations during our site visit we consider that Queensland Rail's approaches for selecting the proposed scopes for the [redacted] and [redacted] scenario are appropriate. Hence, we consider Queensland Rail's proposed scopes to be prudent.

5. 5 Efficiency

Queensland Rail has proposed a unit rate of [redacted] ($FY2018) for Track Reconditioning. We undertook a top-down review of expenditure (analysis undertaken in real $FY2018 terms) as follows:

- Queensland Rail provided us with historical data (nominal terms) from FY2016 to FY2018.[8] All past Track Reconditioning jobs were undertaken on the Rosewood to Jondaryan section. We converted the historical data into real $FY2018 terms, calculated an average cost of the jobs completed in each year, and derived a total simple-average rate of [redacted] over the three-year period.[9]
- As Track Reconditioning is an activity that is performed regularly by Queensland Rail and, in our view, is quasi-maintenance in nature, we consider that Queensland Rail has the experience to estimate costs accurately. At the same time, we note that the Department of Transport and Main Road's (DTMR's) *Project Cost Estimating Manual* provides for a [redacted] contingency range for Development Phase Stage 2 design estimates (i.e. tenders based on final designs, construction specifications and project documentation).[10]
- Track Reconditioning is undertaken regularly by Queensland Rail and there is a robust understanding of the scope and costs of work. However, we consider a 10% increase on historic rates, taking into account in particular cost increases in materials (especially steel for rail) is reasonable. This would make an appropriate unit rate for the DAU2 period to be [redacted]

The [redacted] figure is consistent with Queensland Rail's proposal of [redacted]; hence, we consider Queensland Rail's proposed rate of [redacted] to be appropriate and efficient.

To test the veracity of our top-down analysis, we reviewed the cost components that contribute to the build-up of yearly annual costs (analysis for which was undertaken in nominal terms):

- Out of the 40 cost components in the track-reconditioning project, the five components that contribute most to total costs over the FY2016 to FY2018 period are: rail [redacted]; hire charges for plant and machinery [redacted]; labour [redacted]: sleepers [redacted] and ballast [redacted].
- As the track-reconditioning process covers numerous types of plant and machinery (e.g. wagon hire, lighting towers, bobcats), we did not seek to validate the reasonableness of the unit rates of 'hire charges for plant and machinery'.
- We assessed the unit rates for rail, labour, sleepers and ballast in FY2018:
  - Rates for 50-kg 110-metre standard-carbon (SC) and head-hardened (HH) rail were within [redacted] to [redacted] in FY2018. We note that this is less than the June 2018 contract prices of [redacted] (SS) to [redacted] (HH).[11] Thus, we do not consider the rates excessive.
  - Hourly labour rates were between [redacted] (support staff) to [redacted] (track maintenance supervisor). We consider these reasonable and in line with our in-house labour costs data.

[8] *2018 05 31 B.4471 & B.5171 Reconditioning* spreadsheet.

[9] In the data spreadsheet provided, a few FY2018 jobs were excluded from the sample as Queensland Rail marked them as 'not complete' or 'cost yet to settle'. We have also excluded four Oakey-Jondaryan Relay jobs as there was no length of completion recorded.

[10] See pages 45 and 130 of https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Project-cost-estimating-manual.aspx

[11] E-mail from Queensland Rail on 31 May 2018.

- Sleeper unit rates were [redacted] (CS CL1 CNT PAN 1067 25T) to [redacted] (ASS CS 47/50 LP CNT FAST 3W 20T). We do not consider these rates excessive given that they are in keeping with our in-house cost data.
- The current contract prices indicate the cost of ballast should be [redacted]. This is consistent with the actuals data after converting the unit from per cubic metre to per tonne. We consider these rates reasonable.

Queensland Rail also provided evidence that 41-kg 110-metre SC[12] rail ([redacted]il) was more costly than 50-kg rail, assuaging our concern that the [redacted] scenario would require Queensland Rail to demonstrate that reverting to 41-kg rail was an inappropriate and less cost-effective option than persisting with the move to 50-kg rail.

The data on the cost components has not triggered the need for us to revisit our top-down analysis for Track Reconditioning. Accordingly, we consider a unit rate of [redacted] ($FY2018) to be appropriate and efficient.

5. 6 References

We relied on the following information, provided by Queensland Rail, during our peer review:

- 2018 05 31 B.4471 _B.5171 Reconditioning

[12] HH 41-kg rail is not available.

6. Re-railing

6. 1 Recommendation

We consider the proposed scopes for the Re-railing program (i.e. metres per annum of Re-railing) to be prudent. We also consider the proposed unit rate for Re-railing program (i.e. [redacted]) to be efficient. This is based on us assessing the unit rate that Queensland Rail achieved in West Moreton network during FY2016-FY2018, and considering a reasonable adjustment. We discuss our review in detail in the following sub-sections.

6. 2 Project description

Re-railing constitutes the replacement of worn and defective rail in the West Moreton system. This activity is required to reduce the likelihood of delays and/or derailments caused by the defective rail. This activity also reduces instances of track requiring closing off for maintenance. Thus, Re-railing contributes to the safe and reliable operation of the network. Figure 4 shows an example of rail showing early signs of wear, as evidenced by the flattening of the running edge.

Figure 4: Worn rail in the West Moreton system

The network contains a mix of 41 kg/m and 50 kg/m rail, with 41 kg/m being historical and 50 kg/m used as the replacement that increases stability to the track structure. A discussion of this mix for the Rosewood-to-Toowoomba, Toowoomba-to-Jondaryan and Jondaryan-to-Columboola sections is provided below.

Rosewood to Toowoomba

The Rosewood-to-Toowoomba section, identified as the Main Line, is duplicated between Rosewood and Helidon with only Grandchester to Yarongmulu over the Little Liverpool Range being single track. The down track section is predominantly 50 kg/m rail with concrete sleepers as it mainly carries the loaded traffic, and

therefore is prioritised for upgrade. The up track is typically 41 kg/m rail with 1-in-2 interspersed steel and timber sleepers.

The Helidon to Toowoomba section is single track, with steep climbs up the Toowoomba Range, with five passing loops. It is predominantly 50 kg/m standard carbon rail or 50 kg/m head hardened rail; however, there are curved sections of 41 kg/m rail on the Toowoomba Range.

All concrete-sleepered track rails in the Rosewood-to-Toowoomba section are continuously welded. Non-concrete-sleepered track is in 110 m lengths (or 220 m lengths), except in check rail curves, where the rail is in 28 m lengths. The lower range loops are 41 kg/m rail and upper range loops are 50 kg/m rail.

Toowoomba to Jondaryan

The Western Line is predominantly tangent track with less than 9 km of curves. Toowoomba to Kingsthorpe is predominantly 50 kg/m Continuously Welded Rail (CWR) with small sections of 41 kg/m CWR. Kingsthorpe to Oakey is predominantly 41 kg/m Continuously Welded Rail (CWR). Oakey to Jondaryan is 50 kg/m rails on concrete sleepers.

Jondaryan to Columboola

Jondaryan to Columboola is predominantly 41 kg/m rail in either 110 m or 220 m lengths, with interspersed one in two steel and timber sleepers. The majority of the Jondaryan-to-Miles section is straight track with tight curves.

6. 3 Queensland Rail's proposal

Table 9: Queensland Rail's proposed expenditure for Re-railing ($000s, $FY2018)

Scenarios	FY2021	FY2022	FY2023	FY2024	FY2025	Total
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
R2J	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
J2C	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
R2J	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
J2C	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Under the [redacted] scenario, DAU2 expenditure is [redacted] If throughput increases to [redacted] expenditure lifts by [redacted] We note that Queensland Rail's expenditure proposal is based on a unit rate of [redacted] of Re-railing works. Queensland Rail's proposed scopes, in metres per annum, for Re-railing are set out in Table 10. We note that Re-railing is not planned to occur on the track west of Jondaryan, in either the [redacted] or [redacted] scenarios.

Table 10: Queensland Rail's proposed distances for Re-railing (metres)

Scenarios	FY2021	FY2022	FY2023	FY2024	FY2025	Total
[redacted]	**4,106**	**4,002**	**4,000**	**3,809**	**5,320**	**21,237**
R2J	4,106	4,002	4,000	3,809	5,320	21,237
J2C	-	-	-	-	-	-

Scenarios	FY2021	FY2022	FY2023	FY2024	FY2025	Total
[redacted]	**6,106**	**6,002**	**6,000**	**5,809**	**7,320**	**31,237**
R2J	6,106	6,002	6,000	5,809	7,320	31,237
J2C	-	-	-	-	-	-

Approximately 21.2 km of Re-railing is scheduled to occur in the [redacted] scenario over the five-year AU period, while the figure is 31.2 km for the [redacted] scenario. In the next subsection, we consider whether Queensland Rail's proposal reflects prudent decision making.

6. 4 Prudency

To determine the prudency of Queensland Rail's Re-railing process, we reviewed historical EAMS data. We understand from the data that no Re-railing was conducted in the FY2016 period, but that Re-railing of 4.6 km in the FY2017 period and 8.5 km in the FY2018 period (to date) has been performed. Over the three years, Queensland Rail has averaged about 4 km each year. Hence, there is a degree of confidence that Queensland Rail can attain the proposed scopes in the [redacted] scenario. As Queensland Rail has been able to attain more than 7.32 km of Re-railing work ([redacted] scenario peak in FY2025) in the current financial year, we consider it likely that Queensland Rail will have the resourcing in place to meet scope requirements under the [redacted] scenario.

During our site visit, we did not observe anything to suggested Queensland Rail's proposed scopes for the [redacted] or [redacted] scenario are excessive. Hence, we consider the scopes to be prudent.

Capitalisation of expenditure

Queensland Rail's *Capitalisation of expenditure* documentation provides that Re-railing in excess of 110 metres per job is classified as capital expenditure. We note that the minimum-distance Re-railing job that Queensland Rail is performing during the DAU2 period is 269 metres (see Figure 5).

FY	Corridor	Floc	Start km	End km	Length (km)
2021	Rosewood - Jondaryan	QR01-N-WM-C179-MNL	115.919	117.5	1.581
2021	Rosewood - Jondaryan	QR01-N-WM-C255-MNL	16.705	17.819	1.114
2021	Rosewood - Jondaryan	QR01-N-WM-C255-MNL	18.217	18.486	0.269
2021	Rosewood - Jondaryan	QR01-N-WM-C255-MNL	18.814	19.14	0.326
2021	Rosewood - Jondaryan	QR01-N-WM-C255-MNL	19.16	19.976	0.816
2022	Rosewood - Jondaryan	QR01-N-WM-C255-MNL	19.998	24	4.002
2023	Rosewood - Jondaryan	QR01-N-WM-C255-MNL	24	28	4
2024	Rosewood - Jondaryan	QR01-N-WM-C255-MNL	28	29.73	1.73
2024	Rosewood - Jondaryan	QR01-N-WM-C179-MNL	108.58	110.659	2.079
2025	Rosewood - Jondaryan	QR01-N-WM-C179-MNL	106.6	108	1.4
2025	Rosewood - Jondaryan	QR01-N-WM-C179-MNL	100.08	104	3.92

Figure 5: Queensland Rail's proposed Re-railing jobs over DAU2

Given the above information, we consider that Queensland Rail's proposal for Re-railing jobs represents capital works, not maintenance.

6. 5 Efficiency

We note that Queensland Rail has proposed a unit rate of [redacted] ($FY2018) for Re-railing during the DAU2 period. Our top-down review of costs (analysis undertaken in real $FY2018 terms) revealed the following:[13]

- Queensland Rail's historical data (nominal terms) covers FY2016 to FY2018. The data cover 13 completed Re-railing projects[14], involving 16.675 km of Re-railing over the three years.
- We first converted Queensland Rail's nominal-cost data into real $FY2018 terms. We then derived a weighted-average unit rate, based on distance, of [redacted].
- We understand that Queensland Rail considered that unit rates achieved in FY2018 would be lower than usual due to some of the Re-rerailing occurring within a 10-day track closure triggered by the Commonwealth Games.

Consistent with our approach for estimating a contingency allowance for Track Reconditioning, we consider a [redacted] increase to accommodate:

(a) the higher-than-usual efficiency that is not expected to take place during DAU2 period, and

(b) increases in material and labour costs,

to be appropriate to levy on the average rate. This lifts the unit rate from [redacted] to [redacted].[15]

On factor (b), we note that since steel prices have increased by approximately [redacted] between April 2017 and April 2018[16]. This supports our analysis that a Re-railing rate [redacted] higher than the historic rate can be deemed to be efficient.

To supplement our top-down analysis, we reviewed the cost components that contribute to the build-up of yearly annual costs (analysis undertaken in nominal terms) as follows:

Out of the 35 cost components in the Re-railing project, the two components that contributed most to total costs over the FY2016 to FY2018 period are: rail ([redacted]); and internal labour ([redacted]).

We assessed the unit rates for rail and labour as follows:

- Rates for 50 kg 110 metre SC and HH rail were within [redacted] to [redacted]. This is consistent with our analysis for rail costs (including for 41 kg 110 metre SC rail) in the track-reconditioning capital project, hence we consider the rates reasonable.
- Rates for 27.5 metre SC and HH rail were within the range of [redacted] to [redacted]. We consider this range to be reasonable and in keeping with our in-house cost data. However, we note that Queensland Rail's Capitalisation of Expenditure specification indicates that for capital works, the rail replacements will utilise long welded rail (LWR) (rail exceeding 110 metres). Queensland Rail has explained to us that during capital work in practice, 27.5 metre rail is used together with the 110 metre rail to meet various total length requirement. The 27.5 metre rails are also welded to longer rails when 110 metre rails are under-supplied. We suggest that Queensland Rail include this explanation in its DAU2 submission.

[13] *2018 05 28 B.04291 Rerailing Actual* spreadsheet.

[14] We note that all these projects were undertaken on the Rosewood-to-Jondaryan section only. Therefore we can only estimate a rate to be applied to both sections for the DAU2 period.

[15] See pages 45 and 130 of https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Project-cost-estimating-manual.aspx

[16] https://gensteel.com/steel-building-prices/forecast

- Hourly labour rates were within [redacted] (Re-railing infrastructure worker) to [redacted] (track maintenance supervisor). We consider these rates reasonable as they are in keeping with our internal database of labour rates.

In conclusion, data on the cost components have not triggered the need for us to revisit our top-down analysis. Hence, we consider that [redacted]/metre ($FY2018) reflects an efficient unit rate for Re-railing.

6. 6 References

We relied on the following information from Queensland Rail during our peer review of the Re-railing project:

- 2018 05 29 NDT Defects wrt Re-railing (*Excel* workbook)
- 2018 05 29 Broken Rail Defects wrt Re-railing (*Excel* workbook)
- 2018 05 28 B.04291 Rerailing Actuals (*Excel* workbook).

7. Timber Bridge Upgrades

7. 1 Recommendation

We consider the proposed scopes for the Timber Bridge Upgrade program (i.e. metres per annum of replacement) to be prudent. We have also assessed the unit rate of [redacted] ($FY2018) as efficient, based on our benchmarking of costs with ARTC's Inland Rail project and Queensland Rail's timber bridge replacements along the North Coast line. Accordingly, we consider Queensland Rail's proposed expenditure for timber bridge upgrade to be prudent and efficient.

7. 2 Project description

Queensland Rail is in the process of replacing its timber bridges in the West Moreton system, predominantly with prestressed concrete or steel. This is being undertaken to replace close-to-life-expired bridges with more durable infrastructure, to extend the life of the asset and better manage customers' requirements to avoid track speed restrictions (TSRs).

An example of a timber-bridge structure in the West Moreton system that is currently being replaced is depicted in Figure 6 below.

Figure 6: Timber-bridge structure in West Moreton system – failed girder (bearer)

Figure 7 shows a timber-bridge structure that has succumbed to poor conditions, as evidenced by the hollowed (rotten) nature of the timber cross beam (headstock) to the right hand side of the figure.

Figure 7: Timber-bridge structure in West Moreton system – support beams in poor condition

If the bridges are not replaced (or maintained) at the appropriate time, the risk of failure increases, which will undermine the safety of trains using the network.

Note that a key difference in the capital project over the DAU2 period, relative to the DAU1 process, is that Queensland Rail is seeking to reduce the loading requirements of bridges, namely by reducing the TAL requirements from 30 TAL to 20 TAL. This reflects Queensland Rail's view that the Inland Rail project requires Queensland Rail to be more conservative in its long-term expectations about whether throughput needs of the system will necessitate 30 TAL investments.

7. 3 Queensland Rail's proposal

Queensland Rail has proposed the following costs for Timber Bridge Upgrades (see Table 11).

Table 11: Queensland Rail's proposed expenditure for Timber Bridge Upgrades ($000s, $FY2018)

Scenarios	FY2021	FY2022	FY2023	FY2024	FY2025	Total
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
R2J	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
J2C	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

In total, Queensland Rail proposes to spend [redacted] over DAU, comprising [redacted] in the R2J corridor and [redacted] in the J2C corridor.

The scopes that accompany Queensland Rail's cost proposal are set out in Table 12. The total distance to be covered over DAU2 is 1,117 metres, with 457 metres for the R2J section and 661 metres for the J2C section.

Table 12: Queensland Rail's proposed scopes for Timber Bridge Upgrades (metres)

Scenarios	FY2021	FY2022	FY2023	FY2024	FY2025	Total
[redacted]	**213**	**209**	**224**	**211**	**259**	**1,117**
R2J	213	152	0	91	0	457
J2C	0	57	224	120	259	661

In the next subsection, we discuss our approach to assessing whether Queensland Rail's proposed Timber Bridge Upgrade program reflects prudent decision making.

7. 4 Prudency

In our opinion, the Timber Bridge Upgrade program is required because opting to maintain nearly life-expired bridges is more costly, in the long term, than replacing the structure with prestressed concrete and steel. Choosing to maintain rather than to replace the timber bridges would bring the following issues:

- It would impose frequent TSRs on train services
- Problem of retaining specialist tradesmen
- It requires detailed inspection
- Repair expense would be incurred every year.

Hence, we consider Queensland Rail's rationale for replacing timber bridges during the DAU2 period to be appropriate.

Queensland Rail has a large number of outstanding notifications on timber bridges, with girder wear and splitting being a major problem. In the FY2018 period, there were 75 new notifications and, in the FY2017 period, there were 176 new notifications for bridges. Although the vast majority of defects are low priority, the number of defects demonstrates the poor condition of the bridges. The number of notifications on a bridge and the tonnage over it are being used by Queensland Rail to determine which bridges need to be upgraded first. We undertook a site visit to verify whether Queensland Rail's approach of selecting the bridges for replacement was consistent with the asset condition of the bridges that we observed.

During our site visit, there was nothing to indicate that the selection of timber bridges to be replaced during the DAU2 period reflected inappropriate decision making by Queensland Rail. The bridges we observed were of relatively poor quality and, from our perspective, replacement over the DAU2 period is sensible and more appropriate than persisting with maintaining them. An overview of the bridges that Queensland Rail proposes to replace is set out in Figure 8 below.

FY	Corridor	Functional Loc.	Lin.Ref.Patte rn	Start Point	Description	BRIDGE LENGTH (m	Sum of Total
2020/21	Rosewood - Jondaryan	BRL_01140	C179	88.45	ML U/BRIDGE 88.460 DN RD	30.5	[redacted]
		BRL_01141	C179	88.45	ML U/BRIDGE 88.460 UP RD	30.5	
		BRL_01147	C179	106.02	ML U/BRIDGE 106.060 UP RD	79.3	
		BRL_01148	C179	106.02	ML U/BRIDGE 106.060 DN RD	72.8	
2020/21 Total							
2021/22	Rosewood - Jondaryan	BRL_01105	C179	56.59	ML U/BRIDGE 56.600 DN RD	28	
		BRL_01106	C179	56.59	ML U/BRIDGE 56.600 UP RD	28.7	
		BRL_01109	C179	57.83	ML U/BRIDGE 57.840 DN RD	29	
		BRL_01110	C179	57.83	ML U/BRIDGE 57.840 UP RD	29.9	
		BRL_01115	C179	59.22	ML U/BRIDGE 59.230 UP RD	18.3	
		BRL_01116					
	Jondaryan - Macalister	BRL_02386	C257	106.24	WL U/BRIDGE 106.250	20.8	
	Macalister - Columboola	BRL_02408	C258	161.458	WL U/BRIDGE 161.460	4.6	
		BRL_02415	C258	168.71	WL U/BRIDGE 168.720	13.5	
		BRL_02422	C258	186.618	WL U/BRIDGE 186.620	4.5	
		BRL_02423	C258	189.42	WL U/BRIDGE 189.430	13.8	
2021/22 Total							
2022/23	Jondaryan - Macalister	BRL_02387	C257	106.48	WL U/BRIDGE 106.520 JIMBOUR CRK	86	
	Macalister - Columboola	BRL_02390	C258	114.64	WL U/BRIDGE 114.690 BROADMEAD	91.9	
		BRL_02395	C258	128.72	WL U/BRIDGE 128.740	46	
2022/23 Total							
2023/24	Rosewood - Jondaryan	BRL_01111	C179	58.16	ML U/BRIDGE 58.170 DN RD	21.9	
		BRL_01112	C179	58.16	ML U/BRIDGE 58.170 UP RD	21.9	
		BRL_01113	C179	58.93	ML U/BRIDGE 58.940 DN RD	23.7	
		BRL_01114	C179	58.93	ML U/BRIDGE 58.940 UP RD	23.7	
	Jondaryan - Macalister	BRL_02383	C257	87.17	WL U/BRIDGE 87.200	67.5	
	Macalister - Columboola	BRL_02402	C258	144.77	WL U/BRIDGE 144.780	26.3	
		BRL_02421	C258	186.09	WL U/BRIDGE 186.100	26.3	
2023/24 Total							
2024/25	Macalister - Columboola	BRL_02399	C258	139.66	WL U/BRIDGE 139.690	54.9	
		BRL_02406	C258	155.42	WL U/BRIDGE 155.430	20.8	
		BRL_02425	C258	191.76	WL U/BRIDGE 191.850 COOLUMBOOLA CRK	183.6	
2024/25 Total							
Grand Total							[redacted]

Figure 8: Queensland Rail's proposed Timber Bridge Upgrades during DAU2

As the bridges are in poor condition, it is prudent to replace them to reduce maintenance costs, preserve safety and improve the efficiency of the line. We also note that the distances portrayed in Figure 8 align with the distances inferred from Queensland Rail's capital submission. There is no mismatch between Queensland Rail's capital-planning team and the capital submission.

7. 5 Efficiency

Queensland Rail has proposed a unit rate of [redacted] ($FY2018) for timber-bridge replacements. Queensland Rail's estimate is based on its actual/forecast data on the capital costs of 18 AU1 projects and distances of bridges replaced for those projects, noting that 9 projects are for duplicated track and 9 projects are for single-line track.[17]

The cost estimate includes the contract values with the external service providers to perform the work [redacted], plus internal and external costs set aside for the concept stage, development stage, project management, contract/design management, construction management, engineering support, track protection services, contract insurance, design consultant support, principal contractor contingency, planned risks, unplanned risks and the finalisation stage.

The total capital cost estimate is [redacted] and covers 15 cost components. The cost estimate is then divided by the total distances of bridges replaced (accounting for duplicated track); the total distance is

[17] B.*04636 West Moreton Timber Bridge* spreadsheet.

880.5 metres. Therefore, the unit rate is [redacted], which Queensland Rail has rounded down to [redacted] ($FY2018) for its submission.

Industry comparison

To supplement our unit-rate analysis, we undertook a benchmarking exercise of Queensland Rail's proposed unit rate of [redacted] against recent timber bridge upgrades for ARTC's Inland Rail project, namely the:

- Goonumbla 1 bridge ([redacted] for 21 metres), completed March 2018 - [redacted]
- Tomingley West bridge [redacted], completed March 2018 - [redacted]
- Goonumbla bridge [redacted] completed May 2018 - [redacted].[18]

To allow for an appropriate comparison of the [redacted]/metre range to Queensland Rail's unit rate of [redacted], to account for the bridges on Inland Rail being for a standard-gauge network (1,435 mm width) rather than a narrow-gauge network (1,067 mm width), we increased three of Queensland Rail's 15 cost components, namely Contract Value, Track Construction, and Queensland Rail Engineering Support by a factor of 1,435/1,067. (This step seeks to address which of the 15 cost components would be sensitive to track-gauge width.)

Our analysis yielded a unit rate of [redacted] for Queensland Rail's costs. On this basis, we consider that Queensland Rail's unit rate of [redacted] is comparable with, if not lower than, the unit rates that ARTC has achieved for the Inland Rail timber bridge upgrades.

Queensland Rail also provided data to us that showed the unit rates, from contractor prices alone, for timber bridge upgrades along its North Coast Line have exceeded [redacted][9].

Given the results of the benchmarking process, we consider Queensland Rail's proposed rate of [redacted] to be efficient.

7. 6 References

We relied on the following information from Queensland Rail during our peer review of the Timber Bridge Upgrade capital project:

- WM DAU2 Timber Bridge Upgrade Project (*Excel* workbook)
- B.04636 West Moreton Timber Bridge (*Excel* workbook)
- CW2254247 11 Specification and Statement of Work_rev4 (pdf)
- E-mail correspondence from Queensland Rail officers about the cost build up and assumptions underpinning the content of B.04636 West Moreton Timber Bridge (*Excel* workbook)
- E-mail correspondence from Queensland Rail officers about the recent actual costs of timber bridge replacements on the North Coast Line
- Department of Transport and Main Roads' *Project Cost Estimating Manual*.

[18] See https://www.artc.com.au/2018/05/01/inland-rail-leaders-visit-future-proofing-works-in-nsw/

[19] These data were not made available to us at this point of the peer review, as Queensland Rail was still bound by confidentiality requirements at its awarding stage of the contracts for the North Coast Line jobs.

8. Re-sleepering

8. 1 Recommendation

We do not recommend any changes to Queensland Rail's proposed scope of works or costs for Re-sleepering. We consider the scope established in the DAU2 proposal to be prudent, and the proposed expenditure to be efficient. Our findings are based on our site visit and the recent unit rates achieved for Re-sleepering activities.

8. 2 Project description

Re-sleepering is the *en masse* replacement of defective timber sleepers with new timber sleepers. It is important to note that the replacement of sleepers in this project differs from that occurring during Track Reconditioning; in that the latter activity involves the replacing of defective timber sleepers with concrete sleepers. Figure 9 shows deteriorated timber sleepers along the West Moreton system, as evidenced by the poor visual condition and lifted dog spike.

Figure 9: Deteriorated timber sleepers along the West Moreton network

Such deterioration contributes to track instability. This results in reduced structural integrity of track and an increased risk of derailment. Hence, Re-sleepering is a required capital activity to keep the rail network safe for above-rail operators.

8. 3 Queensland Rail's proposal

Queensland Rail has proposed the following costs for Re-sleepering (see Table 13). We note that the costs for Re-sleepering are not dependent on the throughput-scenario selection (i.e. the choice of [redacted] or [redacted] does not affect Queensland Rail's proposed scopes and costs over the DAU2 period).

Table 13: Queensland Rail's proposed expenditure for Re-sleepering ($000s, $FY2018)

Scenarios	FY2021	FY2022	FY2023	FY2024	FY2025	Total
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
R2J	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
J2C	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Queensland Rail's proposed DAU2 expenditure for Re-sleepering are [redacted]. Works are proposed to occur in FY2021 and FY2025 for the R2J section (total of $[redacted]), and only in FY2021 for the J2C section (total of [redacted]).

Queensland Rail proposed a unit rate of [redacted] for all Re-sleepering activities. The scope that reflects the above proposal is show below.

Table 14: Queensland Rail's proposed scopes for Re-sleepering (number of sleepers)

Scenarios	FY2021	FY2022	FY2023	FY2024	FY2025	Total
[redacted]	**41,100**	**0**	**0**	**0**	**11,000**	**52,100**
R2J	2,600	0	0	0	11,000	13,600
J2C	38,500	0	0	0	0	38,500

In the next subsection, we discuss our approach to assessing whether Queensland Rail's proposed Re-sleepering program reflects prudent decision making.

8. 4 Prudency

Queensland Rail's estimates that timber sleeper degradation will be at a rate of 5% of the total population each year in its 10-year renewal program. With approximately 244,000 timber sleepers[20] in the West Moreton system, the total number of sleepers to be replaced over the five years (with 5% degradation rate each year) will be approximately 55,000, leaving approximately 198,000. This aligns with the DAU2 plan of replacing 52,100 timber sleepers, which demonstrates that there is alignment between Queensland Rail's proposed scope of work and the understanding of the asset condition in the renewal program.

During our site visit, we observed the condition of some of the timber sleepers that Queensland Rail intends to replace during the DAU2 period. From our observations we consider that Queensland Rail's proposed scope proposal is reasonable. Hence, we consider the proposed scopes to be prudent.

Capitalisation of expenditure

[20] 2017-18 AMP, p. 131

We understand that Queensland Rail has sought to classify the Re-sleepering activity as a capital, rather than maintenance expenditure activity. Queensland Rail's Capitalisation of expenditure specification indicates that a capital activity relates to a new asset or to improving an existing asset. Queensland Rail considers the term 'improve' to relate to the following:

> *…expenditure on assets must be capitalised (i.e. added to the carrying amount of the asset) when it improves the condition of the asset beyond its originally assessed standard of performance or capacity. This can occur through:*
>
> - *An increase in the service potential provided by the asset; or*
> - *Increasing the useful life of the asset.*[21]

Our engineering judgement indicates that the Re-sleepering program is capital in nature, because it is an *en masse* campaign of works, in comparison with spot Re-sleepering. In addition, we note that our position is consistent with Queensland Rail's about-to-be published latest Capitalisation of expenditure specification. If the Re-sleepering work is planned and it is for a total distance greater than 500 metres (South East Queensland (SEQ) region) over a short period (i.e. a financial year), then it can be classed as capital expenditure (as long as Queensland Rail spends at least [redacted] on the work and replaces at least 1 in 4 (>=25%) sleepers).[22]

We understand that each km of track generally has 1,500 sleepers, i.e. 750 sleepers for 500 metres of track. Replacing one in four sleepers means a minimum of 125 sleepers need to be replaced in order for it to be classed as capital works. This volume may be considered as the threshold necessary to achieve life extension works and/or improvement in performance for a given section of track. Queensland Rail's proposed Re-sleepering program satisfies the aforementioned requirements:

- 2,600 sleepers replaced in FY2021 [redacted] and 11,000 sleepers replaced in FY2025 [redacted] in the Rosewood-to-Jondaryan section
- 38,500 sleeper replaced in FY2021 [redacted], in the Jondaryan-to-Columboola section.

Accordingly, we consider Queensland Rail's Re-sleepering program to be a capital, not maintenance, activity.

8. 5 Efficiency

Queensland Rail has proposed a unit rate of [redacted] ($FY2018) for Re-sleepering, for both the Rosewood to Jondaryan section and the Jondaryan to Columboola section.

The recommendations from our top-down review of costs are as follows (analysis undertaken in real $FY2018 terms):

- Queensland Rail provided us FY2016 Re-sleepering cost data.[23] As mechanised Re-sleepering is a highly cyclical activity, such works do not occur every year. This explains why only one year of

[21] Page 20 of 39 of Queensland Rail's *Classification of Expenditure* specification.

[22] Even if the West Moreton system is considered to be part of the Regional, rather than SEQ, network, the distance threshold would increase to 2km and number of sleepers to 500 metres, which Queensland Rail's program will more than exceed.

[23] *Resleepering 15-16* spreadsheet.

historical data are available. We converted Queensland Rail's cost data into real terms ($FY2018). The unit rate for:

- Rosewood to Jondaryan is [redacted], based on 11,898 sleeper replacements
- Jondaryan to Columboola is [redacted], based on 49,739 sleeper replacements
- Rosewood to Columboola, covering a total of 61,637 sleeper replacements, is [redacted]. This is within [redacted] of Queensland Rail's DAU2 proposed cost of [redacted].

- Over the DAU2 period, Queensland Rail will be replacing the following number of sleepers:
  - Rosewood to Jondaryan – 2,600 sleepers in FY2021 and 11,000 sleepers in FY2025
  - Jondaryan to Columboola – 38,500 sleepers in FY2021.

We note that Queensland Rail will not gain economies of scale in either of the two rail sections, since sleeper replacements in each year of the DAU2 period are less than what transpired in FY2016. As such, we do not recommend any changes to Queensland Rail's proposed rate of [redacted] over the DAU2 period.

To supplement our top-down analysis, we have reviewed the cost components that contribute to build up of yearly annual costs (analysis undertaken in nominal terms). Key findings are that:

- Out of the 26 cost components in the track-reconditioning project, the four components that contributed most to total costs in FY2016 are: sleepers [redacted]); internal labour [redacted]; use of internal machinery ([redacted]); and miscellaneous permanent way components ([redacted]).
- We did not assess the unit rates for machinery, as the data did not reveal what the various kit for the mechanised-resleepering process encompassed. The 'material description', 'purchase order text' and 'name' columns were blank in the relevant data spreadsheet.
- We did not assess the unit rates for miscellaneous permanent way components as the consumables that fall within this category are diverse (e.g. dog-spikes, screw dogs, plate sleepers and spike springs).
- We assessed the unit rates for sleepers and internal labour:
  - Sleeper (TI 230 X 115 MM X 2.15 M standard size) unit rates were within [redacted] to [redacted]. We consider these rates not to be excessive based on our engineering experience.
  - Hourly labour rates (FY2016) were within [redacted] (Re-sleepering worker) to [redacted] (senior project engineer). We consider these rates reasonable as they are in line with our in-house data for labour rates.

In conclusion, data on the cost components have not triggered the need for us to revisit our top-down analysis. Hence, we consider Queensland Rail's proposed Re-sleepering unit rate of [redacted]/sleeper to reflect efficient costs.

8. 6 References

In reviewing for Formation Repairs, we peer reviewed the following documents:

- AU2 West Moreton Tariff Reset Capital Submission – July 2018
- Queensland Rail's Network Asset Management Plan – 2017/18
- Queensland Rail's Capitalisation of expenditure – June 2017

9. West Moreton Minor Signalling Renewals

9. 1 Recommendation

We do not recommend any changes to Queensland Rail's proposed scope of works or costs for this capital project. As Queensland Rail's proposal for this project is not based on measurable scope of activity and unit rate, the structure of this section is different from the civil-related projects.

9. 2 Our analysis

Queensland Rail proposes spending [redacted] ($FY2018) on WM Minor Signalling Renewals during the DAU2 period. This involves the following spending on the Rosewood-to-Jondaryan section:

- [redacted]
- [redacted]

We note that the following items are included in WM Minor Signalling Renewals project:

- Upgrading of 4.5V Solar Track Feed to 12V. This occurs in Helidon to Lockyer, Forest Hill to Laidley, and Yarongmalu
- Upgrade of Model 10 Mechanical Boom Gate
- Upgrading of Alternators at Grandchester, Yarongmalu and Rangeview
- Upgrading of Asbestos-containing location cases and cabinets.

We note that the projects are mainly required to overcome technology obsolescence and to manage safety requirements. Queensland Rail has also confirmed that changes to wiring-related specifications have resulted in minor signalling works needing large changes to surrounding infrastructure. This activity includes projects that were started in the AU1 period and that will be completed in the DAU2 period.

The replacement of signalling equipment includes many components and costs that may not be readily forecast due to the spasmodic failure rate of such equipment. In Queensland Rail's submission, no details on labour costs, individual components or work completed in the DAU2 period are provided; a detailed breakdown of costs has not been made available to us at this point and we cannot seek to verify the efficiency of Queensland Rail's proposal. We also note that the upgrading or boom gates, removal of asbestos and other projects would be of sufficient financial magnitude to be 'projects' in their own right.

Nothing emerged during our analysis of Queensland Rail's submission and our site visit to indicate that listed activities are not prudent. Subject to any further information being provided about the cost build up for WM Minor Signalling Renewals, we do not recommend any amendments to Queensland Rail's proposal.

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