

UT5 Maintenance Allowance

December 2016

Agenda

Time	Topic	Presenter
11:00	Introduction	Prue Mackenzie
11:05	Safety Share	Jason Livingston
11:15	Overview – Asset Maintenance & Management	Jason Livingston
11.45	UT5 Maintenance Allowance	Mike Bray / Jason Livingston
12:15	Questions	
12.30	Close out	Prue Mackenzie

UT5 on a page – Maintenance Allowance

Aurizon Network's proposal

- › Aurizon Network has improved network performance under a stable, systematic maintenance approach
- › UT5 proposal is to maintain infrastructure through the cycle
- › Aurizon Network has maintained a continued focus on performance improvement
- › Reducing maintenance allowance risks system performance

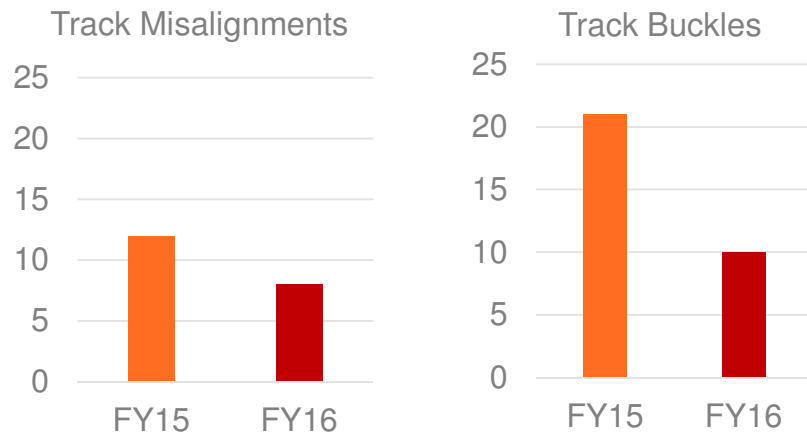
Safety Share

Managing Track Alignment – No Bumps Ahead!

Improvement management of track disturbance works which affect the stress of the rail + increased knowledge of stress free temperatures at critical locations has resulted in:

52% improvement in track buckles

33% improvement in reported track misalignments

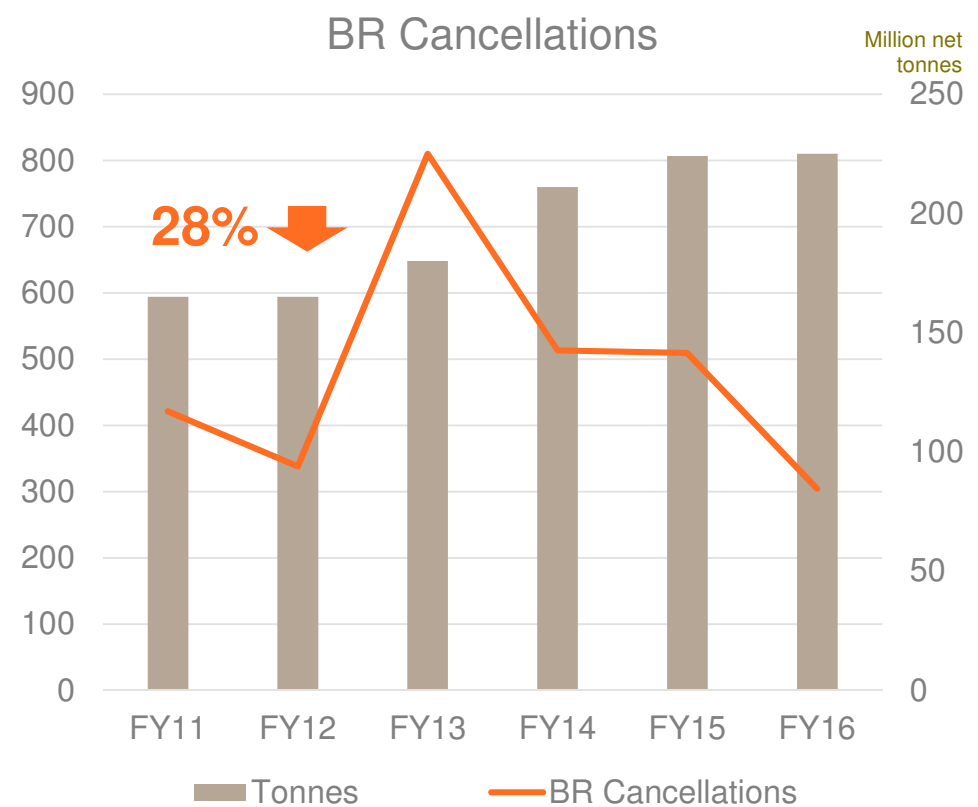
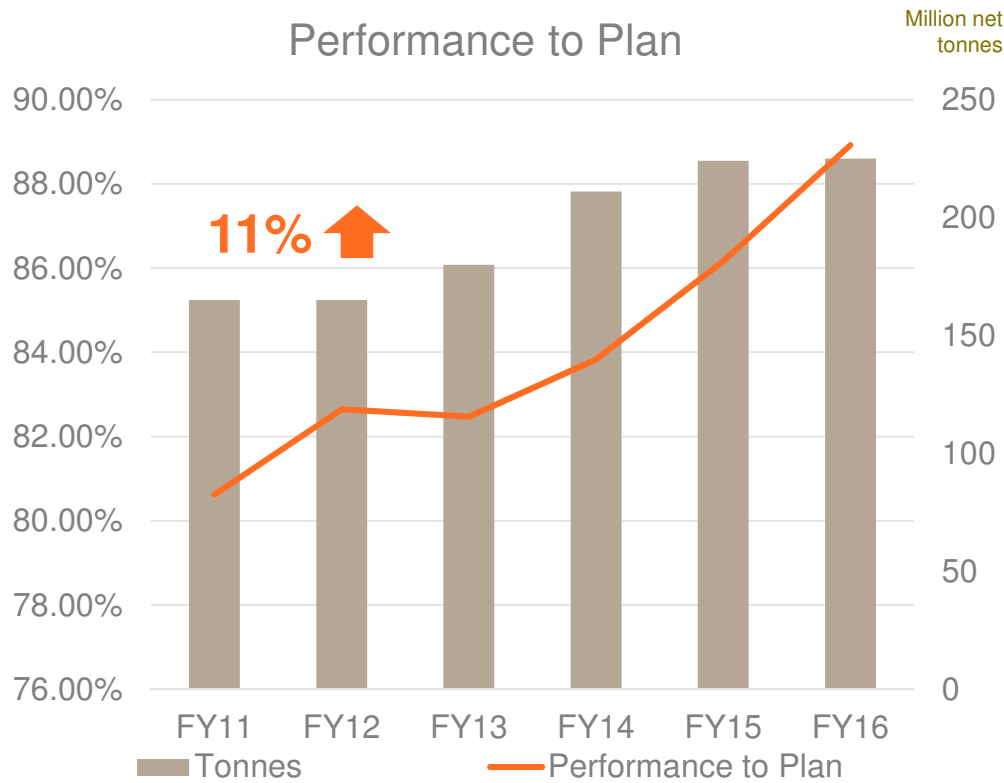


Significant improvement from FY2015 to FY2016 in number of reported track buckles and misalignments

Overview – Asset Maintenance & Management

Aurizon Network has delivered improved system performance

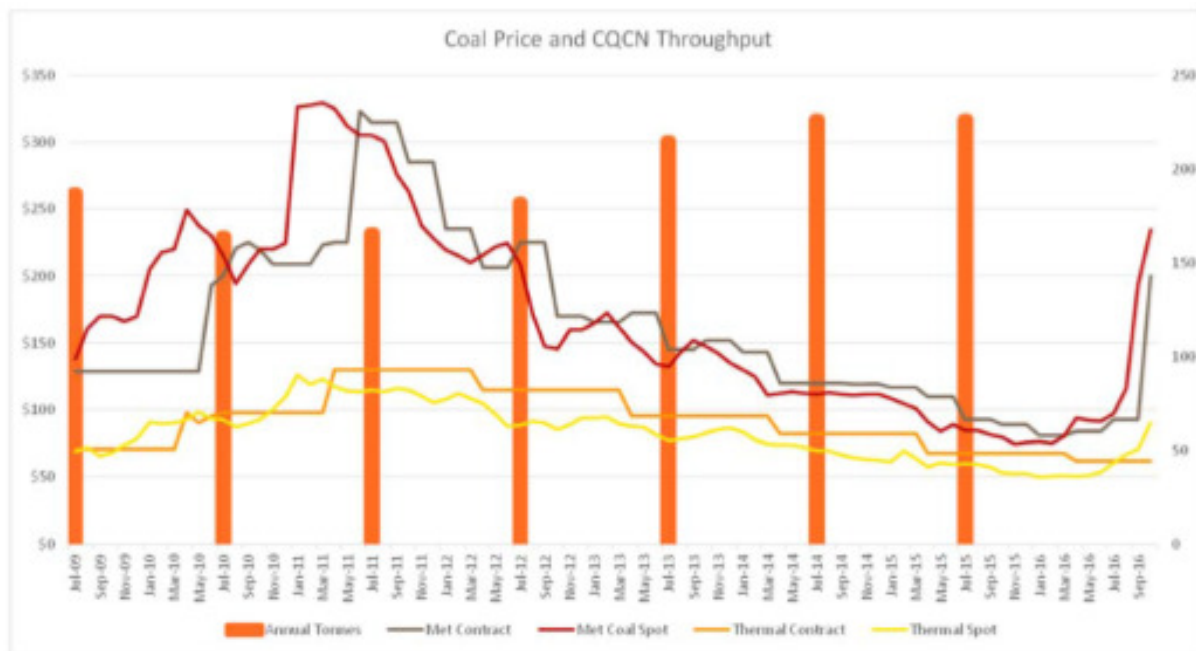
The maintenance regime underpins continuing improvements in system performance and reliability for the benefit of the supply chain



NB: Performance to Plan reported in Aurizon's FY16 annual results is 92.1% relative to scheduled services. Prior to FY13, Performance to Plan was measured relative to Agreed (weekly) orders. The graph has been prepared using Agreed (weekly) orders to illustrate the improvement in Performance to Plan over a longer time horizon.

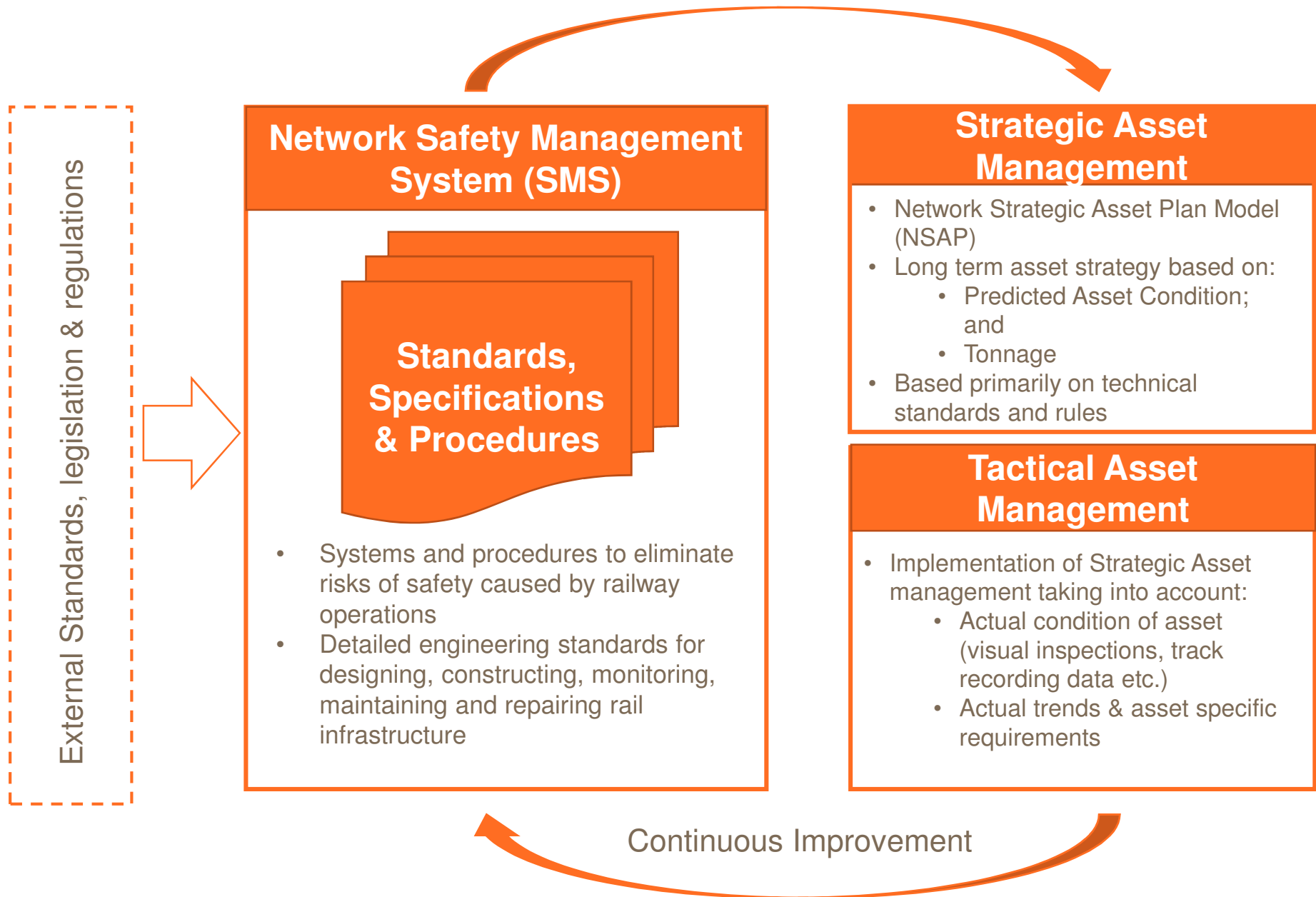


Efficient total cost of ownership (TCO) is managed through the asset life cycle

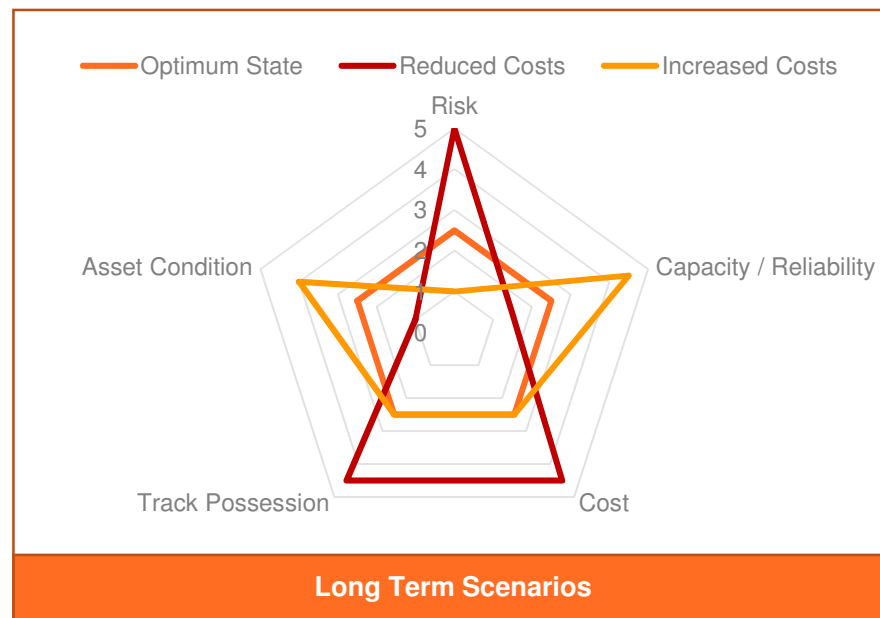
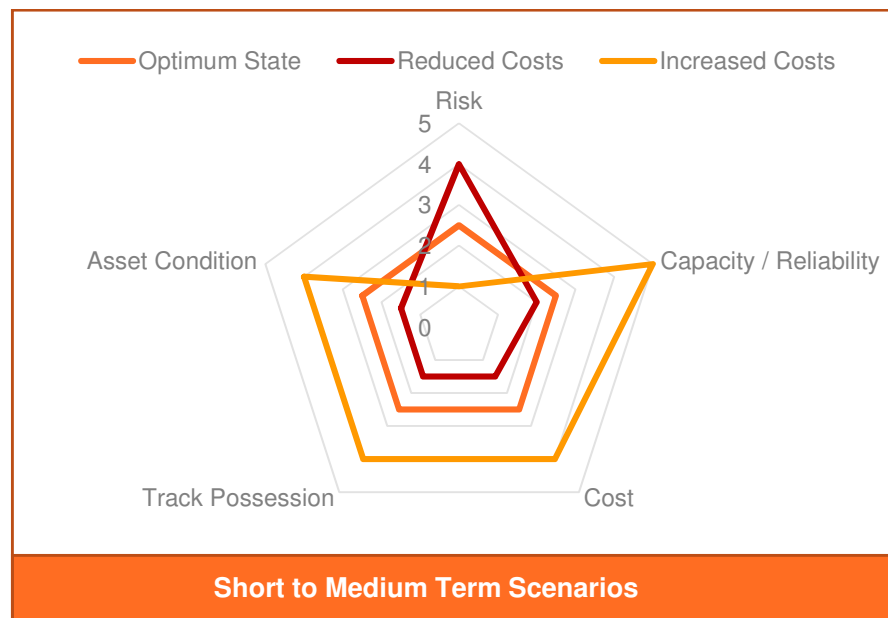


- Asset management philosophy optimizes the life of network infrastructure for the lowest whole of life cost
- Operations phase is longest period in asset life cycle, representing 94% of total cost
- Decisions made in standards, design and construction have a tangible impact on the longevity of the below rail assets during the operation period
- Network Assets acts as the asset custodian for the full life cycle with the aim of providing a safe, available and consistent below rail asset

External requirements are the foundation of the Asset Maintenance Scope



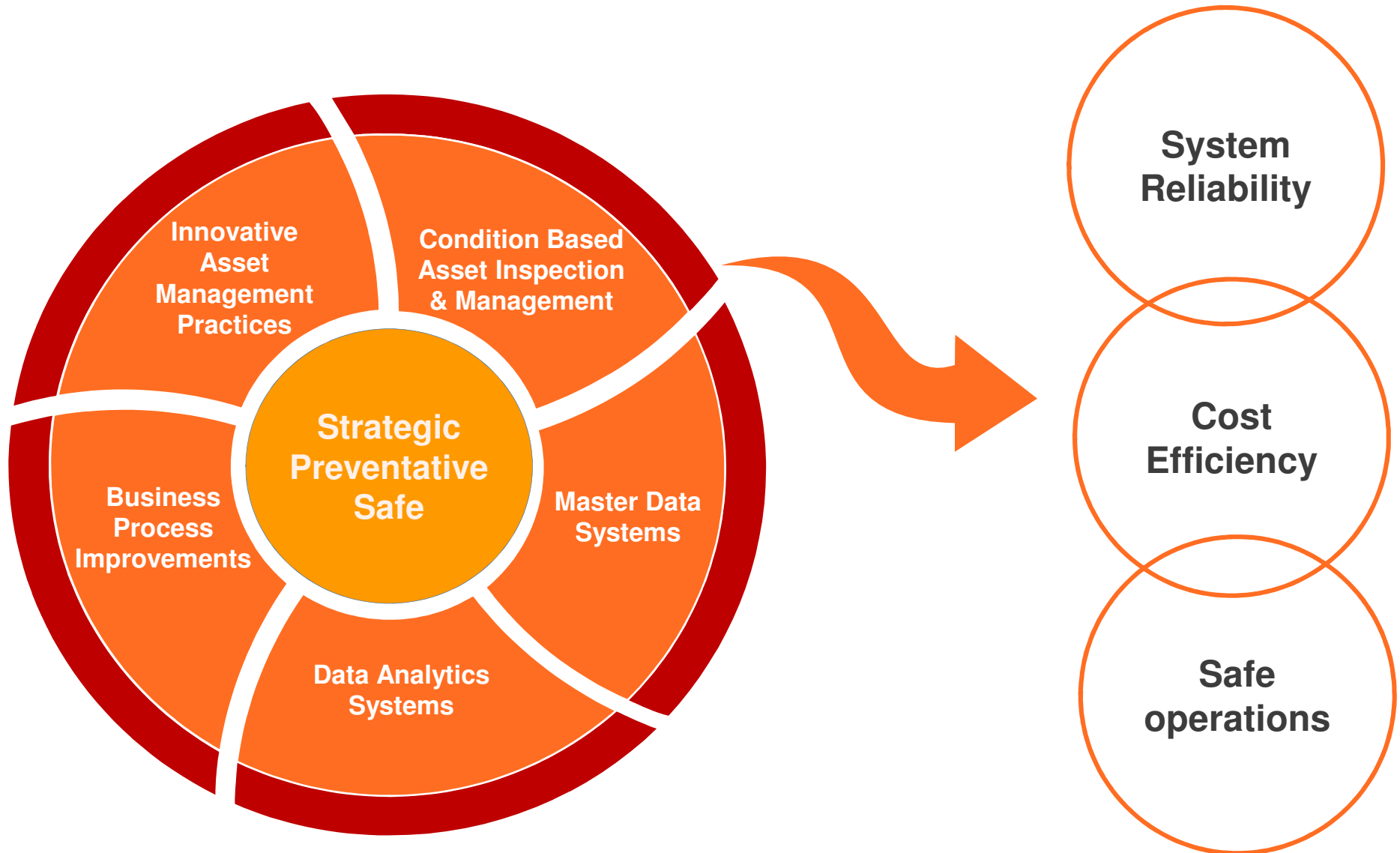
Efficient Asset Management requires a balance



Asset Management requires balancing:

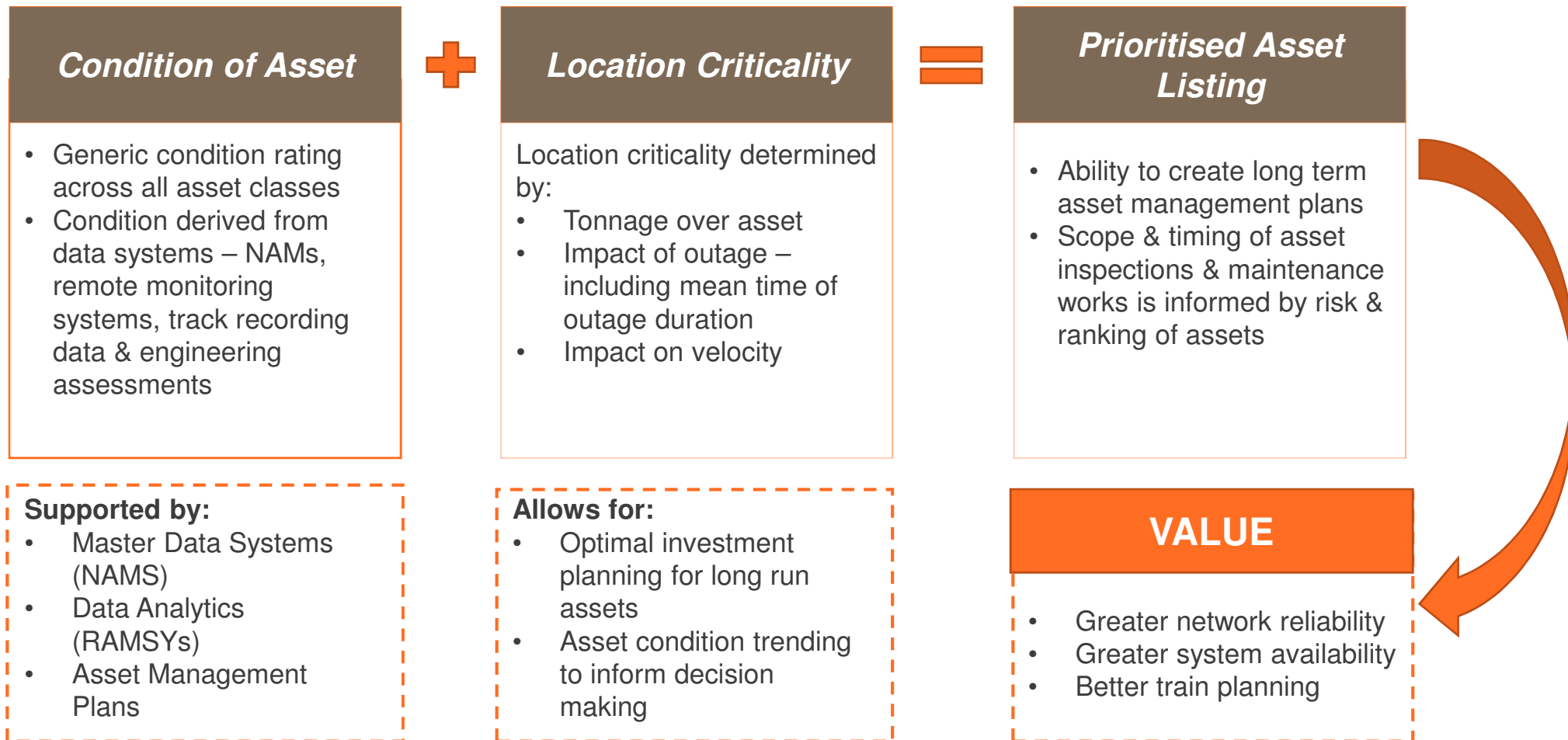
- **Costs** of the works
- **Reliability** of the asset and resulting capacity available to the supply chain
- The amount of **track possessions** required to conduct the works and resulting impact to system availability
- The amount of **risk** if the maintenance or renewal activities are not undertaken
- The long term **asset condition** which is impacted by the balance between preventative versus corrective maintenance

How are we achieving this balance?





Condition & Criticality Based Asset Management





Master Data & Analytics systems are critical to long term strategic asset management

Network Asset Management system (NAMS)

- End to end asset management tool. It provides a single source of comprehensive asset data.
- Uses a world proven SAP solution that is integrated with asset management activities in field to ensure information is current and accurate.
- Provides timely and accurate information and reporting to asset managers for planning and decision making.

BENEFITS

- Better informed whole of life asset management and decision making
- Track asset conditions over time allowing trend analysis
- Planning maintenance so we are doing the right job at the right time, at the right place for the right reason
- Aids condition based asset management – reducing reactive maintenance and risks of derailment and improving network reliability

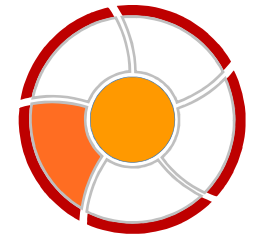
Decision Support Tools

Data analytics tool that allows for captured data to inform asset condition and performance trend. Data sources include:

- Ground Penetrating Radar (GPR) runs
- Rail ultrasonic data
- Track car runs – track geometry
- NAMS data – inspections, work history, existing asset condition

BENEFITS

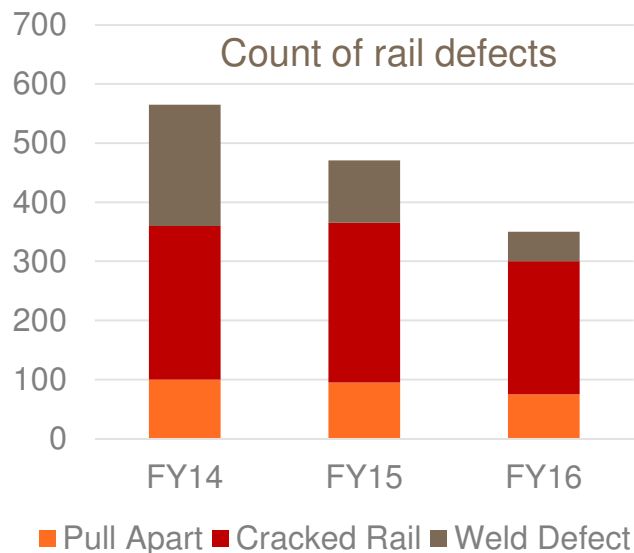
- Consistent & data based decision making
- Trend analysis to inform scope and future maintenance practices
- Best asset condition information to inform investment decisions and maintenance interventions



Business Process Improvements increase asset resilience and reduce unplanned maintenance

Improved rail welding processes, additional training and inspection + new technology (Rail Ultrasonic testing) allowing early detection of defects not capable of detection via visual inspections has resulted in:

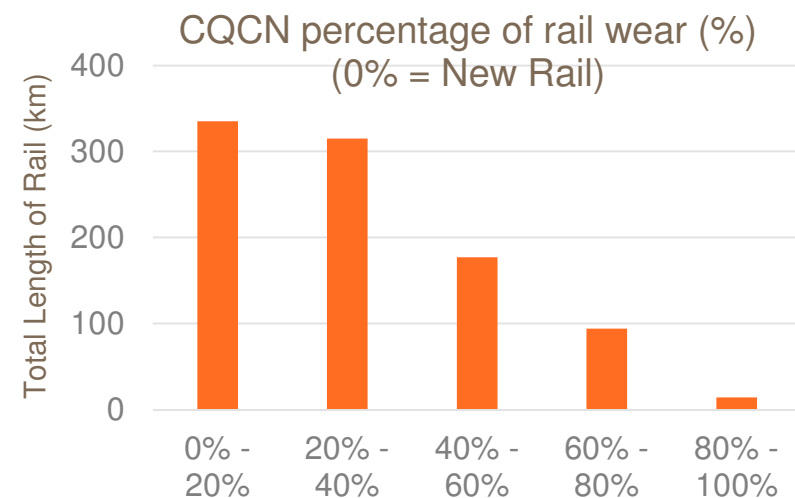
85% reduction in defective rail welds
21% reduction in cracked rails



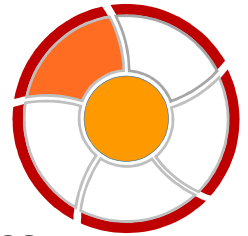
Increased focus on rail renewal to ensure replacement is done ahead of failure and prior to exceeding acceptable rail wear limits.

Rail wear limits are set out in Aurizon's SMS and consistent with other heavy haul railways.

Managing rail wear in this way avoids lumpy capital spend in future years.



Innovation embedded as BAU asset management practice



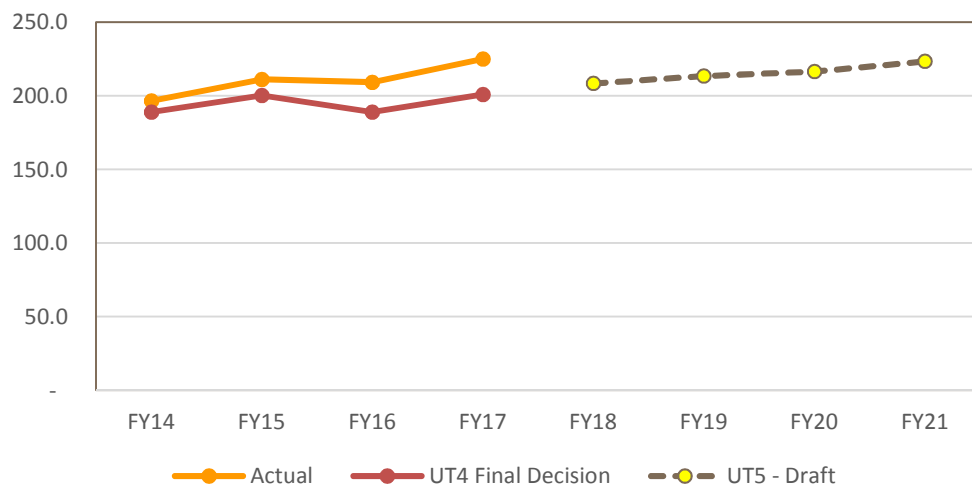
Innovative asset management practices have allowed AN to **extend asset lives, reduce closure times & reduce renewal and maintenance costs**

Project				
	<p>Resin Based Culvert Solution</p>	<p>Unmanned Aerial Vehicle</p>	<p>Ballastless Track Slab</p>	<p>192 hr Scheduled Patrol Inspections</p>
Traditional Approach	<p>Full replacement, requiring a closure and breaking track</p>	<p>Visual inspection using a cherry picker. Time consuming and has capacity impacts.</p>	<p>Ballast required renewal every 2 years in extended of the network closure</p>	<p>96 hour Scheduled Patrol Inspections of the network</p>
Benefits	<ul style="list-style-type: none"> • Lower cost of renewal – 30% cheaper (\$280k versus \$400k) • Does not require full replacement • Does not require track closures 	<ul style="list-style-type: none"> • More inspections in less time without closures – greater system reliability • Increased scope of inspections (infrared inspections) • Superior asset condition data – allowing more informed decision making 	<ul style="list-style-type: none"> • Requires minimal ongoing maintenance • Reduce maintenance & capital costs • Does not require a 2 day closure to replace fouled ballast 	<ul style="list-style-type: none"> • Increased system availability • Safety benefit – Personnel spend less time in DANGER ZONE

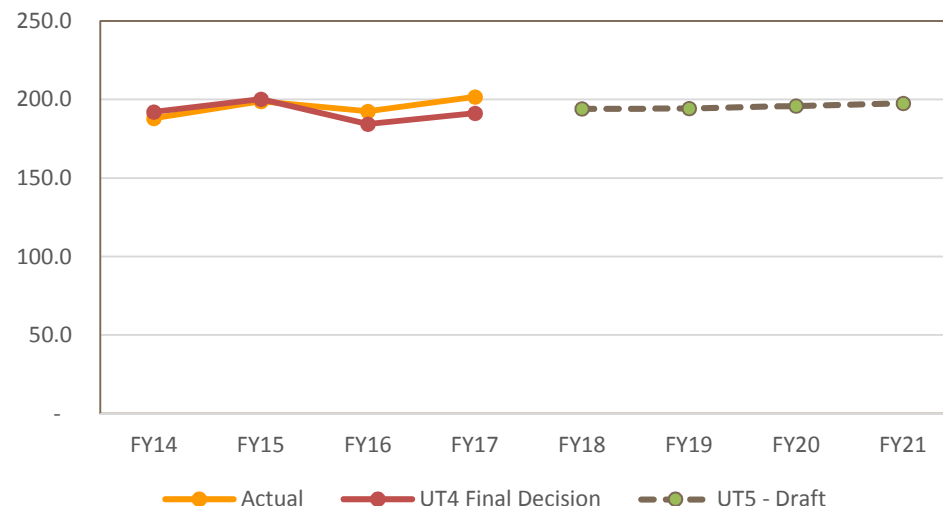
UT5 Maintenance Allowance

UT5 proposes a 14% increase in maintenance costs, relative to the UT4 final decision

Direct Maintenance Costs (Nominal \$ million)



Direct Maintenance Costs (Real, FY15 \$million)

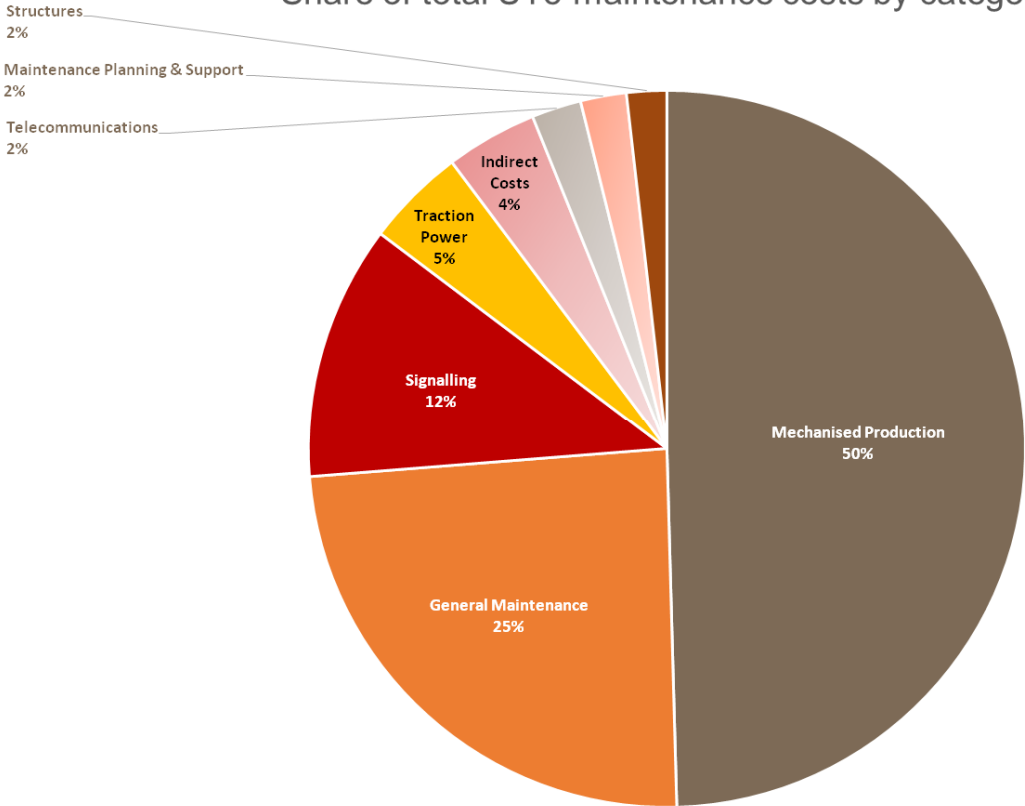


- Total proposed maintenance cost of \$921 million over the UT5 regulatory period
- In real terms, UT5 maintenance costs are 2% higher (on average) than the FY17 costs approved by the QCA in the UT4 Final Decision (FD)
- UT4 FD has provided a significant challenge to Aurizon Network given differential between actual and expected costs
- Timing of UT4 FD (April 2016) meant that Aurizon Network incurred \$18.6m in maintenance costs in FY16 that will not be recovered

NB: change of 19% between regulatory periods, net of UT4 allowance for rail renewal activities.

Scope of maintenance ensures we are able to meet safety obligations and includes initiatives for performance improvement

Share of total UT5 maintenance costs by category



- Methodology fundamentally aligned to UT4 proposal
- Scope reflects legislative and regulatory obligations as CQCN Rail Infrastructure Manager and historical observations.
- Key factors determining the cost movements are:
 - Inflationary impacts;
 - Increase in scope due to ageing asset profile and greater quantum of RAB infrastructure;
 - Recovery of costs associated with Aurizon Network’s investment in high production mechanised fleet; and
 - Rail grinding reflective of competitive market rates.
- Unit rates aligned to UT4 final decision, escalated at MCI.

19% increase vs UT4 allowance; 12% higher in real terms.



Ballast Undercutting

SCOPE	FY18	FY19	FY20	FY21
Mainline (km)	140	140	149	149
Turnouts (no.)	42	42	42	42

UT5 proposal (\$m)	FY18	FY19	FY20	FY21	TOTAL
Mechanised Ballast Undercutting	64.5	67.2	70.8	73.6	276.0

Key Commentary:

- 140km scope has been set on the basis of Network’s UT4 proposal which is consistent with the QCA’s UT4 Ballast consultant findings
- GPR runs scheduled in November to allow Assets to review current scope.
- FY20 and FY21 scope will be revised following further GPR runs.

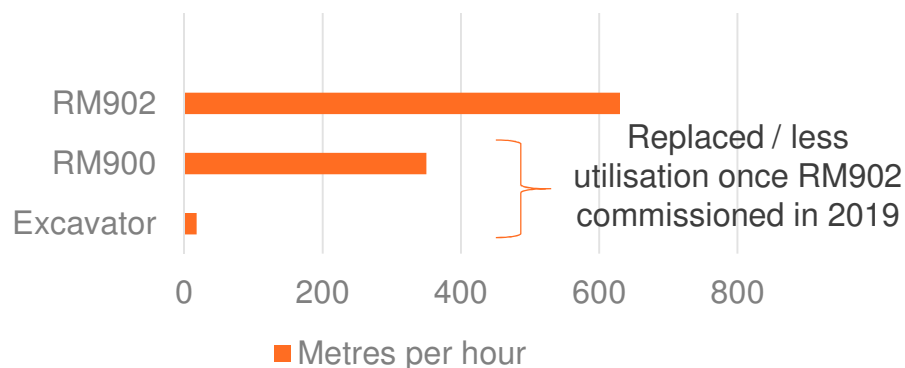
The \$400k / KM Challenge

- QCA UT4 FD cost cap on Ballast - \$400k per km of ballast does not include:
 - Pre-works inspections
 - Rail stress testing
 - Level of access time available to conduct work
 - Performance variances between BCM and track excavator

What this means:

- Increased track access to:
 - Maximise production time and minimise mobilisation costs
 - Increase utilisation of BCM and reduce use of track excavator

Comparison – Ballast Cleaning Machine Production Rates



Ballast Cleaning Production Rates



Excavator with Cutter Bar
10 - 18 metres per hour



RM74 – contract machine from external supplier
90 - 180 metres per hour



RM900 current Ballast Cleaner
220 - 350 metres per hour (650m³ – 870m³)



RM902 planned for delivery in 2017 to replace
RM900
400 - 630 metres per hour (900m³ – 1400m³)

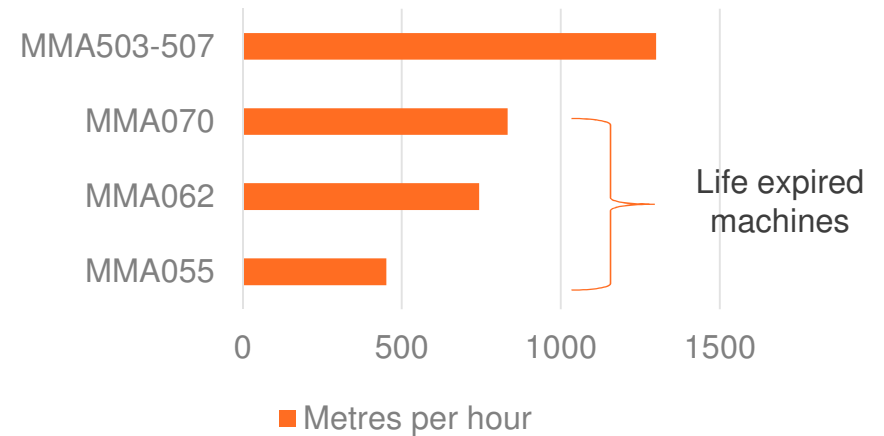


Resurfacing

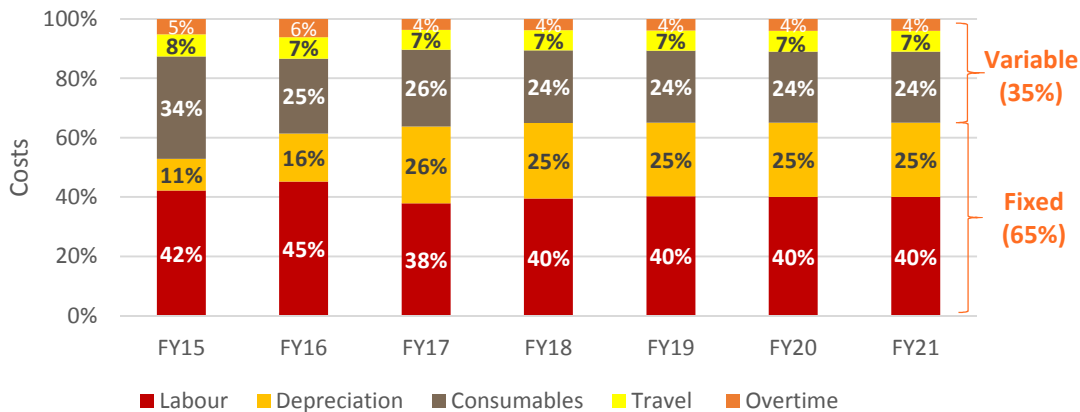
SCOPE	FY18	FY19	FY20	FY21
Mainline incl Stoneblowing (km)	1,868	1,891	1,909	1,926
Turnouts (no.)	375	380	384	387

UT5 proposal (\$m)	FY18	FY19	FY20	FY21	TOTAL
Resurfacing	24.5	25.5	26.4	27.0	103.4

Comparison - Tamping Machines Production Rates



Resurfacing Costs – Fixed versus Variable



- 8 new machines replacing life expired assets are being commissioned in UT5 period resulting in increased depreciation expense during the UT5 period
- Variable component primarily relates to overtime, fuel, demobilisation and mobilisation costs
- The opportunity to reduce costs is by increasing track access and delivering more scope in singular access windows

Tamping Machines Production Rates



MMA055 Harsco Mk111
451 metres per hour



MMA062 Harsco CART
743 metres per hour

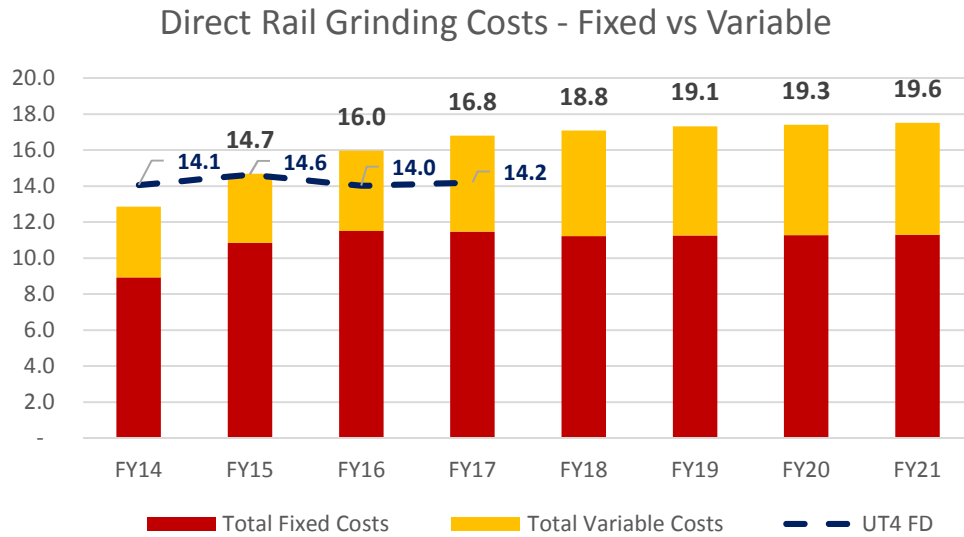


MMA070 Plasser CAT Single Head
833 metres per hour



MMA503 – MMA507 Plasser CAT 2X Dynamic
1300 metres per hour

Rail Grinding



SCOPE	FY18	FY19	FY20	FY21
Mainline (km)	4,139	4,139	4,139	4,140
Turnouts (no.)	748	757	781	782

UT5 proposal (\$m)	FY18	FY19	FY20	FY21	TOTAL
Rail Grinding	18.8	19.1	19.3	19.6	76.8

Key Commentary:

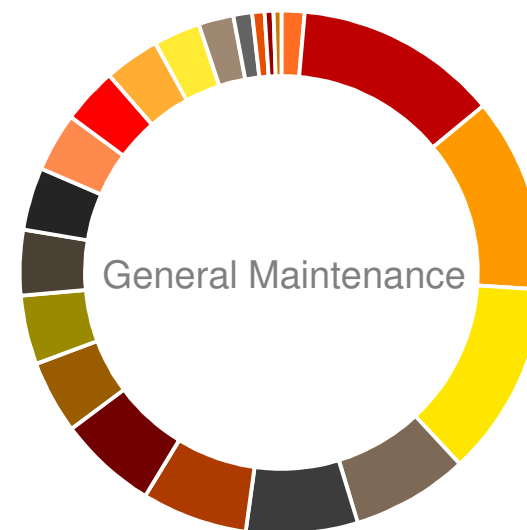
- Fixed versus variable costs are split 65:35 – UT4 FD assumed 100% variable and reduced in line with the tonnage profile. UT4 FD allowance is not sustainable over the UT5 period.
- Aurizon Network has already implemented “double shifting” to meet the increase in scope, conducting 2 x 12 hour shifts of grinding. NB: This is not done in all circumstances to avoid accelerated wear (and increased maintenance costs) on machines.

Non-mechanised maintenance activities

UT5 proposal (\$m)	FY18	FY19	FY20	FY21	TOTAL
Structures	4.5	3.9	4.0	4.2	16.6
Signalling and Telecommunications	30.8	31.3	31.9	32.6	126.6
Electric Traction Systems	10.2	10.3	10.4	10.5	41.4
General Maintenance	54.3	55.2	56.1	57.1	222.7
TOTAL	99.7	100.7	102.5	104.4	407.3

Key Commentary:

- Reactive activities, such as vegetation control, are heavily dependent on external factors (i.e. amount of wet weather)
- Forecast scope and costs of reactive activities are based on historical observations



- GPR Costs
- Rail Repair
- Maintenance Ballast
- Turnout Maintenance
- Track Geometry Recording
- Sleeper Management
- Track CleanUp
- Rail Flaw Detection - On Track Vehicle
- Rail Joint Management
- Monument/Signage Maintenance
- Minor Yard Maintenance
- Track Inspections
- Fire & Vegetation Management
- Rail Stress Adjustment
- Rail Lubrication
- Level crossing maintenance
- Top & Line Spot Resurfacing
- Culvert Cleaning
- Earthworks - Non Formation
- Rail Flaw Detection - Manual
- Fencing

Continued focus on operating improvement

- Focus on continuous improvement and cost efficiency has led to a number of innovations which can be performed under live train operations.
- In addition to initiatives like NAMS and innovative asset management practices, Aurizon Network has also improved cost management through several initiatives.

Education & Accountability:

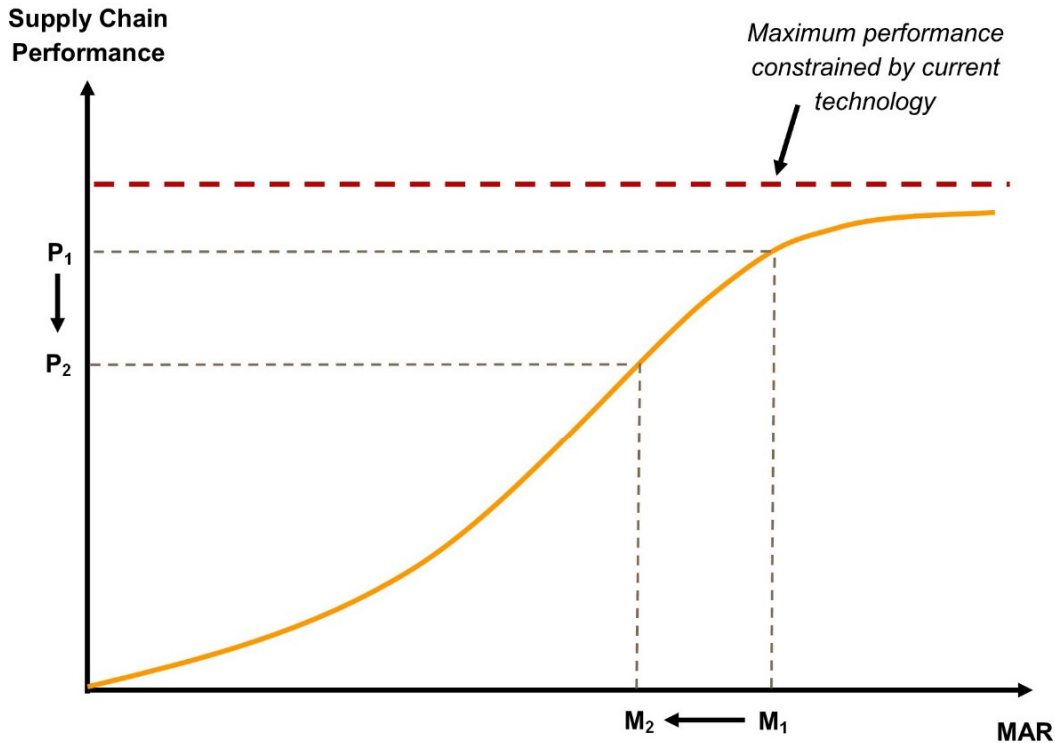
- Education of engineers and maintainers of cost drivers and how to drive efficiency. Building a culture of continuous improvement.
- Budget accountability pushed down to Superintendents and Principal Engineers

Managing Costs:

- Restructured various areas of the Network business. Changing the mix of internal versus flexible external contract services
- Driving down inventory holdings by more than 25% over the last two years
- Review of major supplier contracts to drive more value
- Reducing the pay of specialist workers who benefitted in the boom time from higher wages for increased demand in the market.
- Optimising our fleet based on plant utilisation and operating costs



A reduction in the maintenance allowance will see a reduction in operational performance



M_1 = MAR reflects efficient costs and return commensurate with commercial and regulatory risks

M_2 = MAR below efficient costs

[Redacted text]

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If MAR is set too low, AN will still meet core safety and contractual obligations, but cost-out will ultimately affect supply chain performance.

CASE STUDY: Callemondah

A rail defect on no. 4 Arrival Road needs repair. The low labour solution is to temp plug (4hrs) with final works next day (8hrs).

To prioritise throughput, Aurizon Network chooses “high” labour solution, resulting in a 3.5 then 2.5 hour close, saving 6 closure hours. This avoids c.17 cancellations, at ~150k tonnes of coal (worth ~ \$45m/\$15m at current met/thermal coal prices).



Low returns impact incentives to maintain and improve network performance

No capex beyond minimum to sustain current volumes

Increased risk of asset failure prior to replacement:

- At present we seek to replace as close to life expiry as present, using an asset criticality/matrix to prioritise renewals.
- Our approach is already conservative, for example, in November a feeder station failed, 4 months prior to its planned replacement.
- Fix on fail is not only more expensive, but results in greater network outages. For example in March 2015, a rail defect in Goonyella identified during an inspection required urgent repair: this resulted in over 24 hours of unplanned delays

Future backlog of deferred capex impacting future capacity

- Aurizon Network has recently ramped up rail replacements because modelling demonstrated that if the rate was not increased, it would have been unable to meet the resulting future renewal requirements – without investment now, these requirements would have spiked in future years making it practically impossible to replace expired assets from an asset availability, resourcing, cost and capital planning perspective.
- Critical maintenance and renewal backlogs result in extreme safety issues: the UK Network Rail Hatfield crash, which killed 4, was due to rail defect, resulting from a cumulative backlog of work. The rail had been identified for repair 21 months prior but not addressed.

Limited investment in technology and innovation

Low returns impact incentive and ability to invest in network performance enhancing technologies and innovations (other than straight cost out measures).

Examples of recent projects that may not have proceeded in a low return environment include:

- PACE – software developed by Aurizon Network with the University of Newcastle which enables it to optimise track access planning for maintenance. Led to overall reduction in planned closure hours from 1360 to 878 (btw FY14 and FY17)
- Project Himalaya - [REDACTED] modernisation of end of life mechanised plant. Delivers higher productivity and reduces track access times.
- Resin based culvert solutions – limits need for full replacement. Substantially reduces track closures and reduces renewal costs/
- Ballastless Track Slab – for critical network points. Removes closure requirements enhancing network productivity.
- Robotic welding technology – currently under assessment. Potential to materially reduce closure over-runs and increase rail weld reliability, reducing closure hours, enhancing performance to plan and network reliability.

Questions?

