Memo

SUBJECT
Answer to Queensland Rail's Response to the QCA's Discussion Paper on Queensland Rail's Draft Access Undertaking 3 (DAU3)

DATE AND TIME
28 February 2025

CLIENT
Queensland Competition Authority

Management Summary

Arcadis provided technical advice to the Queensland Competition Authority (QCA) on the operational capacity of the West Moreton System for Draft Access Undertaking 3 (DAU3). Based on Queensland Rail's (QR) DAU3 data, on-site inspections, and identified safety concerns, our analysis concluded that 7.5 million tonnes per annum (mtpa) at 75% utilisation is reasonable under current conditions, assuming reduced possession hours. This conclusion was developed using the globally recognised UIC Leaflet 406 Methodology.

In contrast, QR's proposed capacity of 9.6 mtpa relies on 2016 DAU1 data and theoretical utilisation rates of 95-100%, which present significant operational challenges. QR's consultant, AECOM, acknowledged that key metrics in Arcadis' analysis "are consistent between both organisations"[1], yet their approach incorporates assumptions and data that do not reflect current network conditions or constraints.

QR has suggested rerouting trains to avoid metro congestion, but no evidence has been provided to demonstrate that this is operationally feasible. Without a detailed plan, such rerouting could reduce efficiency and undermine claims of higher utilisation.

We also acknowledge a difference in the interpretation of the UIC methodology. QR's response suggests that "additional time" represents "available capacity," but UIC Leaflet 406 specifies that this time is critical for train path stability and cannot automatically be considered as usable track time.

Although QR's proposed utilisation rate of 83% for 7.5 mtpa is ambitious, it is worth emphasising that achieving QR's proposed 9.6 mtpa would require utilisation rates of 95-100%, as acknowledged in AECOM's findings. Operating at such high levels of utilisation introduces heightened risks of instability, congestion, and safety concerns—particularly given the single-line constraints of the West Moreton System, condition of the infrastructure and geological vulnerabilities of the range in inclement weather events. Without a robust asset management strategy to support higher utilisation, such levels are unlikely to be sustainable or operationally viable.

QR has also suggested repurposing unused paths, such as non-coal and contingency paths, for coal train movements. However, non-coal paths are non-contractable and therefore fall outside the scope of tariff calculations.

Finally, QR's reliance on a significant increase in staffing (from [redacted] to [redacted]) to achieve its proposed capacity raises questions given historic labour market constraints and projected resource demands in Southeast Queensland, particularly with the upcoming Olympics.

[1] Queensland Rail (2025), *Queensland Rail's Response to the QCA's Discussion Paper on Queensland Rail's Draft Access Undertaking 3 (DAU3)*, Attachment 2 AECOM Response to Discussion Paper on West Moreton Operational Capacity, p viii

While QR, as the Rail Infrastructure Manager, is responsible for defining acceptable performance levels, any decision to operate at higher utilisation rates should be supported by rigorous risk assessments and recovery plans.

Arcadis' original assessment remains unchanged, that is, 7.5 mtpa is a reasonable tonnage amount, provided required possession hours are reduced to achieve 75% utilisation. However, 9.6 mtpa is not a reasonable tonnage amount. Exceeding this threshold requires a well-founded, data-driven operational plan supported by clear tactical and asset management strategies, for which our framework and strategic outputs provide a strong foundation.

Purpose of this memo

The purpose of this memo is to respond to *Queensland Rail's Response to the QCA's Discussion Paper on Queensland Rail's Draft Access Undertaking 3 (DAU3)* dated 7 February 2025. This memo will aid Queensland Competition Authority in developing its position on the operational capacity of the WMS and provide Arcadis's view on QR's response to the QCA Discussion Paper.

Limitations

In preparing this Memo, Arcadis has relied upon meetings, data, analyses, plans and other information provided by Queensland Rail in its DAU3 submission and associated documentation, and other individuals and/or organisations, most of which are referred to in the Report (the Data).

Except as otherwise stated, Arcadis has not verified the accuracy or completeness of the data and certain assumptions have had to be made. To the extent that the statements, opinions, facts, information, conclusions and/or observations are based in whole or part on the data, these are contingent upon the accuracy and completeness of the data.

Arcadis will not be liable in relation to incorrect conclusions being drawn should any data, information or condition be incorrect or have been concealed, withheld, misrepresented, or otherwise not fully disclosed to Arcadis.

To the best of Arcadis' knowledge, the facts and matters described in this memo reasonably represent the conditions at the time of writing. However, the passage of time, the manifestation of latent conditions or the impact of future events (including a change in applicable law) may result in a variation to the conditions and assumptions. Arcadis will not be liable to update or revise the memo to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the memo.

This assessment was conducted as a top-down strategic analysis to provide high-level guidance on network capacity and utilisation. It is not intended to be relied upon as an operational plan.

If a detailed operational assessment is required, then a bottom-up, data-driven analysis—using current network conditions, particularly metro constraints—should be undertaken. Our findings can serve as a strategic foundation for this work, but a more granular review is necessary to inform precise operational planning, in particular, the strategic capacity utilisation figure should be used to inform the level of "buffer" applied to operational rules for timetable planning..

Response

After reviewing the response from QR on 7 February 2025, Arcadis maintains their professional opinion and advice provided to QCA regarding the operational capacity of the WMS to date. The below outlines the data that has been agreed between all parties and Arcadis' response to topics that parties are not in agreement with.

Tonnage and possession hours

An imperative data point is Table 1 which outlines the capacity of the Toowoomba Range, the identified bottleneck of WMS. This is the main output by Arcadis following its modelling exercise. The overall table was developed taking a top-down approach using methodology that is accepted as industry best practice when calculating operational utilisation. A top-down approach was implemented instead of a bottom-up approach due to time constraints and the detail required for the purpose, and as presented to QCA and the stakeholders, this is considered as a starting point for detailed capacity discussions and provides for further development of detailed timetabling inputs and capacity studies. It is noted that QR can acknowledge and agree with the contents of Table 1, given its response references the same table[2],[3] and is the basis for its calculation and reporting. Therefore, AECOM's calculations confirm that the possession hours available originally quoted by QR are a result of planning to utilise 100% of available coal capacity and are very close to those the Arcadis team calculated.

Table 1 – Tonnage (mtpa) hauled annual possession hours

		Table 2: Coal net tonnage per annum against daily hours of operation (Note: input capacity % in cell E11)								
Possession Days	Possession hours per year	Daily Hours of Operation	Weekly Coal Paths		Coal Service Gross Tonnage			Coal Net Tonnage		
			Up	Down	Up	Down	Total	Up	Down	Total
0.00	0	24	110	110	16,216,200	4,730,440	20,946,640	11,485,760	0	11,485,760
15.21	365	23	104	104	15,331,680	4,472,416	19,804,096	10,859,264	0	10,859,264
30.42	730	22	99	99	14,594,580	4,257,396	18,851,976	10,337,184	0	10,337,184
45.63	1095	21	94	94	13,857,480	4,042,376	17,899,856	9,815,104	0	9,815,104
60.83	1460	20	89	89	13,120,380	3,827,356	16,947,736	9,293,024	0	9,293,024
76.04	1825	19	83	83	12,235,860	3,569,332	15,805,192	8,666,528	0	8,666,528
91.25	2190	18	78	78	11,498,760	3,354,312	14,853,072	8,144,448	0	8,144,448
106.46	2555	17	73	73	10,761,660	3,139,292	13,900,952	7,622,368	0	7,622,368
121.67	2920	16	68	68	10,024,560	2,924,272	12,948,832	7,100,288	0	7,100,288
136.88	3285	15	62	62	9,140,040	2,666,248	11,806,288	6,473,792	0	6,473,792
152.08	3650	14	57	57	8,402,940	2,451,228	10,854,168	5,951,712	0	5,951,712
167.29	4015	13	52	52	7,665,840	2,236,208	9,902,048	5,429,632	0	5,429,632
182.50	4380	12	47	47	6,928,740	2,021,188	8,949,928	4,907,552	0	4,907,552
197.71	4745	11	41	41	6,044,220	1,763,164	7,807,384	4,281,056	0	4,281,056
212.92	5110	10	36	36	5,307,120	1,548,144	6,855,264	3,758,976	0	3,758,976
228.13	5475	9	31	31	4,570,020	1,333,124	5,903,144	3,236,896	0	3,236,896
243.33	5840	8	26	26	3,832,920	1,118,104	4,951,024	2,714,816	0	2,714,816
258.54	6205	7	20	20	2,948,400	860,080	3,808,480	2,088,320	0	2,088,320
273.75	6570	6	15	15	2,211,300	645,060	2,856,360	1,566,240	0	1,566,240
288.96	6935	5	10	10	1,474,200	430,040	1,904,240	1,044,160	0	1,044,160
304.17	7300	4	5	5	737,100	215,020	952,120	522,080	0	522,080
319.38	7665	3	0	0	0	0	0	0	0	0
334.58	8030	2	0	0	0	0	0	0	0	0
349.79	8395	1	0	0	0	0	0	0	0	0
365.00	8760	0	0	0	0	0	0	0	0	0

The lookup table we developed is designed to allow a basic and rapid assessment of trade-off between operating (and therefore the inverse i.e. possession) hours availability, capacity utilisation (i.e. reliability) and tonnage carrying capacity at a strategic level. (E.g. Possession requirement of XXhrs and Tonnage requirement of YYmtpa = ZZ% capacity utilisation)

Utilisation

As discussed above, it is apparent that QR supports the overall table and our high-level approach as evidenced by the acceptance of AECOM's incorporation of this table in their analysis, and acknowledgement within their report that several of Arcadis' assumptions are correct (maintenance windows, Metro restrictions, contingency). However, despite overall agreement between the two organisations on the underlying methodology and framework, QR has modified those same assumptions to achieve a higher capacity. QR's

[2] Arcadis (2024), *Review of West Moreton System Costs and Other Technical Matters in Queensland Rail's DAU3 – Addendum,* p.14 Table 2-1

[3] Queensland Rail (2025), *Queensland Rail's Response to the QCA's Discussion Paper on Queensland Rail's Draft Access Undertaking 3 (DAU3)*, Attachment 2 AECOM Response to Discussion Paper on West Moreton Operational Capacity

adjustments, which are made on assumptions from QCA's 2016 AU1 decision but do not take into account any evolvement of Metro interactions, network condition or operational requirements since that period, result in a proposed higher capacity utilisation and extended daily operating hours.

Table 2 below presents an extract of the Tonnage Capacity Model developed. Utilising the revised possession hours requirement provided in QR's response we have recalculated the resultant Daily Operating Hours and reviewed the capacity utilisation level required to move the noted tonnages. This provides the following:

- 13.9 hours per day to haul 7.5mtpa = ~90% Coal Capacity Utilisation; and
- 16.2 hours per day to haul 9.6mtpa = ~95% Coal Capacity Utilisation

Therefore, by using the maintenance hours put forward by QR in their response, the capacity utilisation is around 90 and 95 per cent at 7.5 mtpa and 9.6mtpa. This shows that 83 per cent capacity utilisation is not the correct capacity utilisation in these scenarios, when inputting QR's revised maintenance hours.[4] This is also illustrated in the analysis completed by AECOM, which stated that capacity utilisation ranges from 83-100 percent.

Table 2 Tonnage (mtpa) determined by capacity utilisation and annual possession hours

Daily Operating Hours	Annual Possession Hours	Capacity Utilisation %									
		100%	95%	90%	85%	80%	75%	70%	67%	65%	60%
24	0	15.87	14.93	14.10	13.16	12.32	11.49	10.55	10.02	9.71	8.77
23	365	15.14	14.20	13.37	12.53	11.69	10.86	10.02	9.50	9.19	8.35
22	730	14.41	13.57	12.74	11.90	11.17	10.34	9.50	9.08	8.77	7.94
21	1095	13.68	12.84	12.11	11.28	10.55	9.82	8.98	8.56	8.25	7.52
20	1460	12.95	12.22	11.49	10.75	10.02	9.29	8.56	8.04	7.83	7.10
19	1825	12.22	11.49	10.75	10.13	9.40	8.67	8.04	7.62	7.31	6.58
18	2190	11.49	10.75	10.13	9.50	8.77	8.14	7.52	7.10	6.79	6.16
17	2555	10.75	10.13	9.50	8.88	8.25	7.62	7.00	6.58	6.37	5.74
16	2920	10.02	9.40	8.77	8.25	7.62	7.10	6.47	6.16	5.85	5.33
15.5	3102	9.61	9.08	8.46	7.94	7.31	6.79	6.16	5.85	5.64	5.12
15	3285	9.29	8.67	8.14	7.62	7.10	6.47	5.95	5.64	5.43	4.91
14	3650	8.56	8.04	7.52	7.00	6.47	5.95	5.43	5.12	4.91	4.39
13	4015	7.83	7.31	6.79	6.37	5.85	5.43	4.91	4.59	4.49	3.97
12.6	4161	7.52	7.00	6.58	6.06	5.64	5.22	4.70	4.49	4.28	3.76
12	4380	7.10	6.58	6.16	5.74	5.33	4.91	4.39	4.18	3.97	3.55
11	4745	6.37	5.95	5.53	5.12	4.70	4.28	3.86	3.65	3.55	3.13
10	5110	5.64	5.22	4.91	4.49	4.18	3.76	3.45	3.13	3.03	2.71
9	5475	4.91	4.49	4.18	3.86	3.55	3.24	2.92	2.71	2.51	2.19
8	5840	4.18	3.86	3.55	3.24	2.92	2.71	2.40	2.19	2.09	1.78
7	6205	3.45	3.13	2.92	2.61	2.40	2.09	1.88	1.67	1.57	1.36
6	6570	2.71	2.40	2.19	1.98	1.78	1.57	1.36	1.25	1.15	0.94
5	6935	1.98	1.78	1.57	1.36	1.25	1.04	0.84	0.73	0.63	0.52
4	7300	1.25	1.04	0.94	0.73	0.63	0.52	0.31	0.21	0.21	0.00
3	7665	0.52	0.31	0.21	0.10	0.00	0.00				
2	8030										
1	8395										
0	8760										

We note that AECOM's capacity utilisation results differ slightly to Arcadis' results shown in Table 2, due to their electing to utilise an alternative approach to calculating the available operating hours which is built up from DAU1 data and alternative assumptions, rather than derived from QRs DAU3 proposal, as well as some minor discrepancies in summation in AECOM's table[5]. We note that this shift in emphasis to using "required" possession time as the starting point for calculation rather than tonnage carrying capacity is not the way in which we understand QR to have originally calculated both their possession availability and operating hours. The QR data is not presented in a way which aligns with this approach and therefore we understand that they intend to derive the possession hours from the residual availability after calculating the train path requirement rather than the other way around. Our chosen method attempted to replicate QR's calculation process in

[4] Queensland Rail (2025), *Queensland Rail's Response to the QCA's Discussion Paper on Queensland Rail's Draft Access Undertaking 3 (DAU3)*, p. 33

[5] Queensland Rail (2025), *Queensland Rail's Response to the QCA's Discussion Paper on Queensland Rail's Draft Access Undertaking 3 (DAU3)*, Attachment 2, Table 2, AECOM Response to Discussion Paper on West Moreton Operational Capacity

deriving the available hours for possessions and ensuring that we examined their proposed plan on a like-for-like basis.

We also note that AECOM state that they take “Additional Time in the UIC Leaflet 406 as being inclusive of maintenance possessions. This is not the case, “Additional Time” is intended for allowances (i.e. pathing, adjustment, and performance) and other Quality of Service additions (noting that UIC are deliberately ambiguous in their language as different railway operators use different terminology and approaches to this). Possessions are intended to be treated as if they are a train service as they are an occupation of the line rather than a time allowance.

We derived our approach from UIC 406 given the available information, the time available and the task requested. This is a strategic starting point for further work in this space and there is a substantial opportunity to undertake a fully detailed performance and operational capacity exercise and review of the WMS.

In our approach, given preserved paths are non-contractable capacity, preserved paths were purposely excluded from our calculations as the focus of our engagement by QCA was on the coal tonnages element of the system to aid QCA to make an informed calculation about the tariff. As noted elsewhere, in further development and detailed planning, the preserved path requirements should be reintegrated and incorporated in any perturbation modelling and detailed operational planning exercises.

UIC Leaflet 406 provides suggested occupation rates for different types of railway systems, for mixed traffic lines such as the WMS the rate is suggested to be 75% at peak times and 60% for the overall day (see Table 3). Arcadis took the average of peak and daily utilisation percentages for mixed-traffic lines to estimate

Table 3 - UIC Proposed occupancy time rates

Type of Line	Peak Hour	Daily Period
Dedicated suburban passenger traffic	85%	70%
Dedicated high-speed line	75%	60%
Mixed-traffic lines	75%	60%

Following discussions with QR and their stakeholders and recognising the characteristics and utilisation of the West Moreton Line, we elected to take a 75% rate as the overall figure for the coal capacity utilisation, rather than UIC’s 60% for mixed traffic lines. Also noting that we excluded representing the hours available for possessions in the utilisation rate, if these were incorporated into a 24hr figure then the calculated utilisation for those hours (for example, for the purpose of maintenance or capital expenditure) would be at 100% and therefore the overall utilisation would be shown as higher than that stated in our method.

The utilisation levels shown in our work present a staged indication up to a maximum contractable tonnage capacity. Whilst we use a 75% utilisation rate in our report, we are not stating that higher utilisation is not technically possible, rather that it is not good practice to plan to utilise the full amount of the technically available capacity. It must be noted that the higher the utilisation rate, the more impact that performance incidents will have upon reliability of the plan and the more susceptible to issues arising from the condition of the asset, adverse impacts of weather events and other unforeseen events it will be. This is a decision for QR to make, depending on whether they are comfortable with the performance implications of operating at higher utilisation levels and have fully considered the consequences of these decisions.

There are several risks and challenges associated with running a railway network over what is recommended by industry best practice, that is, the network approaches maximum capacity:

1. **Reduced Flexibility**: there is less room for **unexpected events** like delays, maintenance needs, or emergencies. Any disruption can cause significant knock-on effects, leading to delays or even complete service stoppages.
2. **Increased Risk of Delays**: there is less opportunity to adjust timetables or reschedule trains. A small delay to one train could cause a cascading effect, leading to further delays as trains are closely spaced.
3. **Operational Stress**: Operating at a high capacity puts significant **stress on the infrastructure** and personnel. Track maintenance, signal systems, and other operational processes might be more prone to wear and tear, which could increase the likelihood of further required maintenance.
4. **Lower Resilience to Disruptions**: When capacity is near maximum, there's little room to accommodate **emergency situations** like track failures, signal issues, or extreme weather conditions. Any unforeseen problem can lead to large-scale disruption.
5. **Safety Risks**: At higher capacity utilisation, **safety margins** are reduced. Trains run closer together, which increases the risk of **accidents** if multiple failures occur in a "Swiss Cheese" event, such as a train running behind schedule combined with a SPAD event and a safety system failure.
6. **Reduced Maintenance Window**: A higher level of utilisation means less time is available for **track and equipment maintenance**. Over time, this can result in the infrastructure deteriorating faster, increasing the risk of failures or accidents.

Overall, running a network at above recommended utilisation can reduce the network's **ability to cope with disruptions** and **increase operational stress**. It is important to maintain a balance to avoid compromising safety, reliability, and flexibility.

Arcadis does not deny that hauling tonnages of 7.5mtpa and 9.6mtpa is theoretically possible at higher utilisation rates than we support, if there were no unexpected disruptions. However, utilisation percentages preclude unforeseen disruptions such as weather-related shutdowns. To illustrate the impact of unforeseen disruptions, a wet weather event in Q1 2022 resulted in a 19 day shutdown of the WMS.

We note that at these tonnage levels, the resultant trade off would reduce the available possession hours even further. If this occurred, we would assume that QR would develop a revised possession regime to reflect this. We consider that in circumstances where QR has stated that significant sections of the network are reaching untenable safety issues, which was brought to our attention by QR, we believe that putting additional stress on the network could result in increased levels of risk.

We believe that the from the information provided by QR in terms of the condition of the asset, significant safety concerns that were creating untenable safety situations, and to allow contingency (e.g. for weather events) and growing impacts of climate change, 75% utilisation would prove a reasonable level of contractable capacity in terms of safety, reliability and efficiency.

As we note above, ultimately, as the Rail Infrastructure Manager and operator of the network, it is for QR in collaboration with their customers to determine an acceptable performance outturn for the network. This should consider the performance risks associated with operating at higher levels of utilisation and include the impacts of any agreed recovery plans deemed appropriate. Our recommendation that perturbation analysis, which considers impacts on the more congested metropolitan network, be carried out as a part of an overall planning and capacity exercise still stands. We believe that this would aid QR in the development of response plans which underpin the network performance levels agreed with, and expected by, their stakeholders.

In many railway jurisdictions a suite of response plans is prepared covering operational, technical, and customer responses to incidents and degraded performance. These are backed up by plans for continuous improvement in key areas based upon an analysis of trends, allied to business priorities. Figure 1 below

shows an example of this by way of a performance plan matrix used by a European Rail Infrastructure Manager.

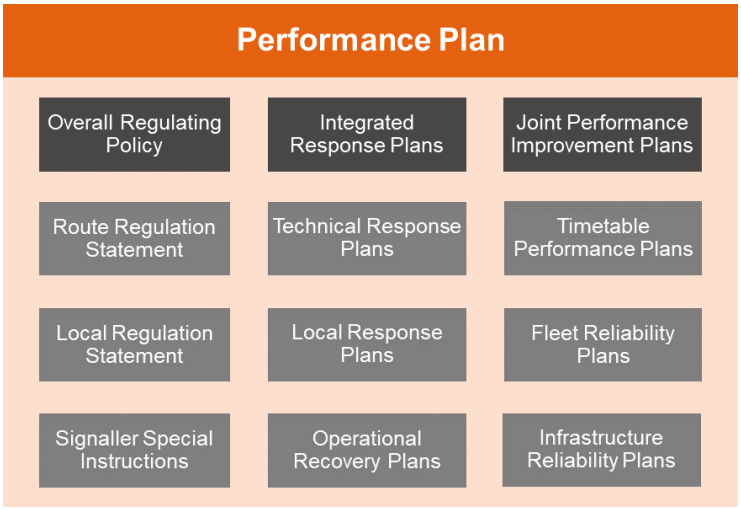

Figure 1 - Example Performance Plan structure from a European RIM

Conclusion

This memo reaffirms Arcadis's engineering and operational reasonableness assessment of QR's Draft Access Undertaking 3 (DAU3) for 2025-2030, which supports the QCA's mandate in regulating rail infrastructure access. Through our assessments—ranging from the reasonableness assessment for the WMS to the analysis of operational capacity based on the UIC Leaflet 406 methodology—we have provided robust technical opinions on both the expenditure and the proposed tonnage haulage scenarios. While our findings indicate that a capacity of 7.5mtpa is reasonable under current conditions, provided required possession hours decrease, our assessment concludes that the higher scenario of 9.6mtpa remains unsustainable without significant enhancements in asset management approaches and leaves little contingency for any disruptive events.

It is important to note that our conclusions are based on data and assumptions provided by QR and other stakeholders. Any future variations in underlying data, operational conditions, or regulatory environments may necessitate a reassessment.

After reviewing QR's response dated 7 February 2025, Arcadis maintains its professional opinion regarding the operational capacity of the WMS. Our previous assessments, including the Reasonableness Assessment and Indicative Operational Capacity Memo, remain valid and continue to support the QCA decision-making process for DAU3.

Key Findings:

1. **Tonnage and Possession Hours**: The Toowoomba Range, the primary bottleneck of the WMS, was modelled using the globally accepted UIC Leaflet 406 top-down methodology, which is considered industry best practice for calculating operational utilisation. Table 1, the key output of our modelling, is acknowledged by QR and has been referenced and used as a basis in AECOM's independent calculations. While minor variations exist in AECOM's results, there is no material impact on our conclusions.
2. **Theoretical Capacity Utilisation:** Our assessment shows that hauling tonnage of 7.5 mtpa at 75% capacity utilisation is reasonable, and 9.6 mtpa is not reasonable this tonnage cannot be achieved at 75%. QR proposes operating the WMS at 83% utilisation, while AECOM suggests a range of 83%–100% to meet tonnage requirements. However, QR does not provide a clear reasoning for its 83% figure under

their DAU3 proposal and misinterprets UIC methodology, incorrectly assuming that 'additional time' equates to available capacity. However, the UIC Leaflet 406 clearly states that 'additional time' is essential for train path stability and cannot be automatically counted as operational capacity.
While we acknowledge QR's assumption is theoretically possible, it introduces significant operational risks—especially considering QR's own acknowledgment of "untenable" safety risks on parts of the network and AECOM's acknowledgement that 95%- 100% utilisation is demonstrated to achieve the higher tonnage requirements of 9.6 mtpa.

3. **Risk Considerations**: Running at utilisation rates equal to or greater than 83% reduces resilience to disruptions, including extreme weather events, which have historically caused prolonged shutdowns (e.g., a 19-day shutdown in Q1 2022 due to heavy rainfall). While the utilisation figures for 7.5mtpa of 90-95% proposed by QR are theoretically possible, they must be validated through a data-driven, bottom-up analysis to determine the real-world operational capacity of the network. Without this, QR risks relying on assumptions that may not hold under actual conditions, leading to operational instability, safety risks, and prolonged service disruptions.
4. **Recommended Capacity Utilisation and daily hours:** Based on QR's own condition reports, identified safety concerns, and the need for contingency planning, Arcadis assesses that 75% utilisation is the most reasonable operational capacity in the absence of clear mitigation strategies from QR. This level balances safety, reliability, and efficiency while allowing for disruptions and climate impacts.
   Our assessment, based on professional expertise and UIC methodology, refutes several points in QR's response, including:

   - Misinterpretation of UIC capacity utilisation standards
   - Incorrect assumption that unused paths (non-coal and contingency) can be included
   - Overreliance on additional staff only to achieve higher capacity
   - Underestimation of metro system constraints, including the impact of New Generation Fleet and Cross River Rail
   - Incorrectly basing their analysis on AU1 decisions while rejecting DAU3 data provided by QR

Without a data-driven, bottom-up assessment, all assumptions remain theoretical and untested, posing significant operational risks.

5. **Future Planning Recommendations:** Ultimately, the assessment undertaken by Arcadis is provided as a guiding framework not a direction and as the Rail Infrastructure Manager, QR must determine an acceptable performance outturn in collaboration with its customers. However, operating at higher utilisation levels should be supported by robust performance risk assessments and recovery plans. Arcadis maintains its recommendation that perturbation analysis—considering the impacts of congestion, particularly on the metropolitan network—should be incorporated into overall planning and capacity exercises. Many railway jurisdictions adopt a structured approach to performance planning, which includes response plans for operational, technical, and customer incidents. These frameworks facilitate continuous improvement based on trend analysis and business priorities, ensuring network resilience and efficiency.
6. **Final Recommendation**: Drawing upon our assessment and professional review we consider that for QR to sustainably increase utilisation beyond 75%, significant enhancements to asset management, operational resilience, and recovery planning will be required. We strongly recommend that QR undertakes detailed perturbation modelling and develops a comprehensive performance management framework, including contingency measures, to support any future increases in network capacity utilisation.

In conclusion Arcadis's original assessment remains unchanged and we remain available to support in further refining capacity and operational planning discussions.

This report has been prepared for the Queensland Competition Authority in accordance with the terms and conditions of appointment for Queensland Competition Authority dated 7 July 2024. Arcadis Australia Pacific Pty Limited (ABN 76 104 485 289) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

Arcadis has relied on information provided to it by Queensland Competition Authority and Queensland Rail to produce the report and arrive at its conclusions. The report is based upon information obtained on or before the report's completion (date above). Circumstances and events may occur following this date beyond our control and may affect the findings or projections contained in the report. We may not be held responsible for such circumstances of events and expressly disclaim any responsibility, therefore.

Appendix A

Issue No.	Statement from QR's response paper	Arcadis' comment
1	*Queensland Rail does not support Arcadis' capacity estimate and maintains that the system can support 9.6mtpa based on … identified errors in Arcadis' assumptions regarding Capacity Utilisation and Daily Operating Hours.*	As mentioned in Arcadis' operational capacity assessment, our assumptions were informed by inputs from Queensland Rail. As noted, we do not state that 9.6mtpa cannot be supported as a technical capacity, rather that, at the higher utilisation levels matched to QRs quoted possession requirements, there would be performance implications associated with the utilisation.
2	*the remainder of Arcadis' capacity assessment relies on a simplistic spreadsheet model*	The spreadsheet is an output of the operational capacity assessment. After digesting inputs provided by QR, Arcadis needed to present their results to ensure that it could be interpreted for all audiences. Therefore, a spreadsheet is an output of our work. Further, QR uses the spreadsheet throughout their response paper. We would assume that referencing the spreadsheet and using it as a base for calculations means that QR agree with the underlying data in the spreadsheet. It is also understood that base assumptions such as number of train paths was agreed. We have also noted that this presents a starting point for further, more detailed, work on the Operational Plan and performance modelling of the WMS.
3	*Arcadis' daily operating hours figure does not account for reduced maintenance possession requirements following completed capital works*	"Arcadis' Daily Operating Hours" are based on Queensland Rail data[6] which itself is derived from the calculation of the number of services required to move the desired tonnages. This table is also referenced in the QR response paper on 7 February. Arcadis was reliant on QR for this input and did not complete a validation of the data provided by QR. The value of a tabulated output as provided is that different annualised hours can be rapidly examined by a look-up.
4	*The methodology that Arcadis has applied to calculating the operational capacity of the WMS is based on two key assumptions, in the capacity utilisation percentage and the daily operating hours. It is AECOM's findings that these assumptions are unsupported to base an analysis on and not reflective of the actual operations of the WMS. For this reason, it is recommended that deriving calculations using a 'bottom-up' methodology is a more realistic approach (shown in Figure 3)*	Arcadis' results exhibit the relationship between capacity utilisation and daily operating hours as a tool to inform users. Our methodology applies a modelling process utilising inputs from Queensland Rail and other stakeholders to build a RailSys model of the WMS infrastructure. After this, we created a base timetable to assess the operational capacity of the network. Assumptions provided by QR and other stakeholders informed our top-down approach. A top down approach was used due to time constraints. We note that

[6] Queensland Rail (2024), *Queensland Rail's Response to the QCA's Draft Decision on DAU3*, Figure 8 and Figure 10, p35 and p37

		AECOM's approach uses our tonnage table[7] as the basis of their calculation and includes a number of assumptions. Therefore, this calculation is not a thorough bottom-up approach, but a high level one, similar to the work of Arcadis. We support the implementation of a true bottom-up approach utilising a full capacity review, examination of running times and perturbation modelling. We note that there was significant appetite for this from stakeholders, this is important because the impact of these decisions on all stakeholders involved.
5	*The Arcadis West Moreton capacity estimate of 5.1mtpa to 6.8mtpa is inconsistent with historical railings regularly achieved in the West Moreton and Metropolitan systems*	Arcadis has deemed that 7.5mtpa is a reasonable amount provided required maintenance and capex hours are reduced. This 7.5 mtpa figure was calculated as a yearly average, rather than being based on monthly tonnages. Consequently, it is expected that interpolating monthly data would result in some months exceeding the average yearly tonnage. This is a sustainable tonnage to be hauled over five years and is not a absolute maximum. We note that, in line with averages, it is possible to have short term peaks above this level.

[7] Arcadis (2024), *Review of West Moreton System Costs and Other Technical Matters in Queensland Rail's DAU3 – Addendum,* p.14 Table 2-1